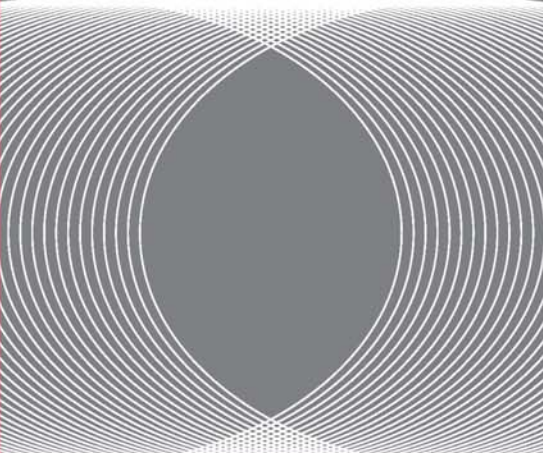


TIME TO PASS THE BATON



Disaster Risk Reduction
from the Perspective
of Environmental
Management, Land Use
Management, Finance
and Public Investment

Edited by:
Juan Pablo Sarmiento

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María Cad, Omar Darío Cardona,
Nelly Gray de Cerdán, Manuel Felipe Olivera,
Silvia Quiroga, Fernando Ramírez,
Lucas Rodríguez, Diana Rubiano,
Juan Pablo Sarmiento, Lucy Vileikis.

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FROM THE AMERICAN PEOPLE

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on an original translation by Charles Swett.

DISCLAIMER: The views expressed in this publication do not necessarily reflect the views of the U.S. Agency for International Development or the United States Government.

IN MEMORY OF PAUL C. BELL, JR.

It is an honor to dedicate this publication to the memory of Paul C. Bell, Jr., a pioneer in the area of disaster risk management. Few people have left such a clear fingerprint not only in the region to which he dedicated his life, the Latin America and Caribbean (LAC) region, but in other regions worldwide that he influenced, thanks to his enthusiasm, passion, professionalism, and humanitarian character.

Paul began his professional life as a missionary, then continued his work in the U.S. Peace Corps, the Inter-American Foundation, the U.S. Department of State Bureau of Refugee Programs, the U.N. Disaster Relief Office, and finally, he dedicated more than 20 years to the U.S. Agency for International Development's Office of U.S. Foreign Disaster Assistance (USAID/OFDA) as a Senior Regional Advisor based in Costa Rica.

Paul was the driving force behind two particularly important accomplishments for disaster risk management in the region: the LAC region training program implemented in the late 1980s, and the hemispheric conference on disaster risk reduction in 2001, two years before he passed away.

The challenge of reducing risk and responding to disasters persists. How can disaster risk reduction be linked to the response and transition phases of humanitarian work? At the same time, how can we influence key stakeholders in the development arena to embrace risk reduction as a decisive contribution to the sustainability of their valuable endeavors?

I hope this book provides some answers and food for thought as we continue to work together to save lives, alleviate human suffering, and reduce the social and economic impact of disasters.

Ky Luu
Director
Office of U.S. Foreign Disaster Assistance
United States Agency for International Development

BLANCA

PROLOGUE

The U.S. Agency for International Development's Office of U.S. Foreign Disaster Assistance (USAID/OFDA), part of the Agency's Bureau for Democracy, Conflict and Humanitarian Assistance (DCHA), has been working continuously in Latin America and the Caribbean for more than 20 years. Its labor in response to emergency situations, as well as its training and technical assistance, has been well received and recognized throughout the region.

Conscious of the scientific and technical advances in matters of risk and disaster generated in recent years, the regional office of USAID/OFDA has decided to move forward on issues of risk management. To date, the program's evolution has produced two landmark accomplishments in this area: (1) the hemispheric December 2001 conference on risk reduction, and (2) the identification, in 2005, of a series of central issues linked to risk reduction that will allow for strategic planning and the establishment of medium and long-range priorities. USAID/OFDA has also backed a variety of initiatives in the field of disaster risk reduction with agencies from the United Nations, the Caribbean Development Bank, and the Organization of American States, to mention a few.

To approach these new challenges in a systematic manner, USAID/OFDA and the International Resources Group (IRG), the company that implements USAID/OFDA's technical assistance program in Latin America and the Caribbean (IRG/OFDALAC program), designed a strategy that would help to explore possible areas for intervention in the near future. Two years have passed, in which IRG/OFDALAC has promoted the integration of "communities of practice" designed to reduce disaster risk in areas such as environmental management, land use management, finances and public investment, and education. These communities of practice identified the need to generate a series of documents that will allow the establishment of state-of-the-art instruments in the various areas, as well as a compilation of the tools and instruments that are available.

It is with great pride and pleasure that USAID/OFDA supports the publication of the works of distinguished and recognized experts in critical areas of the development of countries throughout the region. We hope that this document becomes a reference tool for universities, professional groups, public offices, cooperation organizations, governments and non-governmental organizations (NGOs) as well as independent professionals.

Tim Callaghan

Senior Regional Advisor

Regional Office for Latin America and the Caribbean
Office of U.S. Foreign Disaster Assistance

United States Agency for International Development

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*THE CHALLENGE OF RISK MANAGEMENT AS A
STRATEGY OF MULTISECTORAL AND PARTICIPATIVE
INTERVENTION AT THE SERVICE OF DEVELOPMENT*

Prepared by:

JUAN PABLO SARMIENTO PRIETO

JUAN PABLO SARMIENTO PRIETO

Medical doctor and surgeon graduated from the University of the Rosario, with studies in Disaster Management at Oxford, Great Britain, High Level Public Administration from the Colombian Superior School of Public Administration; a specialization in Education from the University of the Sabana, Colombia; a residence in Nutrition at Tufts University in the United States and a master's degree in Project Administration from the University for International Cooperation (UCI), Costa Rica. He has held the posts of Chief of Health Services for Colombia's Civil Defense, Shift Manager of Emergency Services at the Colombian Central Military Hospital, Coordinator of the Health Ministry's Disaster Program, National Aid Director for the Colombian Red Cross and professor of the Health and Social Security Administration master's programs of the Faculty of Economic and Administrative Sciences of the Pontificia Universidad Javeriana. On the international level, he has worked as a consultant for the Pan American Health Organization (PAHO) and member of United Nations Disaster Assessment and Coordination (UNDAC) teams; currently he is the Technical Manager of the regional risk management program that the International Resources Group (IRG) is implementing in Latin American and the Caribbean for the U.S. Agency for International Development's Office of U.S. Foreign Disaster Assistance (USAID/OFDA).

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The Challenge of Risk Management as a Strategy of Multisectoral and Participative Intervention at the Service of Development¹

PRESENTATION

Conscious of the profound changes that have taken place in recent years in the way society has dealt with the subject of risks and disasters, the regional USAID/OFDA office decided to guide the subject in the direction of risk management. The traditional approach has involved acting in response to the consequences of natural and socio-natural events as well as those influenced by human activities. This is a process known as *disaster management*. This approach has now evolved into a process focused on anticipating the consequences, identifying and characterizing all types of hazards, determining the factors associated with conditions of vulnerability, and creating probable risk scenarios under a multihazard approach. This approach now enables risk management to design processes of intervention, aimed at *modifying* the risk conditions, a focus known as *disaster risk management*. But progress does not end there. This risk management, initially centered on a “**corrective**” or “**compensatory**” approximation, in which, according to the Lavell proposal, *the action is concentrated on intervention in existing vulnerabilities and in cases where it is possible to act on identified hazards*. Today, it is considered imperative to go beyond this compensatory focus and evolve into a “**prospective**” approach to risk management. This latest approach is now oriented toward structurally modifying the patterns of development. In this way we seek to have new settlements, expansions of existing ones and, generally speaking, all public investment, incorporate the elements of risk management needed to ensure the safety and sustainability of these future developments.

This document is based on actions within the compensatory as well as the prospective dimensions, breaking away from the traditional treatment of the subject of disaster risk management and especially that of risk reduction in the Americas, thereby transcending the conventional focus. It is now time to pass the baton to the people who must carry the instrumentation and implementation of disaster risk management forward, from what has, up till now, been a mere exercise in conceptualization, with isolated practice sessions to demonstrate the benefits of their adoption, to a concrete contribution to the sustainability of the region’s development.

The U.S. Agency for International Development’s Office of U.S. Foreign Disaster Assistance (USAID/OFDA), part of the Agency’s Bureau for Democracy, Conflict and Humanitarian Assistance (DCHA), through its regional office for Latin America and the Caribbean, has promoted a series of forums in the region to generate a debate on risk reduction from the perspective of environmental management, land use management, finance and public investment, oriented toward the strategic axes that make it possible to incorporate a positive and effective contribution to sustainability in the design of the region’s development.

These forums also served to lay the foundations for the creation and start up of “communities of practice” that became a venue for debate, reflection, exchange of experiences and information as well as a place to proactively propose the creation of guidelines for future endeavors.

¹ Based on the document presented to the Discussion Workshop about Environmental Management, Land Use Management and Risk Reduction, Buenos Aires, November 2005.

For practical purposes, we adopted the concept of *community of practice*, originated by Seely Brown J. & Solomon Gray E.:

“At the simplest level, a community of practice is a small group of people... who have worked together for some time. They are not a team, they are not a task force, they are not even necessarily an identifiable or authorized group... They are equals in the performance of ‘real work.’ What keeps them together is a common sense of purpose and a real need to know what their counterparts know.”

These communities, in their initial state, discussed matters of identification and characterization of methodologies, techniques and the tools available to them; they explored the inventory of processes for systematization and process validation. In their desire to continue along this road they came up with a proposal to develop thematic documents that would serve as a reference for people within the communities of practice, among neighboring communities, academic circles, government agencies and civil society, interested in broaching the subject of risk management. This document compiles three different, yet complementary, approaches, under the title **“Time to Pass the Baton: Disaster Risk Reduction from the Perspective of Environmental Management, Land Use Management, Finance and Public Investment.”**

Much remains to be done to consolidate and maintain these communities of practice: identifying key actors, interest groups and future candidates to join them, defining channels of communication and creating permanent communication with other communities of practice.

INTRODUCTION

For centuries, humans have worked with the concept of risk, as recorded by Cardona,² from the times of Ancient Barcelona (3200 B.C.) through Mesopotamia and a couple of centuries after; the Hammurabi Code in 1950 B.C., Greece in 750 B.C. until the Roman Empire.

It is with the fall of that Empire that we lose the records on practices designed to manage risk, only to have them reappear centuries later around A.D. 1000 when Italian navigators and later the Spanish and English included them, as a common practice, in the area of trade and commerce.

The need for anticipation and action before the possible effects of socionatural phenomena and those generated by humans was handled for centuries under a scheme of common sense, traditional wisdom, and trial and error. Applying the concept of probabilities to natural phenomena is first recorded around the middle of the 20th century.

So-called risk management is a fairly recent concept, whose systematic actions are focused on having better knowledge of the variables that intervene, in order to determine the intensity and extension of the impact that disasters might cause. This knowledge has been transferred from the technical and scientific to the social and political fields, and eventually to the community. Awareness of the existence of these conditions that favor the occurrence of adverse events and disasters has led to the need for designing and implementing mechanisms that can intervene in the causes, eliminating them or at least modifying them in order to prevent or mitigate their effects.

Risk management allowed for the real application of the concept of risk scenarios, and acceptable and accepted risk, the implications of which have generated a whole new reality. The deterministic elements employed by technicians begin to give way to the stochastic, which necessarily breaks away from the short-term view and obliges us to consider the long-term under different levels of uncertainty.

Risk management should be considered a strategy rather than a discipline, as it is the result of an interdisciplinary and multisectoral pattern of behavior. Risk management is not an activity for the exclusive use of institutions, but rather an activity, or even a *value* or *principle*, of and for society.

2 Cardona, O.D., Holistic Estimate of Seismic Risk using Complex Dynamic Systems. Barcelona, 2001.

THE RISK MANAGEMENT ENVIRONMENT

Risk management, understood as the set of elements, measures and tools used to alter the conditions of vulnerability, or act on threats (whenever possible), or both, is meant to reduce or mitigate existing risks. Risk management is an alternative that emerged to break the vicious circle that disaster management had fallen into.

We can definitely state that risk management is *the component of the social system that is made up of an efficient planning, organizing, direction and control process, which is designed to analyze and reduce risk, handle adverse events and assist in recovery after they have occurred.*

Several authors have concluded that the risk itself is the fundamental problem and that the disaster is a derived problem. Risk and risk factors have become the fundamental notions and concepts in the study and practice involved with the question of disasters. This transformation in the paradigmatic roots of the problem has gone hand in hand with an increasing emphasis on the relationship of risks and disasters, with the processes and planning for development, and as a consequence, with environmental factors and the sustainable or unsustainable nature of development. Risks and disasters are now visualized among the components of the development scenario, rather than autonomous conditions generated by forces outside of society.³

What was known, until a few years ago, as the disaster cycle, with its phases and stages, gave way to a new, more dynamic and proactive concept called risk management, made up of areas and components that thrive in a symbiotic relationship and that do not necessarily conform to a time sequence. The following section contains parts of a conceptualization document on risk management that was discussed on the Latin American and Caribbean level in December 2001.⁴

Areas and Components

Risk Analysis – A study of hazards and vulnerabilities.

Risk Reduction and Transfer – Prevention, mitigation, financing, and transfer of risks.

Adverse Event Management – Preparation, alarm and response.

Recovery – Rehabilitation and reconstruction.

Risk Analysis⁵

Risk analysis has progressed from being an isolated function to becoming an essential area in risk management, making it possible, under the systematic use of available information, to determine the probability that certain adverse events will occur, as well as the magnitude of their possible consequences.

Among the most relevant activities are:

- Identifying the nature, extension, intensity and magnitude of the hazard.
- Determining the existence and degree of vulnerability.
- Identifying the available measures and resources.
- Constructing probable risk scenarios.
- Developing a multihazard focus.
- Determining acceptable levels of risk, as well as cost/benefit considerations, of possible measures intended to avoid or reduce that risk.
- Setting priorities regarding timing and movement of resources.
- Designing effective and appropriate administrative systems to implement and control these processes.

As we can deduce from the above, the data generated from risk analysis are fundamental to all of the rest of the components of risk management.

3 Cardona, O.D., idem.

4 Hemispheric Conference on Risk Reduction, San Jose, Costa Rica, December 2001.

5 *Where Do We Come From and Where Are We Going? A Perspective of 30 Years on the Subject of Disasters in the Americas*, Bell, Paul C.; Sarmiento, Juan Pablo; Olson, Richard S. draft, August 2002.

Risk Reduction

This is the latest area to be included in risk management; therefore, its conceptualization is still evolving. The activities carried out in this area are aimed at eliminating or reducing the risk, in a clear and explicit effort to avoid the occurrence of disasters. Progress in the area of risk reduction has been important, although subject to limitations. The actions have always been considered costly, and perhaps one of the greatest problems faced is that of “sectoral exclusion” (compartmental focus) with which they have been handled. Risk, then, has been conceived in its fragmented rather than its integral form, according to the vision of the particular discipline involved in evaluating it. This situation has varied in its epistemological and methodological aspects. Unfortunately, this dispersion of efforts has been a hindrance to the task of the decision-makers, who require an integral, cross-sector and multidisciplinary approach to risk reduction.

Most of the organizations that have worked in this area have been educational institutions or those dedicated to research, as is the case of universities, geological and hydro-meteorological institutes, non-governmental organizations (NGOs), foundations and others, which have had the economic support of development financing and funds from friendly governments and multilateral or bilateral agencies.

This area has seen a recent increase in the participation of multilateral banks. They have come to recognize the economic, political, environmental and social effects of disasters on the development of the region’s countries and have begun a process of adjustment to include aspects of risk reduction in their development funding and financing policies.

The question of disasters has come to be recognized as a broader and more complex issue. We have come to a point where risk reduction can no longer be left in the hands of a few myopic specialists. It is for this reason that the subject must be approached in a proactive and integral manner. The old saying that “response is the solution” is no longer valid. This new paradigm requires that risk reduction be considered a matter that demands the integral participation of the entire society. To the extent that the efforts made in this area are able to

help different sectors define and put their strategies into practice, these efforts will be an important contribution to the coherent and consistent management of risk, of preparation and response, as well as recovery, and will positively affect the region’s development.

Two main components stand out in this area:

- **Prevention:** A set of actions whose objective is to **prevent** or **deter** natural, socio-natural or man-made occurrences from causing adverse events by, for example, preventing subjects’ exposure to the hazard. It is difficult to achieve measures that completely neutralize a given risk, especially if it originates from a natural hazard, such as a hurricane, earthquake, volcanic eruption or tsunami. Generally, the measures of prevention are extremely costly and of limited viability, when analyzed in the context of the real situation. Examples of preventive measures include the permanent relocation of houses, production centers or infrastructure located in high hazard zones (landslides, floods, volcanic eruptions, etc.). Prevention, undoubtedly, now takes on a greater importance and acquires its utmost application in the process of future development. Some authors have called this approach a *prospective risk focus*. By way of illustration, we can mention how a change in land use management for new areas of expansion of a city constitutes a circumstance in which the concept of prevention may be included, as an additional variable, in the criteria for decision-making, with clear repercussions for the future.
- **Mitigation:** The results of intervention intended to **reduce** the risks. The idea is to implement activities that reduce the magnitude of the event, thereby achieving a maximum reduction of the damage it may cause. Some of the activities included in this intervention strategy include the construction of engineering works to minimize or attenuate the impact, the elabora-

tion of management standards for natural resources and the confection of construction codes. Mitigation actions are usually oriented toward an existing risk, for which the actions would be, to a certain extent, reparative or, as they have come to be called, *corrective* or *compensatory*.

A third component, **Risk Transfer**, has gradually come to be recognized. This comprises the activities or instruments intended to reduce economic losses generated by an event to a minimum, or eliminate them altogether. It is convenient to clarify that these mechanisms of risk transfer do not reduce the real vulnerability, and that they are frequently ineffective from the perspective of cost. Therefore, all of the efforts to reduce the vulnerability of the assets to be covered should be exercised prior to transferring the risk. Although we tend to use the generic term “*risk transfer*,” in reality the term comprises three distinct and complementary approaches: *risk retention*, *risk transfer* and *risk financing*. Instruments or mechanisms such as emergency/contingency funds, self-insurance, insurance policies available in the market, catastrophe bonds, contingency loans and others, make up part of the arsenal available to those seeking financial protection in both the public and private sector, at the individual and collective level.

Adverse Event Management

This is precisely where plans are laid out for optimum handling of the impact generated by events and their effects; it covers the performance of those actions necessary for timely response, such as evacuation, attention to the victims and reduction of property loss.

A decade ago, disaster activities were concentrated predominantly in this area. Disaster management has traditionally enjoyed political support at national levels, as well as that of diverse international organizations, which has made it possible to achieve an acceptable level of professionalism among first response organizations. The impressive technological evolution, over the past few years, has been of undoubted benefit to this component. There are many new advances in the development and implementation of plans, programs, and projects. Impor-

tant achievements have been made in the definition of guidelines, protocols and procedures, as well as in the design of simulation and drill exercises. However, while some disciplines and organizations have made significant progress, others have fallen far behind.

In other areas, parallel to this evolution, there has been a notable increase and accumulation of vulnerability factors, a situation far from being attended to by those focused on disaster management. Added to this are the huge losses caused by disasters that have created the need for new loans to cover the processes of reconstruction, thereby worsening the already fragile financial situation of affected countries.

Disaster management works in conjunction with risk reduction, so that through risk reduction, disasters are mitigated to a point where they are within range of response capabilities, thereby reducing the losses occasioned by these adverse events. We should not let disasters turn into catastrophes. They can become simple emergencies. By doing this, we would be much closer to making their effects compatible with existing response capabilities. Following this train of thought; in the face of disaster, the better we have prepared ourselves in these two areas (risk reduction and disaster management) the fewer losses of lives, goods and services we will suffer, and therefore, the fewer resources we will have to invest in recovery, and the sooner we will have reestablished the living conditions of the affected population.

This area of disaster management considers three components:

- **Preparation:** A set of measures and actions applied to reduce the loss of human lives and other damages to a minimum, organizing the response and rehabilitation phases in a timely and effective manner. This can be illustrated through activities such as the elaboration of search-and-rescue plans, pre-established mechanisms for bringing aid and assistance to victims; as well as the formulation of contingency or procedural plans, according to the nature of the risk and its degree of affectation. Some examples of instruments used in this activity are: an inventory of physical, human and financial resources, monitoring and vigilance

over dangerous phenomena, training personnel for attending to emergencies and the definition of evacuation routes and work zones.

In some cases this includes the **Alert** as part of the preparation, while in other cases it will be considered independent. Alert is understood to mean the status declared for the purpose of taking specific precautions, owing to the probable and proximate occurrence of an adverse event. It not only informs of the imminence of disaster, but also establishes the actions that both the institutions and the population should carry out. It is important to take into consideration that a timely alert greatly depends on the velocity of the event's evolution, since there are slowly developing events (tropical storms, droughts, etc.), as well as those that appear suddenly (tornados, landslides, etc.); so it is not always possible to establish these alert status classifications. Remote sensors, tidal sensors, networks of rain gauges and records, satellite systems, etc. are examples of instruments used in this component.

- **Response:** Actions carried out, in case of an adverse event, with the aim of saving lives, reducing suffering and reducing losses. Here, immediate reaction is needed to provide timely attention to a population that has suffered a severe change in its pattern of life, brought on by the emergency. Actions such as search and rescue of affected persons, medical assistance, damage assessment, temporary shelter and the distribution of food and clothing are examples of typical response activities.

Recovery

Finally, the area designated “recovery” is where the process of re-establishing the normal living conditions of a community affected by an adverse event is initiated. This area covers two major aspects: the first involves the short-term re-establishment of temporary indispensable basic services, and the second progresses toward

a permanent long-term solution, where the goal is to return to the normal living conditions of the affected communities.

Much of the criticism concerning the management of recovery is directed at certain practices, where the infrastructure and affected processes are reconstructed without taking the risk variable into consideration. This tendency to “reconstruct the vulnerability” creates a new risk scenario. The lack of citizen participation in the reconstruction process is another frequently criticized aspect. Yet another important point has to do with the entities that take on the management of the recovery process. There is a wide range of experiences, whose options differ notably from country to country. The range goes from ad-hoc commissions, which take charge of coordinating efforts with the ministries in charge of the different sectors, (public works, agriculture, animal husbandry, housing, energy, telecommunications, etc.) to autonomous organizations that are formed with the occurrence of a disaster to independently manage the jobs of rehabilitation and reconstruction.⁶

Regardless of the differences, in terms of the future needs for the design of integral reconstruction and transformation plans, it is clear that these plans must incorporate civil society as well as the private sector into both the planning and the execution phases.

Based on recent experiences, the tendency has been to promote the establishment and adoption of certain orienting principles, to be put into practice during reconstruction, without failing to recognize that each situation deserves its own particular analysis, a faithful verification of existing conditions, idiosyncrasies, and the abilities and potential of the affected populations. It is absolutely vital to continue systematizing these experiences.

Within this area, two components are clearly identified:

- **Rehabilitation:** Short-term recovery of basic services and initiating the repair of physical, social and economic damages. This is where the gradual recovery of services affected by the event is initiated, as well as

6 Segura, N., 1995.

the rehabilitation of the damaged zone. The re-establishment of services is achieved through temporary or provisional measures that do not necessarily constitute a definitive reparation of the affected system; instead, what is sought is simply to renew the service as quickly as possible.

- **Reconstruction:** The process of medium and long-range reparation of the physical, social and economic damage, at a level of development superior to what it was before the event. It is precisely within this component that the greatest opportunities to improve on the level of development, prior to the disaster, are generated. Therefore, the measures are managed at the medium and long-range to achieve objectives, such as the creation of new jobs, the repair of material damages and the incorporation and adoption of preventive and mitigating measures.

Recovery presents a window of opportunity for improving on the level of development prior to the disaster, and includes the incorporation and adoption of preventive and mitigating measures.

As explained above, there is a close inter-relationship between the four areas – risk analysis, risk reduction, disaster management and recovery – therefore, the implementation of any of these factors has an effect on the others and on the overall process of a population's development. The process of socioeconomic development is intimately and reciprocally connected to each of the areas and components. This explains how development can have a decisive influence on risk management, creating conditions that are propitious to intervention in the reduction of risk, or, to the contrary, may generate worse conditions that lead to greater vulnerability and thereby end up increasing the risk. On the other hand, the development process itself may become compromised when existing risk conditions turn into disaster situations.

RISK MANAGEMENT AND DEVELOPMENT

From a plethora of definitions of *development* we have chosen to apply the one used in the USAID/OFDA Training and Technical Assistance Program for Latin America: “Development is the accumulated and durable increase in the quantity and quality of goods, services and resources of a community, united with social changes that tend to improve the security and quality of human life, without compromising the resources of future generations.”

This definition contains elements compatible with the concept of sustainable development:⁷ “Sustainable development is understood to mean development leading to economic growth, the elevation of the quality of life and social well-being, without depleting the base of renewable natural resources on which that economic growth relies, nor deteriorating the environment or the right of future generations to use those resources for their own needs.” This focus enables us “... to satisfy the needs of the present generation without compromising the ability of future generations to satisfy their own needs.”⁸ Resource utilization is rational, preserving its existence and its capacity for renewal.

There can be no doubt about the cause-and-effect relationship between disasters and social and economic development. Development programs are beginning to include the risk variable, either for detecting whether these programs reduce the probability of an event's occurrence or reduce its effects; or because these development programs increase the probability of the event's occurrence or create adverse effects. In both circumstances, the study of the effects that these events might cause is now included in many of today's community development programs.⁹

According to the recognition by the Habitat II Commission for Human Settlements, in its sessions of May 1995,¹⁰ “sustainable development” should be based on three inter-related pillars: the environment, the economy and society.

7 Law 99 of 1993, *The National Environmental System*, Republic of Colombia, 1993.

8 Margarita Marino de Botero, founder of the Verde de Villa School in Leiva-Colombia. A personal letter.

9 **Sarmiento, J.P.** Risk Mitigation, Environmental Management and Sustainable Development: A Public Policy, Center for Environmental Studies for Regional Development, Autonomous University Corporation of the West, **October 1996**.

10 Habitat II, *Commission for Human Settlements*, May 1995.

This premise implies that sustainable development goes beyond environmental protection and enters into aspects of economic development, with an equitable characteristic regarding access to the same opportunities by all people, without compromising the load capacity of the world.

Sustainable environment management may contribute to reducing the number of disasters and, as a collateral benefit, the measures used to diminish the effects of these disasters are good for the environment.¹¹

In spite of the achievements in this approach to the issue, there has not been much progress in improving the urban environment. Factors like flood plains and river banks prone to landslides and movements being used for the construction of housing, frequently low-quality housing, are the consequences of the existing reality in many Latin American cities that can be summarized as follows:

- An absence of development plans,
- A lack of land use policies,
- Deficiency in the application of regulatory standards on construction,
- Problems of access to appropriate housing solutions,
- Dissociation of the variables of housing and employment opportunities.

The consequence of these factors is a clear increase in vulnerability, a fact that, in its maximum manifestation, can itself become a hazard, a vulnerability, and a risk.

According to Luc Vrolijk and Elina Palm, in their publication "The Reduction of Disasters, Urbanization and the Environment,"¹² there is not the slightest doubt that degradation of the environment increases the intensity of disasters generated by natural or socio-natural hazards. A solid environmental management program would contribute to the reduction of disasters of this

type; for this it is necessary to study the fundamental points of the environment-development relationship. The opportunities for risk reduction that study the causes and determining environmental factors that worsen risk situations of natural origin, may, in many cases, serve to reduce the effects of destructive events and to carry out more sustainable management of the environment.

In spite of this, the analysis should not be limited to the environment-development association to define the determining factors of potential disaster circumstances. It is convenient to analyze the other situation: the short-term and long-term effects that natural or man-made events generate in the environment, whose results will, undoubtedly, be reflected in the development of the affected community.

In the discussion on the status of risk reduction, held in Manizales, Colombia,¹³ it was concluded that, "Risk management is an essential and integral component of sustainable human development, within the framework of a universal agenda that seeks to increase the well-being of the majority. Although this was the proposal in Cartagena and Yokohama, sadly, in practice, there is a firmly rooted conceptual and operational segregation between the policies of development and risk management. In order to overcome this artificial separation, it is necessary to guarantee that risk management be recognized and incorporated, as an essential element, in the practice of development. The achievement of the Millennium Development Objectives (MDO) will be possible only with an effective articulation of risk management within the function and practice of development."

A couple of months later, during the meeting in Hyogo,¹⁴ the following mention was made: "...We are convinced that disasters significantly and suddenly negate many of the results of investments in development, and therefore continue to be an important obstacle to sustainable development and to the eradication of poverty. We are well aware that investments in development that do not

11 Olavi Elo, *Disasters and the Environment*. Stop Disasters. Number 27.1/1996.

12 Luc Vrolijk and Elina Palm, *The Reduction of Disasters, Urbanization and the Environment*, DHA Geneva 1996.

13 Inter-American Conference on Disaster Risk Reduction, *Reflections and Proposals for Improving the Effectiveness of Management*, November 17, 18 and 19, Manizales, Colombia.

14 Report of the World Conference on Disaster Reduction, Kobe, Hyogo (Japan), January 18 to 22, 2005.

duly take disaster risk into account are apt to increase vulnerability. Therefore, one of the most important challenges faced by today's international community is to bolster the capacity to face disasters and mitigate their effects, for the purpose of making the sustainable development of nations possible."

In this same Hyogo declaration, mention is made of other declarations, such as that of the World Summit on Sustainable Development, celebrated in Johannesburg in 2002, which requested: "The application (regarding vulnerability to disasters and the evaluation of risks and disaster management) of an integrated, inclusive focus; one that considers multiple threats and that covers activities of prevention, mitigation, preparation, response, and recovery, essential for the world to be safer in the 21st century." Within the framework of the Hyogo Action for 2005-2015, reference is made to the "Increase in resilience¹⁵ of nations and communities in the face of disaster, with a predictable result; their strategic objectives and priorities of action, as well as the strategies of application and applicable follow-up measures, as constituting an orienting framework for reducing the effects of disasters in the coming decade." It also concluded "...sustainable development, the reduction of poverty, good government and the reduction of disaster risks are objectives that mutually reinforce themselves." The first objective states: "The most effective integration is to consider disaster risk as part of the policies, plans, and sustainable development programs at all levels. Special emphasis should be placed on the prevention and mitigation of disasters, the preparation of disaster scenarios and the reduction of vulnerability." Finally, it includes a statement of shared responsibility of the government in promoting risk management: "We affirm that it is principally the duty of the state to protect its population and its assets within its territories before existing threats and, consequently, it is essential that the state give high priority to disaster risk reduction within its national policy. This

should include an adjustment of the capacities and the resources it has available. We agree that it is especially necessary to strengthen community's capacity to reduce the risk of disasters at a local level, estimating that the adoption of adequate measures for disaster reduction, at this level, will allow communities and individual citizens to considerably reduce their own vulnerability to these dangers. Disasters continue to represent an important hazard to the survival, dignity, means of livelihood, and the security of the people and their communities, especially the poorest. It is therefore urgent that the capacity of developing countries prone to disasters be improved. This is especially true in the case of the least advanced and smallest of the developing island states, which need to increase their risk management capacities in order to reduce the effects of disasters by multiplying their national efforts and intensifying bilateral, regional, and international cooperation, especially through technical and financial assistance."

Concomitant with the subject of risk management and development is the matter of governance. As mentioned in the Manizales meeting of 2004, "...an effective risk management requires conditions of governance that allow for and promote the designation of responsibilities and implementation, an inalienable obligation of compliance and absolute transparency in risk management policies. Consequently, a broad based, democratic participation of the civil society, represented by its legitimized organizations, is necessary from a perspective of social empowerment and decentralized management. Furthermore, the private sector should be appealed to for its participation in reducing disaster risks, by the creation of incentives for strengthening its social and environmental responsibility."

We therefore conclude from the testimony of multiple declarations, proclamations, essays and many other types of documents, that their authors all coincide in the need to relate development to risk management.

15 The United Nations defines resilience as "the capacity of a system, community or society, potentially exposed to threats to adapt itself, resisting or changing, in order to reach or maintain an acceptable level in its functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity to learn from past disasters, in order to better project itself into the future and improve its measures of risk reduction."

INTERDISCIPLINARY VISION

Risk management, even when it applies, as explained, to an area of recent study, has been the constant object of change and revision, which is not unusual in a matter of such dynamic and permanent evolution. This explains how an eminently single-hazard vision has seen the convenience of migrating toward a multiple-hazard approach. This greater complexity is compensated by the integral nature that it takes on when dealing with different conditions of risk within a single political, economic and social reality, thereby allowing for the identification of generalities and particularities, common and divergent areas, and interest groups with differing needs and expectations. In few words, integral risk management includes a systemic vision, coherency in policies and decisions and rationality in the use of resources.

Considering everything expressed up till now, it seems redundant to affirm the need to approach this complex matter of risk management from the multidisciplinary, interdisciplinary and ideally, transdisciplinary point of view.

A **multidisciplinary focus** comprises a way of approaching a process concentrated on the treatment of one or several issues from the perspective or view of one discipline, yet including the contents or contributions of the others.¹⁶ According to Piaget, this constitutes the lowest level of integration.

An **interdisciplinary focus** means that two or more disciplines or forms of knowledge are combined or coordinated at the conceptual level to see their inter-relationships and/or to explain an object or problem.¹⁷

A **transdisciplinary focus** deals not with a single discipline, but rather a field of knowledge. This focus allows for the interaction of different dis-

ciplines to develop a common perspective, while conserving the riches and power of their respective areas of knowledge.¹⁸

The complexity and interdependence of topics that fall under the so-called risk management heading demand an equally complex approach. Some of the most relevant include development, economic development, culture, poverty, vulnerability, environment, risk, resilience, urbanization, marginalization, land use politics, governance, and democracy, to mention but a few.

Although it is undeniable that leadership in risk management matters requires disciplines such as engineering in its multiple facets, geography, economy and public health, the contribution of the sciences, such as geology, vulcanology, meteorology and hydrology, are of undeniable value. Still other disciplines such as sociology, anthropology, health and political sciences and many others make a potentially enormous contribution to this interdisciplinary approach.

When mentioning interdisciplinary and transdisciplinary approaches, we cannot fail to consider two, in particular, that mark clear tendencies in the changing world situation: the sectoral and territorial aspects. Sectoral factors are understood to mean the interaction of institutional groups, recognized for their representation in areas of economic and social development, health, education, transportation, housing, the environment, and similar considerations. Territorial considerations refer to the political-administrative organization, from the centralized level, through the organizations on the communal base, including the intermediate structures of different denominations, such as regions, provinces, states or departments, or units indistinctly referred to as local mayoral or parochial districts.

Sectoral and territorial aspects interact and illustrate how a matrix of multiple inputs is able to generate multiple results. Risk management integrates this matrix as

¹⁶ Adapted from Quintana, Hilda, *Curricular Integration and Globalization*, Logopedic Space. www.espaciologopedico.com

¹⁷ Adapted from Klein, T.J. (1990). *Interdisciplinarity: History, Theory & Practice*. Detroit: Wayne State University Press, p. 196.

¹⁸ Lebel, Jean, *Health: An Ecosystemic Focus*, EnFoco - Alfaomega/IDRC 2005 - ISBN 1-55250-174-4

a transversal element, present in practically all situations, adding a related factor of complexity to the mix, but distributing the load among the components of the process.

THE GREAT CHALLENGES OF POPULATION EXPANSION FROM A PERSPECTIVE OF RISK MANAGEMENT

In spite of the numerous initiatives in the risk management field, there has been a notable increase in risk conditions. The only possible alternative lies in the incorporation of the risk concept into the daily routine of society. The alarm that a group of experts sounded in Manizales¹⁹ gave a concrete definition to this situation:

“New challenges for risk management are coming to light in areas of the overlapping processes of economic globalization, commercial aperture, international migrations and population dispersion resulting from armed conflicts and infrastructure mega projects, among other causes. The vicious circle of social exclusion is adding to the conditions of vulnerability among marginalized populations, adding strength to the risk factors in many countries throughout the region. The current rules that govern international economic relations and the new world economic order should be examined from a political, economic, social and environmental perspective of risk reduction.

Global environmental changes are further exacerbating existing hazards and setting new scenarios in most of the countries. These risk scenarios are derived from complex processes of environmental deterioration, unplanned urbanization and technological development with inadequate control measures. This situation demands a prospective management of risk that rewards

responsible investments in its prevention and mitigation, in the context of development and in the processes of post-disaster rehabilitation and reconstruction.

Faced with the prevalence of arguments suggesting that risk reduction is excessively costly from the cost-benefit perspective, it is important to remember that there are other, non-economic criteria that can and should be used to evaluate measures of prevention and mitigation. Poor populations will never be justifiably rehabilitated by a cost-benefit criterion, from an economic point of view. There are relevant approaches from the ethical and human rights perspectives that stimulate solidarity and mutual compensation among the different sectors of society. Therefore, the reduction of risks should be seen as a wise investment, not merely as a cost.

Risk management is an inherent and inevitable responsibility of the state. Risk, as well as the act of risk management, requires follow-up mechanisms that allow tendencies to be observed and compared, the identification of achievements and good practices, and the denunciation of negligence, corruption and practices that perpetuate risk conditions.

To follow up on risk and exercise risk management, it is necessary to develop systems of cross-check control and accountability through control mechanisms, systems of regulation and vigilance regarding the transparency of public management, as well as networks of governance that reinforce public risk management at the global, national and regional levels.”

Faced with the evidence of existing hazards and the near impossibility of making profound modification to society's present vulnerabilities, the concept of resilience takes on an ever-increasing importance, although it should be better understood and provided with the necessary instrumentation.

19 Inter-American Conference on Disaster Risk Reduction, *Reflections and proposal for improving management effectiveness*. November 17 - 19, 2004. Manizales, Colombia.

The challenge is in conceiving a true system, comprised of sub-systems and key elements for systematizing experiences, evolving and optimizing existing mechanisms based on criteria for de-concentrating, decentralizing and enhancing efficiency, where the acts seek to satisfy immediate needs, while implementing long-term solutions that would bolster the sustainability of development processes.

This demands the search for strategic partners, a permanent promotion activity and lots of persistence, in order to achieve awareness of the issue within society in general and among the political class in particular. It is vital to obtain its inclusion into the public agenda, its placement within the social structure, the definition of the necessary legal tools, the assignation of resources, and citizen participation, among many other related factors.



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*ARTICULATION OF ENVIRONMENTAL
MANAGEMENT AND RISK MANAGEMENT*

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Articulation of Environmental Management and Risk Management

I INTRODUCTION

With the idea of bolstering the connections between environmental management and risk management in a practical manner, USAID/OFDA has sought to contribute to the creation of practical instruments on the basis of which a variety of organizations and governments can implement strategies for articulating these two management tools and reaping the results.

This document seeks to illustrate what environmental management is, what risk management is, how each has evolved and how the two working schemes can be articulated for the purpose of minimizing the damages produced by human activities or generated by natural phenomena.

Starting with a few retrospective elements concerning the relationship between humans and nature, we will review the concepts of risk and environmental management. It becomes obvious that, through inter-governmental treaties and commitments, there has been a worldwide effort to implement mechanisms for minimizing the damages to human populations and to the environment, from differing perspectives, although based on common elements.

Later we will analyze the instruments used in each model, and finally arrive at a proposal for articulation of the two types of management. In this way, we will provide the users of this document with a set of practical mechanisms to articulate environmental management with risk management.

The focus of this document is oriented toward local actors. This does not mean that national or regional levels of decision-makers do not have a role in carrying out environmental and risk management. For those levels of decision, several multilateral entities have developed sophisticated models of analysis and management, and they frequently turn to those entities precisely because of their own institutional and the population's lack of capacity for attending to risk situations, or for applying good environmental management practices.

We will also highlight the fact that there are indicators, with varying degrees of complexity, in both the management of risk and of the environment. It is also worth noting that managing these indicators frequently encounters difficulties, due to the fact that local authorities seldom take part in analysis or data generation.

All of this gives emphasis to the fact that it is precisely at this local level where drastic and lasting changes in the patterns of environmental and risk management will or will not be realized, since it is at this level that human beings suffer the effects of natural or man-induced damages.

Therefore, this document attempts to orient local efforts with the analysis that is presented and with the tools that are suggested, which, in any case, require national or regional participation to bolster their usefulness.

This does not mean that the national level lacks the competence or that it should cease to act when it is needed. It means that it should readjust its activities, in such a way as to strengthen ties with management at the local levels of public administration and civil participation.

2. A BRIEF RETROSPECTIVE

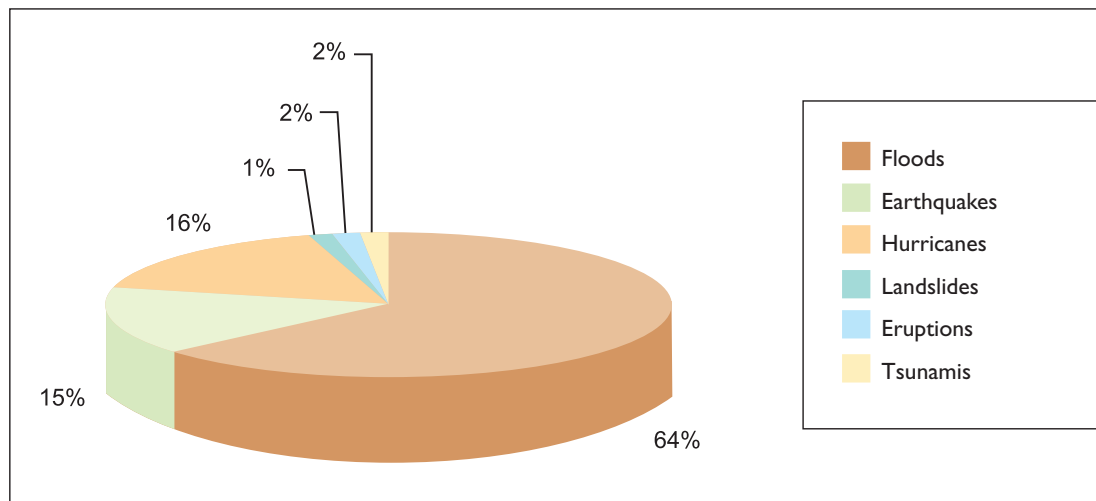
For centuries now, the "Western world" has had the idea that humans were given proprietary rights over everything that the environment has to offer on this planet, whose resources seemed to be inexhaustible, and that they were put there to be at humankind's exclusive beck and call. As we began to see famines, pandemics, and, more recently, a population explosion, it has become easier to visualize how the deterioration of the environment has effects, principally on people. Add to that the number of annual natural and technological disasters and we can get a good idea of how vulnerable our human existence really is.

Just to have an idea, it is generally accepted that natural catastrophes did away with the lives of millions of dominant species during part of the Earth's evolution,

and made it possible, thanks to the evolution of human capacities, for humans to become dominant, particularly over the last 10,000 years. In fact, the intense environmental changes that the planet underwent led to massive extinctions some 488 million years ago, 444, 360, 251, 200 million years ago and the most recent, 65 million years ago, when it is estimated that 50% of the world's species, including the dinosaurs, disappeared.¹

The human species has always coexisted with natural disasters. Over the last 10 centuries, more than 15 million people have died from a variety of catastrophes aside from war or the famine in Maoist China, which apparently killed more than 45 million inhabitants. The following graph shows the percentage of deaths generated by certain types of disasters.

Figure I. Natural Disasters: Deaths in the 10 Most Severe Events in Each Category



Source: Elaboration by author from several sources consulted on the Internet.²

Other hazards, falling into the public health category, have taken a huge number of lives. Pandemics such as the “black plague” in the mid 14th century produced 25 million deaths in Europe, Asia and Africa in six short years. The “Spanish flu” at the beginning of the 20th

century killed some 25 million people in six months, although it is estimated that twice that many died throughout the world, including 17 million in India alone, 500,000 in the United States and 200,000 in England. Other events have come and gone, some have been

¹ http://es.wikipedia.org/wiki/Extinci%C3%B3n_masiva

² http://en.wikipedia.org/wiki/List_of_deadliest_natural_disasters;
<http://www.nbc10.com/news/4030540/detail.html>;
<http://library.thinkquest.org/C003603/english/avalanches/tenworst.shtml>;
<http://library.thinkquest.org/C003603/english/earthquakes/tenworst.shtml>;
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<http://library.thinkquest.org/C003603/english/tsunamis/tenworst.shtml>;
<http://library.thinkquest.org/C003603/english/volcanoes/tenworst.shtml>

controlled, such as cholera, although it persists today. The most recent threat, besides AIDS, is avian flu, with its apparent mutant origins in Vietnam, which is now in the process of spreading across Europe.³

Thanks to the advances in our knowledge of nature, with regards to the varying behaviors of different media, and thanks to the modern possibilities of transmitting information to and from anywhere on Earth, our awareness of our own humanity has evolved, leading to our rediscovery of ourselves as just another inhabitant of this planet and to understanding how our aggressions against the environment tend to have direct repercussions on our quality of life.

The current conditions of explosive population growth, technological progress, accelerated urbanization around the world, excessive exploitation of natural resources and environmental contamination, among other factors, have led to severe deterioration and maladjustments in a diverse array of ecosystems, and put the well-being of the humankind's existence on Earth in grave and imminent danger. Some of these conditions have made important contributions to the occurrence of natural disasters, and to the increase of their frequency and severity, for example, in the case of disasters related to floods. Historically, floods have played an important role in the dynamics of river basins. The elimination of vegetative covering has changed the behavior of the stream flow of no small number of waterways, especially the torrential ones.

The subject of disasters, particularly those related to public health, has evolved since the end of the 19th century into the current institutional research and the development of actions seeking the control of epidemics or pandemics. More recently, and partially as a result of the absurd world wars of the 20th century, assistance became the *modus operandi* for handling disasters. By the 1980s, disasters began to be viewed from an integral perspective, based not only on the concepts of risk, hazard and vulnerability, but also on those of disaster prevention and response.

So, given the fact that disasters tend to produce greater adverse effects on more socioeconomically vulnerable populations, the continuing tendency is to approach most disasters through responsive reactions based on human assistance, where there is a prevalence of preparation for rapid response intended to help the communities, as far as possible, to return to at least minimal conditions of existence. This orientation tends to undermine the environmental causes that, when they are controllable and are not taken care of, can generate recurrent episodes affecting the population.

On the other hand, handling environmental problems took a new direction and important surge of energy during the 1960s. The approach took on a sectoral orientation accompanied by the necessary jurisdictional and institutional developments, which now exist in practically every country in the world.

The initial environmental norms were essentially based on public health, oriented toward pollution control "at the top of the smokestack." Public health criteria became the focal point of environmental management throughout the world.

Different inter-governmental encounters changed the direction of environmental management and agreed to insert political concepts and priorities into this management scheme to progressively detain environmental deterioration.

The concerns of human pressure on the environment led to the realization of studies and subsequently inter-governmental meetings to generate actions for reducing the causes of environmental deterioration. This initiated the elaboration of reports and the creation of discussion spaces for attacking this problem.

The year 1968 saw the emergence of a group denominated the "Rome Club," made up of scientists, researchers, and politicians who shared a growing concern about the environmental problem. In 1972, this group presented the

3 Olivera, M.F. 2005. Sustainability of Development and Risk Management. Document prepared for USAID/OFDA (IRG).

report “The Limits of Growth,” which concluded that if the tendencies of resource exploitation and demographic growth continued, the global system would overload and collapse around the year 2000. The importance of this work lies in its triggering numerous discussions that questioned and obliged us to review the prediction models being used, to generate more reliable environmental information, and to include the subject of the environment in the political debate.

One of the first actions oriented toward reducing the damages on the environment was the Convention on Wetlands, signed in Ramsar, Iran, in 1971. Later would come numerous thematic and global accords signed and ratified by governments, other accords were reached to deal with their management.

In 1972, the United Nations Conference on the Human Environment was held in Stockholm, becoming the first world level conference to expose the global environmental problem, where the principal environmental problems were recognized, and 26 inspiring political principles were proposed on environment and development in all of the countries of the region and of the world. One outcome of that meeting was the adoption of environmental-impact studies by the legislative branches of several countries, as an instrument of prior analysis of potential environmental problems for development projects and for their decision-making processes. This tool was later adopted by the multilateral banking system, as part of its policies and procedures for the analysis of credit applications.

The 1990s became the most prolific decade with regards to environmental matters, not only for the number of meetings held, accords signed, norms issued, and institutions created, but because the subject of the environment was carried to the highest political spheres, at a time when the private sector assumed an unprecedented leadership on the theme.

In June 1992, the United Nations Conference on Environment and Development, better known as the “Earth Summit,” was held in Rio de Janeiro, Brazil. In this confer-

ence, the participating countries agreed to adopt a focus that would protect the environment, while ensuring economic and social development. In this conference, 178 governments approved a variety of documents, among them the Program 21 (originally denominated the Agenda), the Rio Declaration on the Environment and Development, the Declaration of Principles on Forest Management, the Conventions on Climate Change, Biological Diversity, and Desertification.

Later, conventions were negotiated, such as those oriented toward the reduction of substances with a persistent impact on the environment, chemical weapons control, control over the flow of hazardous material across borders, among other instruments oriented toward reducing the sources of threats to the environment and to the communities.

At the same time, United Nations programs promoted the concept of “cleaner production” as a strategy to help companies minimize waste.

The Agenda 21 adopted in Rio de Janeiro established guidelines for environmental management to voluntarily commit the private sector. It emphasized strategies oriented toward increasing productive efficiency to bolster ecological efficiency – later denominated eco-efficiency – as a model for corporate development, a concept that embraces the criteria of economic growth, environment protection, and social well being,⁴ which are emphasized in the Agenda. The reduction of risks to health, well-being, assets, and the economy of the human population as a government commitment was also incorporated into Agenda 21, an initiative that was extended to include the reduction of technological risks related to productive activities.

In 2002, the World Summit on Sustainable Development was held in Johannesburg. In this summit no quick solutions were proposed for the current problems, however, participants achieved the establishment of certain goals, among which are found: increasing the coverage of basic health and sanitation services by the year 2015, producing and using by 2020 chemical products utilizing methods that have a minimum of significant negative effects

4 Schmidheiny, S. et al. 1992. (p 8-9 and ss).

on human health and the environment, maintaining or reestablishing expended fish populations, urgently and if possible by 2015, to levels that can provide maximum sustainable production, and by 2010, achieving an important reduction in the current rate of loss of biological diversity.

Together with these efforts in matters of environmental management, there has been a series of international meetings on reducing the negative effects of disasters.

The private sector took the initiative in the 1980s, adopting guidelines of good corporate practices, especially as a result of the accident in Bophal, India, in which, besides causing thousands of deaths and the contamination of a vast area, changed the future of the chemical industry, one of the most important and risk-ridden sectors in the world. This sector gave rise to the voluntary program denominated Responsible CARE.⁵ This voluntary program became a world example on how corporate management is capable of integrating good practices of environmental management, oriented not only toward compliance to norms, but toward the prevention of damage, through the prevention of disasters, based on the permanent and constant analysis of the sources of risks, and the reduction of those risks, in their productive processes and their work with the community, to which the corporations opened their doors and connected themselves to the management of emergency situations.

Based on the previous experience, and for the purpose of backing the corporate sectors, programs like APELL⁶ were born, with the backing of the United Nations Environmental Programme (UNEP) and oriented toward the prevention of corporate disasters, linking the neighboring populations to the management of risk situations.

In 1989, the General Assembly of the United Nations declared the International Decade for Natural Disaster Reduction (IDNDR) 1990-1999 for the general purpose of “reducing, through a concerted international action, especially in developing countries, the loss of lives, mate-

rial damages and social and economic upheavals caused by natural disasters such as earthquakes, high winds, tsunamis, floods, landslides, volcanic eruptions, fires, locust plagues, droughts and desertification, and other calamities of natural origin.”

In 1994, the Yokohama Strategy emerged in Japan, after following up on the progress of the goals proposed for the International Decade for Natural Disaster Reduction. One hundred and fifty-five countries participated in this exercise. This strategy established directives for the action of prevention, preparation, and mitigation of disaster risk, based on a group of principles that highlight the importance of risk evaluation, prevention of disasters and preparation, the capacity to prevent, reduce, and mitigate disasters and early warning.

In January 2005, the World Conference on Disaster Reduction was held in Kobe, Hyogo (Japan), denominated “Increase of Resilience of Nations and Communities in the Face of Disasters.” The conference constituted an exceptional opportunity to promote a strategic and systematic approach to vulnerability reduction, reduction of hazards, and the risks they carry.

In spite of the evolution of environmental and disaster prevention themes through numerous international efforts, there is still a need to clearly and concisely establish the relationship that exists between these two areas and the mechanisms that can be integrated in the countries to implement strategies for systematic and sustainable solutions.

3. SOME DISASTERS AND THEIR RELATIONSHIP TO ENVIRONMENTAL DEGRADATION

The history of disasters, or catastrophes, is by far older than the very existence of humankind. Events that have changed living conditions have taken place all through recent geological history, from the extinction of the dinosaurs 65 million years ago, to more recent and

5 Community Awareness and Emergency Response.

6 Awareness and Preparedness for Emergencies at Local Level.

irreversible events like Bhopal in 1984, Chernobyl in 1986 or Indonesia at the end of 2004.

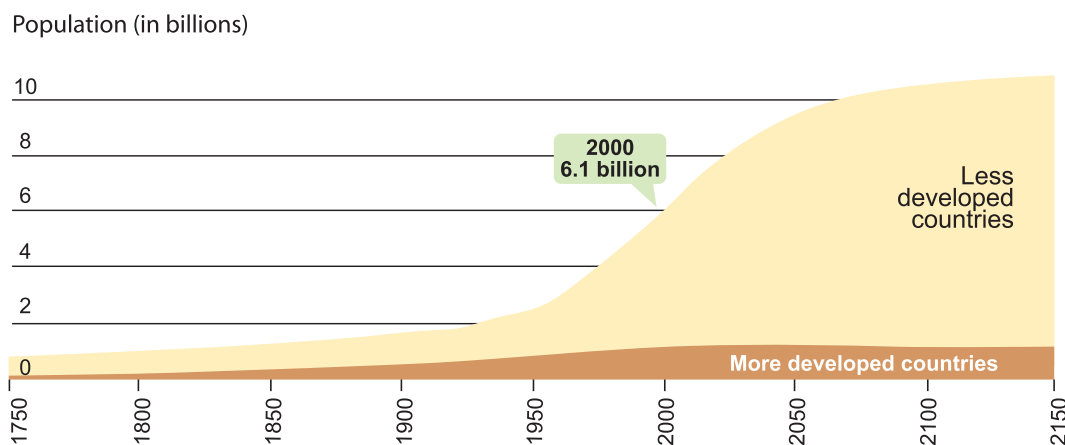
There appears to be a certain correlation between the changes that humankind has made in the environment and a certain type of disaster. The modification of the environment has been continual over the last 4.5 billion years,⁷ and has taken on a special vigor under the influence of humankind during the last 10,000 of those years. By 8,000 years ago, most of the vegetation of the Mediterranean had been modified; 4,000 years ago saw massive deforestation begin in China; 550 years ago the European forests gave way to cultivated crops, and over 100 years ago the North American forests had been transformed into “amber waves of grain”(UNESCO-MAB 1985); a few thousand years ago tropical forests covered 15.5 million km² (12% of the planet’s surface), of which there remains around 6.8 million km² (5.3% of the terrestrial surface of the Earth⁸).

As we saw earlier, floods are the most frequent and the most victim-producing of all disastrous events. At the same time, the year 2006 was one of the driest ever recorded for the Amazon River and for the Iguazu Falls.

In recorded history of warm and cold years, the 2005-2006 period appears to be unbeatable.

What is even more important seems to be that disasters, over time, have increased their noxious effects on the population, the infrastructure and the environment. This reality is partially due to the fact that the population has increased substantially. The world’s population grew from 731 million in 1950 to 3.15 billion in 2005, multiplying itself by more than four times over this short period. Over the same time period, the initial urban population represented 29% of the world’s total and has grown to almost 50% at present, representing more than 70% in several developed countries and some developing countries. The census bureau of the United States estimates that 450 million people now inhabit the world’s 85 largest urban areas. It calculates that those areas occupy 50,600 square kilometers – the equivalent of six lakes the size of Lake Titicaca. Some of the most densely populated cities are found in coastal areas, others are in zones with high seismic activity, and yet others are on the flood-prone banks of great rivers. And the population keeps growing, with projections as shown in the following illustration.

Figure 2. Growth of Human Population, 1750-2150



Source: United Nations, *World Population Prospects, The 1998 Revision*; and estimates of the **Population Reference Bureau**, Internet: http://www.prb.org/Content/NavigationMenu/PRB/Educators/Human_Population/Population_Growth/Population_Growth.htm

7 Olivera, M.F. 2006. El DAMA or the Importance of the City. (Memories of the Seminar on Environmental Management). (University Externado of Colombia. En prensa).

8 <http://rainforests.mongabay.com/0101.htm>, Tropical Rainforests of the World.

By the look of things, it would seem that natural hazards, possibly worsened, possibly not, by the way humankind has handled the natural environment, as well as the population's exposure to those hazards, will continue to grow.

This relationship between environmental degradation and hazards also seems to present itself in disasters such as:

- **Hurricanes:** It is estimated that 119 million people are exposed to this hazard. Hurricanes are strong storms that form at sea and tend to provoke winds with speeds of more than 110 kilometers per hour (74 mph).

These climatic events tend to occur naturally and periodically every year, affecting regions where there are physical conditions that propitiate their formation and development. However, environmental changes generated by human beings tend to improve the conditions for these phenomena to be more and more devastating.

Activities such as the deforestation of mangrove swamps allow the tidal waves that accompany hurricanes to find coastal areas unprotected, the deterioration of the chains of coral reefs that provide natural barriers to reduce the impact of waves on the coast have been affected by the contamination of the sea water, and finally, the events associated with climate change suggest an increase in the number and intensity of these natural phenomena. Everything seems to indicate that climatic behavior and the hurricane season of the year 2005 coincide with the Glick predictions (2004), whose projections on the probability of occurrence of different meteorological phenomena associated with global warming, indicates as i) very probable, among others, higher maximum temperatures and more hot days (6)⁹ and ii) as probable, among other things, that there will be more intense hurricanes (see article in Terra on hurricanes in 2005).¹⁰

- **Floods:** Around 196 million people in more than 90 countries around the world are exposed to floods, according to the world report "Disaster Risk Reduction. A Challenge for Development."¹¹

Deforestation is a leader among the processes of environmental degradation that lead to the occurrence of floods. Trees help regulate ground water, storing it in the winter and maintaining certain levels of humidity during the dry season; through these same passive activities they protect the soil from agents of erosion, water and wind, preventing sedimentation in bodies of water and the loss of nutrients from the soil.

It is estimated that 8,000 years ago, forests occupied around 50% of the Earth's surface (6.2 billion hectares) (Bryant et al 1987). Today, that percentage has been reduced to 28% (4 billion hectares), a figure that continues to shrink by 94,000 km² per year. Add to this the conditions of violence and poverty that some countries suffer and which has obligated the population to migrate to the cities where, not finding safe and economic alternatives in which to settle, they invade zones near bodies of water, thus exposing themselves to conditions of risk.

- **Landslides:** In most developing countries, physical conditions promote the occurrence of landslides in the winter or rainy season. This situation is due to the fact that there are population migrations from the interior of the countries, stimulated by conditions of poverty, violence and lack of employment opportunities, to the outskirts of cities where they "adequate," or condition, the surroundings for their minimum shelter needs.

This "adequation" refers to digging into embankments and steep slopes, deforestation and changes

9 See The Guardian, July 18, 2006, at: <http://www.guardian.co.uk/weather/Story/0,,1823094,00.html>); also WMO 2006, Declaration of the WMO on the State of the World Climate in 2006, at: www.wmo.ch/web/press/pr_768_english.doc

10 http://actualidad.terra.es/sociedad/articulo/finaliza_epsilon_temporada_ciclonica_amenaza_622398.htm)

11 United Nations Development Programme. Directorate for Crisis Prevention and Recuperation. 2004

in the vegetative covering, and sending wastewater down the embankments, all conditions that add up to lamentably high risk situations.

There are other disasters for which the conditions of human-induced environmental deterioration bear less importance; such is the case with earthquakes, tsunamis or volcanic eruptions, for these disasters there are other elements that condition the gravity of the damages when they occur.

To configure a risk condition, it is necessary for a hazard and an exposed element to exist; with the accelerated growth of the population that the world has seen for approximately the last 50 years, zones that are exposed to earthquake hazards have seen a considerable increase in their populations, as is the case with cities such as Los Angeles, San Francisco, Istanbul, Tokyo and Mexico D.F., to mention a few, each of them having different levels of development that make them more or less vulnerable.

There are also internal migrations of the rural population toward cities; it is estimated that the urban population is growing at an annual rate of 3%. By 2007, the predicted number of urban inhabitants in developing regions will exceed the rural population. Nearly 1 billion people in developing countries live in slums, where they lack the minimum conditions for their safety, from the environmental, risk and physical integrity perspectives.

4. CONCEPTUAL ELEMENTS REGARDING RISK

Risk analysis related to disasters is frequently carried out in function of human beings, their activities and their goods, rather than in terms of the effects on nature itself. This does not mean that the risk of a forest fire in wooded areas does not affect the ecosystems and generate losses in the natural value of those systems. This happens, but it does not tend to make much difference, or to affect environmental accounting in terms of human patrimony: nature itself. The focus has been fundamentally anthropocentric in that social organizations consider their first priority to be the defense of the lives of human populations, and in second place, that of the rest of the species.

1. Risk

Risk is defined as the probability that determined levels of damage, as well as economic and social losses, will occur in a defined time and place. Risk in a specific area is conditioned by the presence of two essential elements: hazard and vulnerability. Hazard is in most cases associated with natural phenomena, while vulnerability is associated with the socioeconomic conditions of the population.

2. Hazard

Hazard deals with a latent danger that represents the probable manifestation of a physical phenomenon of natural, socionatural or anthropogenic (for example technological) origin that may produce adverse effects on people, productive activities, infrastructure, goods, or services. It is a factor of external physical risk to an exposed social element or group of elements, which is expressed as the probability that a phenomenon will occur with a certain intensity, in a specific place, and within a defined period of time (Lavell, 2003).

As established in the definition, hazards may result from three types of events:

- **Natural:** Their occurrence is associated with the dynamics of the planet itself; they are not caused directly as a result of humankind's action on the environment. These include earthquakes, volcanic eruptions, tsunamis, hurricanes, tornados, floods, and landslides, among others. In this type of event, there are some over which it is impossible to take any type of precautionary intervention.
- **Socionatural:** Their occurrence is influenced by phenomena associated with the Earth's own dynamics plus the interventions of human beings in the environment. This group mainly includes landslides and floods.
- **Anthropic:** This type of hazard is unleashed by the direct, however unintentional, action of human beings on the environment. In this group one can mention accidents generated by mainly industrial activity and environmental contamination, which can generate events such as fires, explosions, leaks,

or spills. Within these one can consider the biological risks that are understood as the possibility of releasing live agents, such as virus and bacteria, or the action of toxins, produced by different agents, including plants and animals.¹²

3. Vulnerability

Vulnerability is the susceptibility of an element or set of elements of a social, economic or natural system, to suffer failures or damages due to the occurrence of a phenomenon that, because of its magnitude, is potentially destructive or destabilizing. This susceptibility is a function of the resilience and resistance of the system (Olivera 2006).

As mentioned earlier, vulnerability is focused on exposed elements, such as the population, the infrastructure, the natural and man-made environment. According to Wilches 1998, one can identify a series of factors that condition this vulnerability, including environmental,¹³ physical,¹⁴ economic,¹⁵ and social¹⁶ factors.

4. Risk Management

Risk management is understood to mean the application of a set of measures for planning, organizing, regulating, and intervening physically and socially, oriented toward reducing the conditions of risk within a determined territory, with the active participation of the community and of the different state entities, verifying their own incorporation into the culture of the population and their effects,

within the process of economic and social development (Vargas 2002).

Risk management emerged as a response to the need for changing the perspective and way of dealing with disasters, moving from disaster assistance to development planning, and generating long-term measures that not only mitigate the conditions of existing risk, but also generate legal, environmental, administrative and territorial mechanisms to prevent its reappearance. Therefore, the actions are oriented on the one hand to the reduction of the hazard, and on the other to the reduction of the vulnerability and the protection of economic, social, or exposed environmental capital.

Frequently, a lack of clarity exists regarding what this new perspective represents, because it means not only changing the name of a previously workable process as a measure of prevention and response to disasters, but also adapting a longer-range strategy.

5. ORIENTATION OF RISK MANAGEMENT

In the year 1989, the member states of the United Nations General Assembly declared the International Decade for Natural Disaster Reduction (IDNDR), which was conceived as an international promotional mechanism to be promoted between 1990 and 1999 to motivate concerted action and cooperation worldwide, to reduce, especially in developing countries, the loss of life, material damages, and social and economic upheaval caused by natural disasters.¹⁷

12 VALVERDE, Lidier. p. 8.

13 Those related to the way a determined community exploits the elements of its surroundings, weakening itself and the ecosystems of their capacity to absorb the phenomena of nature without trauma.

14 Related to the physical location of settlements with the technical qualities and conditions of occupation or exploitation of the environment and resources.

15 Refers to both the absence of community members' economic resources and the poor utilization of the resources they have available for appropriate "risk management."

16 Refers to a set of relationships, behaviors, beliefs, ways of organization (institutional and communal), and ways of acting of the people and communities that they put in conditions of greater or lesser exposure. Among these factors can be highlighted: political, ideological and cultural, educational, institutional, and social factors related to organization.

17 Taken from the article on "The International Decade for Natural Disaster Reduction," p. 5.

Before the 1990s, the problem of disasters was mainly approached from the perspective of preparing for response. However, some progress was also being made in prevention and mitigation. However, these actions were oriented principally toward the reduction of the hazard by means of engineering projects and a few relocation actions, which, in spite of being recognized as necessary, did not have the political or popular backing needed to take priority over traditional response activities.

The decisive step from the response mode to mitigation was the promulgation of the IDNDR together with the dawning awareness of the importance given to the local and community levels, making them key actors responsible in some cases for the generation of risk conditions as well as the solutions to those conditions, thus going beyond the work of mitigation. Accepting this reality demanded that community actions be evaluated to define which of those actions made communities more vulnerable to hazards, especially due to the growing conditions of environmental deterioration.

With this decade a new conception of disasters began, humans are learning a little more about the real causes of the significant increase in social and economic losses that these disasters cause and are beginning to perceive a relationship between the occurrence of disasters and the models of development. This theory was mainly supported by the fact that the developing countries are the most commonly and severely affected by disasters, and therefore require that the actions defined for approaching this problem be included in development planning at the territorial and sectoral levels.

Arguing that the developing countries are the most frequently affected by disasters does not mean that disasters are the exclusive realm of developing countries, but that the existing social and economic conditions make the effects more severe, causing them to require more time to return to normal conditions.¹⁸

With the appearance of the first ideas on risk management, in 1996, by the Network of Social Studies on Disaster Prevention in Latin America (LA RED), disaster prevention and mitigation became more comprehensible. It was not only a technical practice, meant to provide products, but a complex social practice, in which diverse social actors participated with different perceptions and imageries of risk.

5.1 Model of Risk Management

The model is integrated by certain basic conditions of the surroundings, certain action guidelines with which the intention is to reduce existing risk conditions, while avoiding the creation of new ones, and is backed by an organizational structure, understood as a fundamental element for the development of successful management integrated into the daily routine of the communities and institutions.

This scheme starts with the recognition of the existence of certain daily dynamics between people and their surroundings, motivated by the basic needs for human subsistence, such as health, sanitation, education, employment, and recreation, to mention a few. These actions seek to rise from an inferior to a superior level of quality of life, with the backing of the state, in the sustainable processes of economic and social development of the different territories.

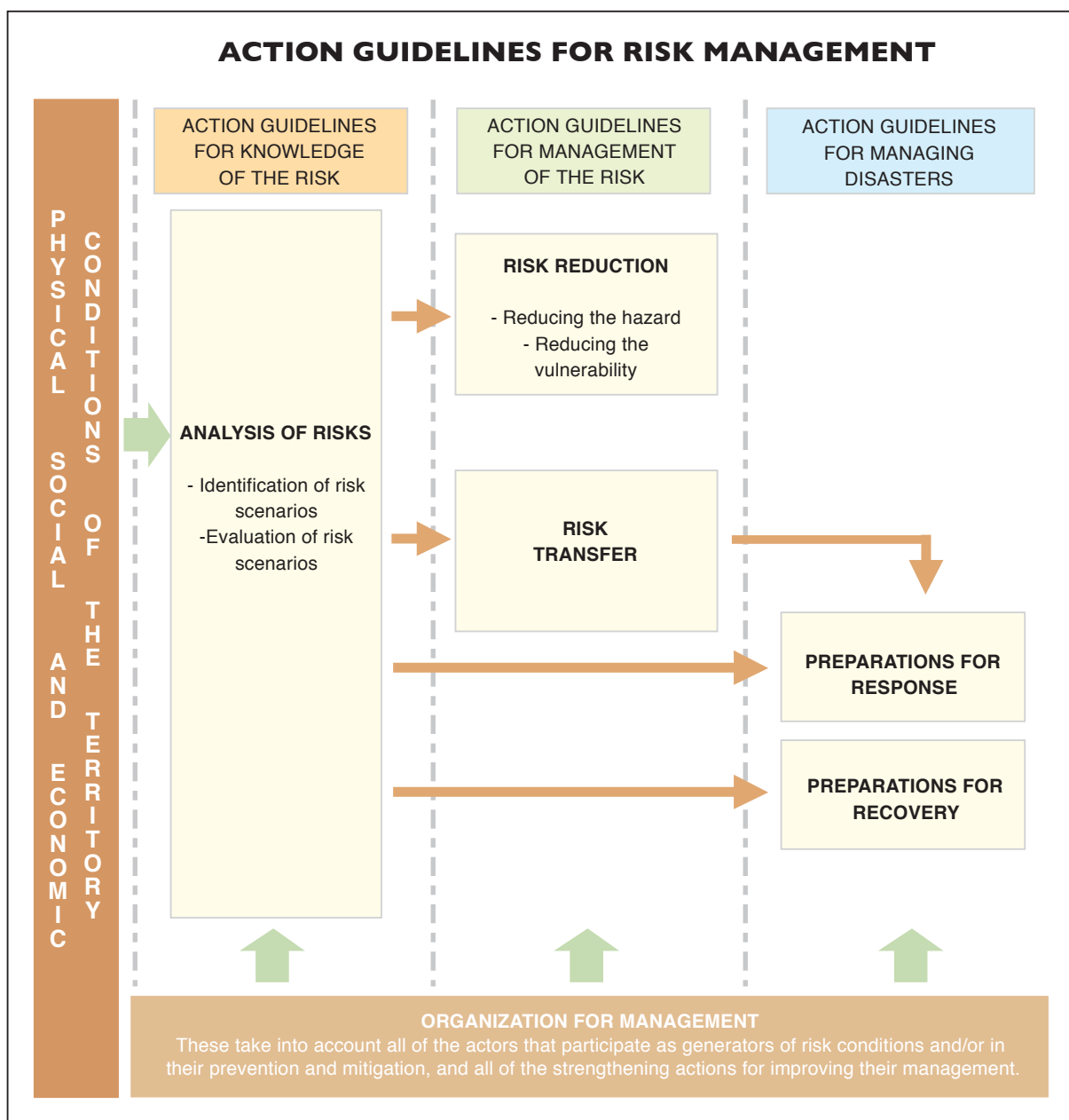
The development of this management tool is based on a series of action and organization guidelines for management. Regarding the action guidelines, their articulation allows for management to advance in function of concrete objectives. In general, three major areas of action are recognized:¹⁹ knowledge of the risk, management of the risk, and management of the disaster.

Putting each action into practice requires data, information, and indicators for analyzing the effect of the actions that are undertaken. These lines of action are explained here.

18 In the case of disasters that happen in developed countries, despite having greater economic losses, the processes of recovery tend to be faster because they have the economic capacity to supply the needs that the process of reconstruction demands.

19 Some authors suggest others, which are really inserted into the more general ones.

Figure 3. Summarized Model of Risk Management



5.1.1 Action Guidelines for Knowledge Concerning Risk

Risk analysis consists of identifying and analyzing existing risk conditions in a specific territory, the causes that produce it and the actors associated with those causes. To accomplish this, it is necessary to obtain socioeco-

nomie, physical and environmental information. This task is oriented toward providing technical support to the decision-making process.

It is important to take risk into account as a variable; therefore one should consider the current conditions as well as those projected for the future, the prospective

view with which one expects to be able to generate immediate and long-range mechanisms of intervention that avoid generating new conditions of risk.

In general, natural risks require an intense compilation of information, which at times is beyond local capacities and requires the participation of national, technical or scientific entities.

However, there are hazards resulting from or induced by the way the population handles its surroundings. Floods and landslides tend to be the two principal problems closely associated with environmental transformations of the landscape with the activities these transformations bring about and of the type of settlement patterns they create in the territory. As a consequence, identifying the problem becomes an essential input for the following action guideline.

5.1.2 Action Guidelines for Knowledge Concerning Risk Management

This line of action involves the definition of policies and strategies of intervention for confronting the identified and evaluated risks (hazard and vulnerability), considering the possibilities and technical, political, cultural, and economic capacities of the territory analyzed, and which will be implemented by means of projects. This requires the definition of mechanisms for follow-up of the actions taken to measure the real impact that these actions can generate for risk reduction.

The attenuation of several types of risk requires investments, or actions associated with the management of the environment, with the intention of minimizing the hazards or the possible damages. Elsewhere, they require efforts for recuperating spaces with precarious settlements, to place them into protected ecosystems, public space or zones where human presence is minimal, in order to lessen socioeconomic losses.

This line of action generates concrete programs and projects, whose characteristics have been remedial, when

the actions should be oriented toward the solution of the hazard or at least its mitigation. The investments can be defined in structural or non-structural terms, including training, awareness building, social organization, risk transfer, etc.

Regarding risk transfer, this refers to the set of economic or administrative instruments by which a third party assumes the costs of preventing the damage or those of attending to the disaster.²⁰ One of the most relevant means of transferring risk is coverage by insurance policies. This concept is dealt with in detail later, but the important thing is that it deals with a very powerful set of actions for managing risk, whose origin is individual, communal, institutional (public or private), a product of free initiative or mandatory application for legal or economic reasons.

5.1.3 Action Guidelines for Knowledge Concerning Disaster Management

In spite of the fact that the intention of the stages described above is to achieve an effective reduction of risks, it is important to recognize that the processes that generate the risks, which have been working and evolving for many years, are quite probably not going to take their risk-diminishing effect immediately. Therefore, this stage is considered a fundamental mechanism for reducing the damages resulting from a disaster, and the population's suffering, as well as for creating certain basic conditions of well-being for the affected populations.

An adequate and timely response requires developing a set of preparations beforehand, at the institutional, inter-institutional and community levels. These preparations incorporate organization, coordination, training, capacitating, building an inventory of resources, enlisting, drafting operational procedures for response, holding simulations and drills of response operations, etc.

This stage can also be taken advantage of to identify conditions that are unleashed by the disaster to avoid having them repeat themselves in the future.

20 For example, the public financing of disaster prevention or assistance is understood to be a mechanism of risk transfer. For further illustration, see: IADB, 2004 and USAID, 2006.

5.1.4 Organization for Management

Considering the importance that risk management places on inter-institutional and community participation and coordination, organization for management requires carrying out activities aimed at empowering institutional capacities and their relationships with the communities in the local environment, as a space for the generation and reduction of risks.

This stage covers institutional development, strengthening of public entities' capacities for planning and carrying out actions in conjunction with other public or private entities, and strengthening the relationships between public entities and the community.

All of the activities should be oriented toward constructing or improving the management capacity of each public entity, and achieving teamwork that allows for planning, carrying out and following up the actions within the framework of risk management.

This requires the existence of an organizational, normative framework endowed with resources specifically oriented toward risk management where an atmosphere of competency is defined for each of the entities, and which has the capacity of involving the community in the management process.²¹

5.2 Characteristics of Local Risk Management

Beginning with the reality that the expression of risk affects strictly local communities and territories, and that disasters, once they have happened, can compromise regional or national levels and even the macroeconomic conditions of a country, risk management begins and ends at the local level, even though the optimal situation is for it to happen in an articulated manner at all government levels.

For risk management to be successful, it must fulfill, as far as possible, the following characteristics:

- It should be considered part of the development planning process, beginning with the local levels, since this is where the participating actors, who generate and modify the conditions of risk, are found.
- It should have a participatory nature. Participation is a mechanism of legitimacy and a guarantee of relevance and ownership of the processes by the local actors.
- It should have a permanent, not temporary character if we seek to achieve a real impact. To reduce risk in territories requires dealing with the processes in a framework of social transformation sought through local development.
- It should have a decentralized character. Just as risk is defined and manifested in the local environment, its intervention should be the responsibility of local administration, a space for participation and management where decisions are made to solve the different problems that are identified. This does not mean that the regional and national levels should not intervene, support or participate, but it will always be the local level that takes the lead, if there is to be success in the solutions.
- It should have a coordinated, inter-sectoral and inter-institutional character. Each entity carries out a specific function and has competency, respecting the autonomy and responsibility of the local governments. It seeks to maintain good coordination and integration between the duties of the entities, to avoid duplicity of actions and to guarantee the flow of information and the realization of processes in both vertical and horizontal directions.²²

21 Formulation of a General Model for Risk Management in Cities, Richard Alberto Vargas. 2002.

22 WILCHES, Gustavo. The Peak, Fall and Rise of Felipe Pinillo, Mechanic and Welder, or I am Going to Run the Risk. Quito, LA RED, 1998.

5.3 Corrective Management and Prospective Management

Two forms of approaching the problem of risks are generally accepted, according to the current dynamics of the territories, considering that there are current risk conditions that require immediate intervention, and socioeconomic and environmental conditions that can lay the groundwork for future risks, so one speaks of corrective management and prospective management of risk (see, for example Lavell, 2003).

- Corrective Management is part of the intervention in existing risk conditions that are products of past activities. This, in turn, can be conservative when one focuses on solving some of the most distinguishable aspects of risk without pretending to find solutions of major impact, or to the contrary transformational when the intention is to bring about more sustainable, integral changes that have greater impact.
- Prospective Management is more in tune with the process of development, since it specializes in foreseeing risks that do not yet exist, which might evolve from the realization of works and development projects.

Considering that risk management is conceived as a process through which participants seek to improve the living conditions of the community that is at risk, and at the same time avoid creating other future risks, all of the proposed actions include the processes of territorial planning. Below are the definitions of some of the advantages to be gained:

- When measures for reducing vulnerability are part of a set of projects formulated in a development process or plan, there is a greater probability that they will be implemented, that they will endure over time, and more importantly, that they will be effective.
- If we include the components of risk (hazard and vulnerability) within development projects from the design stage, the costs are lower than those

of a later modification, or worse yet, the repair or reconstruction after damages occur.

- To the extent that development projects require evaluation, if this is done correctly, the risk analysis will make it possible to foresee future problems and review the projects in function of their real sustainability. This analysis is being incorporated, ever more frequently, into the environmental-impact evaluations when these are required by law in the different countries.
- When risk-reduction components are incorporated into the development process, it is done in spite of the fact that some government officials and communities do not consider the matter a priority; thus actions are taken that favor risk prevention and reduction as part of other projects.
- The exchange of information between planning and emergency preparedness agencies bolster the work of the first and alert the latter as to the elements whose vulnerability will not be reduced by the proposed development activities.
- Through the territorial planning process we can substantially improve the conditions of quality of life, reducing the vulnerability of human settlements and, as a consequence, reducing the risks they face.

6. CONSOLIDATION OF ENVIRONMENTAL CONCERNS

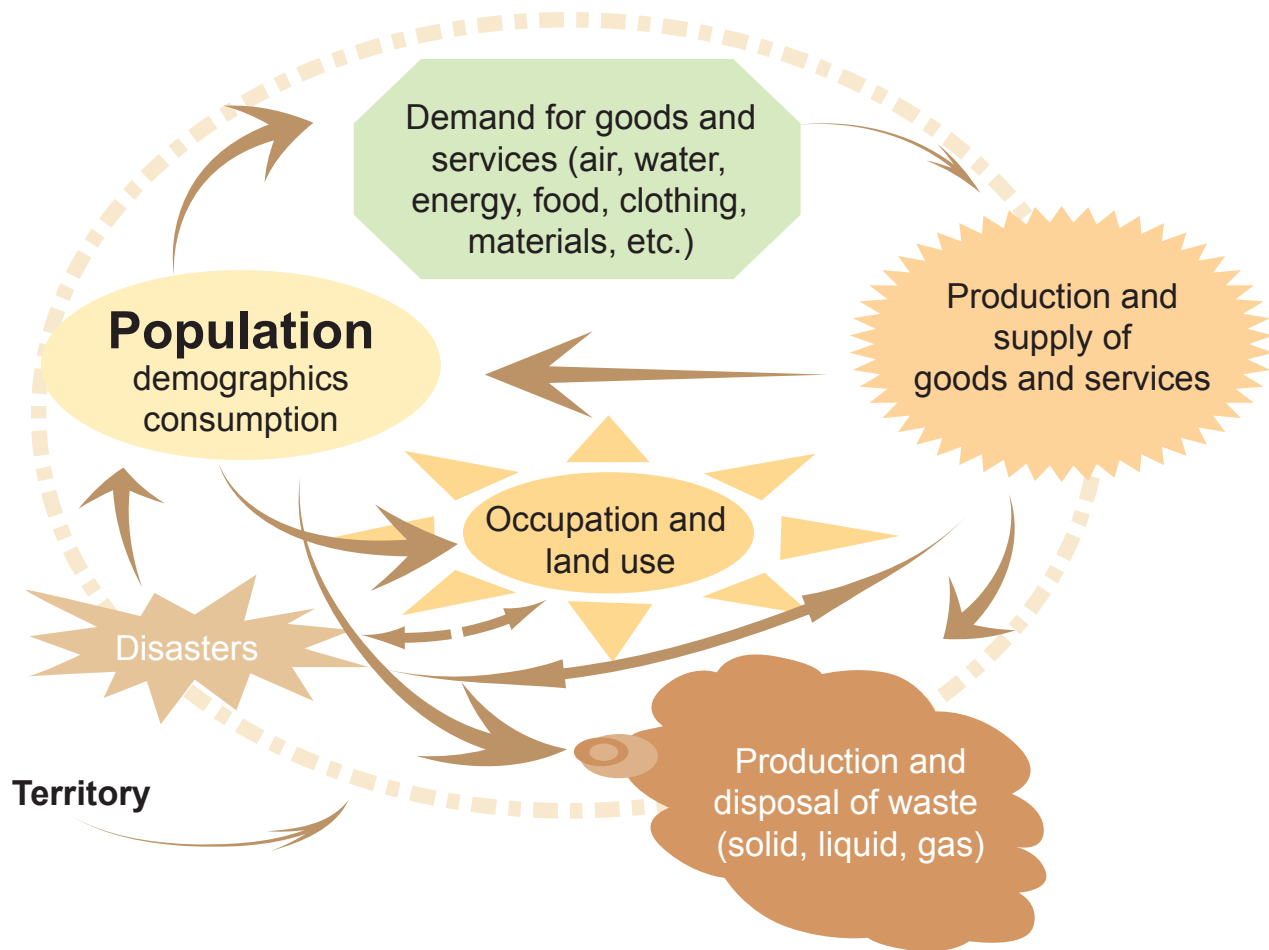
Pressure on the environment comes from human demands for resources: vital resources such as water and air, space for living in, for producing, for moving about, for recreation, for the services people require (health, education, sports, etc.), energy to move all of the processes, means of disposing the waste resulting from the natural metabolism of human activities: atmospheric emissions (gases, vapor, particles, noise), water pollution, and soil contamination.

All human activities generate changes in the environment. Of course, the more people there are, the greater the

demand for resources, and the greater the changes to the surroundings. These transformations generate new dynamics for ecosystems, or entirely new ecosystems with their own characteristics, such as urban, agricultural, energy generators.

In synthesis, the following graph shows the elements that generate transformations of the environment, giving evidence that the principal origin of this dynamic is the population and its demand for goods and services as well as land.

Figure 4. Transforming Territorial Elements



When human pressure passes a certain threshold, the ecosystem is incapable of returning to its previous condition; its resistance is broken. In other words, the force that makes the system resist change loses its resiliency, that is, its capacity to return to its original state. Thus villages and cities, vast extensions of cultivated land or pastures, and man-made reservoirs, canals, roads, etc. have come about.

This resistance to change and resilience in an ecosystem is reflected in different ways: an increase in the frequency of flooding of possibly larger areas, a search for stability in embankments through small or massive landslides, an increase in the frequency or type of plagues, expansion of invasive vegetation, to mention a few of the expressions.

When the ecosystem can resist no more pressure, it generates other evidence of change, such as the exhaustion of the soil's productive capacity, the exhaustion of surface, sub-surface and subterranean water supplies, desertification, changes in local climatic patterns, receding glaciers, and lasting contamination of waterways or soil, among other symptoms. Frequently, these new conditions are understood as an expression of system degradation.

Faced with the changes induced by human beings, after decades of concern, there has emerged a set of strategies to control the symptoms, first, and then the immediate causes, later come initiatives oriented toward the prevention of contamination and finally the integral management of the environment is developed.

The history of civilization recalls that one of the first problems felt by humankind was famine caused by poor or lost harvests, some associated with desertification in productive valleys, such as the Tigris or Euphrates. More recently, the loss of arable lands caused by exposing the earth to strong winds as happened in the United States

at the beginning of the 20th century, led to the creation of an entity responsible for soil conservation in that country. The appearance of locusts in Colombia during the beginning of the 20th century led to the creation of the Ministry of Agriculture. Sanitation problems became the world's driving force for the creation of health-care organizations. Finally, generalized environmental problems have led to the creation of ministries or entities for environmental control, during the last part of that same century. In general, countries have been reactionary in the face of environmental problems.

Intense activity for the establishment of norms came about in the 1960s.²³ Although based on arguments related to public health, they evolved from control "at the top of the smokestack" with a high degree of government intervention by health organizations, and in some cases by entities that managed natural resources, going through phases of prevention of contamination, cleaner production, eco-efficiency and the Theory of Zero Waste. More recently, free-market theories have led to the adoption of instruments also pertaining to the market, and based on the economic rationale of the environmental resource user carrying out their own exercise of environmental control.

State control of the environment was exercised for decades over private sector pollution. Norms were also designed in this case, but in relation to water resources, the waterways continued deteriorating because of residential wastewater, which is still an unresolved problem in most of the developed world today. This condition responded to the logic of public investment, where the priority was not always to resolve matters of sanitation. Potable water became an issue of world interest only toward the end of the last century thanks to the efforts of the United Nations. At the beginning of this century, 83% of the world's population managed to have

23 Quotes are frequently found in various books on how emperors (Charlemagne, Napoleon) or leaders for independence (Bolívar, Martí), had a certain feeling for the environment, especially regarding the forests, and at times the bodies of water, elements for which acts of government were produced: protection of waterways, reforestation along the same and along the highways (more for creating shade for the troops in some cases, than for ecological purposes).

sources of “improved” water,²⁴ but in sub-Saharan Africa and the Pacific, the rates are little more than 50%. As long as potable water is not available, it is highly improbable that there will be treatment for wastewater. No more than 50% of the world’s population has access to sanitary sewer installations. The disposal of solid waste has also become a major environmental problem with effects on human health. Gas emissions into the atmosphere grew basically as a result of the use of fossil fuels for generating energy, including automobile transportation. Cities became the least appropriate of ecosystems for the healthy lives of people until drastic changes began to take place regarding urban environmental management with cities like Curitiba first and later Bogotá setting the example.

Water has been and will continue to be the backbone of environmental endeavors. Unfortunately it becomes important only when crises are at hand: shortages, contamination, diseases transmitted through water, floods, droughts, and excesses of rain as with El Niño. Managing river basins became the model for environmental management to follow, as a result of the vision that guided the development of the Tennessee Valley Authority in 1933. Especially in Canada and Latin America, the management of river basins dominated for decades and is still promoted. In some countries this model became the environmental authority, leaving electrical power generation out of the rational exploitation of hydrological sources, as happened in Colombia with the appearance of Law 99 in 1993.

River basin management led to plans for their managed use through plans, instruments of state intervention establishing the definition of land usage for each basin, while seeking to harmonize the environmental supply with the social demand for resources. Even multilateral organizations have financed river basin management in areas where several countries converge.²⁵

The criteria for this type of orientation for environmental management typically revolves around the identification of the relevance of natural resources, the importance of the social and economic development of the basin, and the importance of conserving of natural resources for the sake of “sustainable development.”

When the concept of sustainable development entered our lexicon,²⁶ it opened the way for integral environmental management based on the principle that the goals of development should be a function of the capacity of the environment and of society to fulfill them without compromising the potential for development, nor the quality of life for future generations in the process.

Thus, environmental management has become the set of resources and instruments of a political, legal, technological, social, economic, and administrative nature, established, in most cases, by the state, oriented toward the management, administration and sustainable exploitation of the natural resources existing in the region or territory for the purpose of achieving sustainable development.²⁷ And, as shall be seen later, since the beginning

24 http://www.unicef.org/spanish/wes/index_statistics.html December 2006.

25 See, for example, water basin projects on the web page www.iadb.org

26 Although tradition has it that the concept was coined in the Bruntland report, G. (ed.) 1987. **Our Common Future: The World Commission on Environment and Development**. Oxford, Oxford University Press, it really came into being with the work done by IUCN-WWF-UNEP in 1980, with the report titled, **World Strategy for Conservation**. Then, the concept was accepted worldwide in the Rio de Janeiro conference in 1992, and incorporated into the documents adopted there.

27 That is, the environmental assets that have been incorporated into the economic system of a society.

of the 1990s the theme of natural disasters began to be incorporated into the concept of environmental management, to the point that the environmental norms have assumed disaster prevention as an integral part of environmental management.²⁸

This implies that environmental management is incorporated into the socioeconomic context of a country to be considered and implemented as a flexible process, susceptible to adjustments according to the changing needs of the surroundings in which the participation of the actors involved in making decisions becomes possible. It also supposes that it goes beyond the creation of environmental entities, since lately these entities are simply instruments in support of the development process.²⁹

6.1 General Model for Environmental Management

Environmental management stems from the definition of development objectives of a society, which are social, economic and environmental. The latter elements refer as much to the quality of the environment that we intend to achieve within a given timeframe as to the level of environmental transformation that is acceptable to society.

The objectives that should be quantified whenever possible to verify whether they are being fulfilled or not, are solidified through the expressed intentions in

the policies of the state and of the government. These policies indicate the courses to follow, both for the administration and for the administrated.

The implementation policies are planning, normative, institutional, fiscal, economic, administrative, social, technical and self-management instruments.

The application of these instruments has the purpose of direct or indirect intervention of the state in search of the previously mentioned objectives.

Environmental management is frequently concentrated on the control of contamination or forest control, more than on other environment-transforming elements.

The orientation of basic environmental management is based on elements that interact as seen in the following table. In order to be effective, management should measure itself in a way that will allow for prioritizing its actions and measuring its progress in the foreseen direction, with indicators of the quality of life of the human population, and in agreement with the goals pursued by the objectives of development.

6.2 Structure for Environmental Management

The following table integrates the usual components of environmental management.

28 For example, in Colombia, Law 99 of 1993, with which the Ministry of Environment was created and the sector reorganized, adopted disaster prevention as an environmental principle and imposed, as an obligation of the environmental authorities, "conducting evaluation, follow-up and control of the ecological risk factors and of those that might have a negative effect, in case of natural disasters, and to coordinate with the other authorities, the actions aimed at preventing emergencies or hindering the extension of their effects." In Costa Rica, the law that established authority over the environment foresaw guarantees against risk caused by environmentally evaluated projects. In Ecuador, the General Law on the Environment foresees the evaluation of risks in the systems of environmental management.

29 We frequently fall into the mistake of believing that the climax of environmental management comprises the environmental institutions. This is especially valid in Latin America, more than in Anglo Saxon countries.

Table I. Principle Components of Environmental Management

Social, Economic, Environmental								Objectives
Policies								Purpose
Self-management Techniques	Social	Administrative	Economic / Financial	Fiscal	Institutional	Normative	Planning	Instruments
		X	X				X	Development plans
		X	X				X	Plans for usage [*]
			X				X	Action plans
			X				X	Programs
	X	X					X	Projects
		X					X	Budgets
							X	Project evaluation
	X					X		Taxes
	X					X		Rates
	X		X			X		Fees
	X		X			X		Fines
	X		X					Deposits
	X		X			X		Contributions
	X		X			X		Property rights
X	X		X	X		X		Tax exemptions
X	X	X				X		Social compensations
	X		X			X		Norms for coexistence
	X		X			X		Norms for performance
	X		X			X		Quality standards
	X		X			X		Standards for emissions ^{**}
			X			X		Technical norms
			X			X		Requirements and sanctions
	X		X	X				Emissions market
			X	X				Rights market ^{**}
X			X					"Green" market
	X		X					Knowledge generation ^{***}
	X		X			X	X	Environmental evaluations
	X		X			X	X	Risk evaluation
	X		X			X		Licenses, permits
		X	X					Management, updating and recovery plans
			X					Plan for social management
X			X			X		Policies for compliance
	X		X			X		Insurance against damages (policies)
	X		X			X		Control
	X		X			X		Follow-up
	X		X			X		Monitoring
X	X		X				X	Indicators
	X		X					Alerts
X	X		X			X		Environmental management systems
X	X		X			X		Voluntary agreements
X	X		X			X		Compliance agreements
X	X		X					Awards
			X					Certificates
			X		X	X		Institutional competences
			X		X			Authorities and delegations
X	X	X	X			X	X	Participation
X	X	X	X			X	X	Consultation
X	X	X	X			X	X	Oversight
	X	X	X			X		Denunciations, complaints
	X	X	X					Communication and education
X	X		X			X		Public progress reports
X	X		X					Information systems

* Territorial, environmental, land use, urban, resources (water, forests, etc); includes the restrictions for use of spaces or resources, the generation, recuperation and management of protected areas and public spaces.
 ** Emissions into the air, water, soil or subsoil.
 *** Refers to the markets for licenses, rights to land use, sale of environmental services
 ****Data, information, quality or monitoring networks, studies.

Source: specially compiled for this document, gathering some elements from the United Nations 2004 among others, **Living with risk. A world report on initiatives for disaster reduction (www.crid.cr) Fundación Natura, Sun Mountain International Consulting, IADB. 2004. Disaster Risk Reduction through Environmental Management: Use of Economic Instruments.**

6.3 Quality of Life and Environmental Management

To put the previous model into practice, it is useful to be perfectly clear regarding the concept of quality of life since it is the nucleus of environmental management. It is what the whole process of development normally

seeks, at times based on the principle that the state is the essential promoter of this process, other times based on the concept that the market takes care of it, which lately always returns a whole gamut of inalienable responsibilities of the state which the market has demonstrated incapable of solving.³⁰ This can be defined through the following equation:

Conceptual Equation for Quality of Life

Quality of Life	=	Way of Life	+	Livelihoods	+	Well-being	+	Level of Coexistence
QL	=	WL	+	LL	+	WB	+	LC

Source: Modified from Olivera, M.F.2000. Environmental Management in the Capital District. DAMA, Bogotá.

Each of the parameters of the equation has several variables susceptible to quantification, weighting and implementation to realize the operation for determining a quality of life benchmark, and also as a goal in a given period of time. The parameters also serve to implement a process of prioritization before real possibilities for action, which are frequently determined by budget and political willingness. As an example, see the following table.

This table contains certain variables that typically need to be examined through the instruments mentioned in the model, variables that in order to transform them need input data, that is, knowledge and indicators, to be able to monitor and set concrete goals in order to verify their transformation. In other words, it is through this type of variables that environmental management implements its specific actions through the use of the instruments that it selects as ideal for each purpose.

30 A market without rules does not exist. All markets function with more or fewer legal or technical rules, of which environmental, health and sanitation, labor, and child protection regulations are the most frequent. These rules, as many others, are set and enforced by the state. The interests of the international market frequently are shielded by the concept of "dumping" (environmental, for example), which in the end is no more than a reactionary mechanism toward state requirements (standards) that are stronger than those of the suing party.

Table 2. Determining Factors for Quality of Life

Examples of Qualitative – Quantitative Variables															
Way of Life	<table border="1"> <thead> <tr> <th>Elements of the Environment</th> </tr> </thead> <tbody> <tr><td>Air quality</td></tr> <tr><td>Waterway quality</td></tr> <tr><td>Availability of natural areas</td></tr> <tr><td>Biological diversity</td></tr> <tr><td>Waste treatment</td></tr> <tr><td>Re-use, recycling</td></tr> <tr><td>Public spaces</td></tr> <tr><td>Scenery</td></tr> <tr><td>Natural hazards</td></tr> </tbody> </table>	Elements of the Environment	Air quality	Waterway quality	Availability of natural areas	Biological diversity	Waste treatment	Re-use, recycling	Public spaces	Scenery	Natural hazards				
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	Air quality														
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	Waste treatment														
	Re-use, recycling														
	Public spaces														
Scenery															
Natural hazards															
Livelihoods	<table border="1"> <thead> <tr> <th>Economic Elements</th> </tr> </thead> <tbody> <tr><td>Income</td></tr> <tr><td>Employment</td></tr> <tr><td>Business opportunities</td></tr> <tr><td>Corporate opportunities</td></tr> <tr><td>Access to credit</td></tr> <tr><td>Access to the markets</td></tr> <tr><td>Vulnerability in the face of hazards</td></tr> </tbody> </table>	Economic Elements	Income	Employment	Business opportunities	Corporate opportunities	Access to credit	Access to the markets	Vulnerability in the face of hazards						
	Economic Elements														
	Income														
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	Corporate opportunities														
	Access to credit														
Access to the markets															
Vulnerability in the face of hazards															
Well-being	<table border="1"> <thead> <tr> <th>Quality, Quantity, Accessibility</th> </tr> </thead> <tbody> <tr><td>Health</td></tr> <tr><td>Education</td></tr> <tr><td>Water</td></tr> <tr><td>Sewers</td></tr> <tr><td>Wastewater treatment</td></tr> <tr><td>Waste collection</td></tr> <tr><td>Waste disposal</td></tr> <tr><td>Transportation</td></tr> <tr><td>Living space</td></tr> <tr><td>Risks</td></tr> <tr><td>Recreation</td></tr> <tr><td>Free time</td></tr> <tr><td>Mobility (time, effectiveness)</td></tr> </tbody> </table>	Quality, Quantity, Accessibility	Health	Education	Water	Sewers	Wastewater treatment	Waste collection	Waste disposal	Transportation	Living space	Risks	Recreation	Free time	Mobility (time, effectiveness)
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Free time															
Mobility (time, effectiveness)															
Level of Coexistence	<table border="1"> <thead> <tr> <th>Elements of Civil Harmony</th> </tr> </thead> <tbody> <tr><td>Conditions of marginality</td></tr> <tr><td>Public security</td></tr> <tr><td>Fights</td></tr> <tr><td>Armed confrontations</td></tr> <tr><td>Investment in arms</td></tr> <tr><td>Effectiveness of justice</td></tr> <tr><td>Corruption</td></tr> </tbody> </table>	Elements of Civil Harmony	Conditions of marginality	Public security	Fights	Armed confrontations	Investment in arms	Effectiveness of justice	Corruption						
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	Fights														
	Armed confrontations														
Investment in arms															
Effectiveness of justice															
Corruption															

Source: Compiled by the consultant for this document.

6.4 Components of Environmental Management

Normally, any model of environmental management that pretends to be integral and to be an expression of, or in support of, a process of sustainable development, is made up of the elements described below.

6.4.1 Objectives

The social, economic and environmental objectives reflect the objectives of the country's development. Social objectives are those that allow participants to define to which level of cultural, educational, organizational, democratic, participative, health-care advancement, etc., they intend to move the population over a given time lapse. The economic objectives have classical macroeconomic components. Plans for development are especially concerned about rates of economic growth, major areas of public and private investment, etc. And the environmental objectives should refer to the goals of covering the basic services of potable water, sewer systems, water treatment, waste management, risk reduction for the population, growth of protected areas, introduction into the market of forest areas, urban development, etc.

For each of the development objectives, there are those responsible on a national, regional, and frequently local level. When there are local, popularly elected administrations, national participation tends to diminish, respecting the local opinions. However, in no case is any level exempted from its responsibility regarding the role it should play in fulfilling the objectives of general interest to the population.

Therefore, if dealing with cleaning up the environment and the local government does not have the resources, the nation should normally respond with financial backing.

We frequently find the following environmental matters among development objectives:³¹

- i) Protecting biodiversity.
- ii) Protecting the water as one of the country's strategic elements.
- iii) Modifying productive behavior and that of natural resource exploitation to guarantee the sustainability of those resources.
- iv) Inclining toward the achievement of sustainable development through a balance between the real needs of the country's development and the rational use of its natural resources.
- v) Making environmental improvement a determining factor in the quality of life of the population, including the inhabitants of urban centers.

However, these types of intangible objectives are insufficient. It is necessary to define them with more precision, define concrete goals for each objective, the policies that they require, the ideal instruments, the actors involved, and the responsibilities of each of them.

In general, defining objectives requires the participation of these actors through their representatives so that achieving their objectives is viable.

6.4.2 Policies

Policies are normally generated on the national level in each country. However, they are also produced locally and require pertinent scopes of coverage, since it is at the local level where the daily problems that affect the quality of life of the people are really confronted.

Policies reflect a line of work for public administration and a set of durable rules for the private sector, so that it can carry out its investments and develop its projects with confidence in its future. In this sense, policies also identify the responsibilities of the state and of the private citizen.

31 OLIVERA, Manuel F., MACIAS-GOMEZ, Luis Fernando. Elements for Structuring Sectoral Environmental Management in Colombia. Cecodes, Bogotá, 2004

Policies set priorities, which normally are associated with the destination of investment resources, since these are never sufficient for dealing with all of the country's or the local community's objectives for development.

Policies also organize the applicable instruments for the different development objectives. It may or may not be public policy to apply incentives to environmental management or to transfer risks to the individual through insurance policies.

Legal norms are what determine the way policies are put into practice, in some cases through a law that adopts a development plan through new legal norms that allow the state to act in one direction or another; through regulations for the control of contamination or for the definition of discharge, etc. Therefore, when policies are not reflected in normative instruments, they rarely become applicable.

6.4.3 Instruments

As the table shows, the most frequent instruments refer to those used for planning, creating norms, institutional, fiscal, economic, administrative, social, technical and those of self-management, among others. Although there can certainly be discussion regarding these instruments, the important thing is to be clear as to the utility of these instruments in function of the purpose they seek.

6.4.3.1 Planning Instruments

These are the best-developed tools proven useful during at least the last 50 years, which explains the need for an overview.³²

- Development plans are associated with the periods of government, which normally reflect the program of whoever has been elected to govern, at the level to which he or she is elected. These plans sometimes have long-range projections for

certain sectors whose dynamics tend to transcend a single term of government.

- Land-use plans refer to those plans employed for issuing directives on the use of land in a given territory, whether it be a river basin, a municipal jurisdiction, a natural or forest reserve (creation, recovery or management), be it rural or urban, or both. They include plans for urban development, where the growth of the city is oriented, and the development and recovery of public pedestrian and recreational spaces, of varying types of infrastructure, of areas destined for housing, the permitted heights and the limitations of use. Also included is the use of natural resources such as forests or bodies of water through reserves or protected areas. In the latter case, it involves determining the levels of quality and use by which the resource is managed, as well as the supply and demand permitted regarding the former. These plans that formerly generated directives from the national level have become classic instruments for municipal management. They are frequently written to outlast the administrations that formulate them.
- Action plans are used to harmonize projects with the available budgets in such a way as to move them from formulation to execution. They may include structural projects or "soft" projects where the population is the main executor and receptor of the actions. These normally are short term since they are associated with defined budgets.
- Programs are used in certain planning approaches. The plans are carried out through programs and these in turn through projects. Programs normally identify projects and articulate them into a development process. They assign priorities, and they organize projects into a time schedule, fortify the links and connections between one another, generate spaces for participation for the concrete definition of projects and assign general budgets for subject groups of sectors of action.

32 To learn more, see the document, Fundación Natura, Sun Mountain International Consulting, IADB (2004).

- Projects are ideas prepared in such a way as to be put into practice with the necessary designs (at the conceptual or constructive level), the defined budgets, the impacts analyzed, the benefits quantified, the limits defined and the responsible parties established.
- Budgets, public or private, are the set of financial resources whose availability will effectively allow the project to become reality. A budget results from bringing together several elements such as the identification of a need or an investment opportunity (both cases understood as a project), of the political willingness to carry out the projects, the quantification of the requirements thereof, the analysis of the funding sources, the effective obtaining of those resources, and the existence of the operational capacity to execute them.
- Evaluation (public) of projects is normally done in economic and social terms. For the last five years they have included the environmental evaluation of the project. This deals with comparing the costs against the benefits, quantifying the risks to the project and to the benefited population, and finally the financial viability of the project through evaluations such as the internal rate of return.
- Environmental evaluation of projects and of risks (see administrative instruments).
- Indicators deal with an explicit measure used to determine performance. They are a signal that reveals the progress toward the objectives, a means for measuring what is really happening in comparison with what was planned in terms of quality, quantity and timeliness.³³

6.4.3.2 Normative Instruments³⁴

The rules of a society, of a civilization, are found in its norms. These should reflect lasting policies to ensure that the impact occurs within the scheduled timeframe. They can be understood as rules of behavior and of government, the latter being those that are issued to facilitate the work of the government or to organize the institutional tasks. The rules of behavior are associated with sanctions, incentives, or non-monetary stimuli that are frequently understood as standards or technical norms, both from different origins. The first stem from the social requirement to control a problem, while the second set of rules frequently comes from agreements or business interests concerning the characteristics and specifications of their products.

Many management tools require norms for their very existence, and since all normative instruments have a specific function (economic, financial, technical, etc.), each tool is explained in its respective section.

6.4.3.3 Institutional Instruments

These instruments consider public entities as management tools where the responsibilities of the state apply in function of the two spheres of action: the general authority and the specific authority in environmental matters. In the first case, the entities responsible for the application or development of some type of tools have a role to play in environmental management. The entities that develop infrastructure are included, as well as those that propose and adopt financial, economic, or fiscal instruments, the entities that apply justice, etc. None of them is exempt from the responsibilities involved in environmental management. In the second case are the specific authorities in environmental matters – those

33 Definition added by Olivera (2006) from that published by IDRC at: www.idrc.ca/es/ev-30231-201-1-DO_TOPIC.html International Development Research Center.

34 Several authors, such as Rodríguez (2002), have started to call some normative instruments “command and control,” perhaps employing meanings poorly translated from English. In reality, the exercise of authority is based on the demand for compliance, in the control and imposition of measures, some of them sanctioning, all of this accompanied by the proper administrative process.

concerned with the fulfillment of the norms of behavior regarding the environment.

In matters of authority, the institutions may delegate to lower level territorial entities in order to promote decentralization and distribute the functions and facilitate follow-up. There are also examples for delegating duties to the organizations of civil society, especially on matters of civil vigilance or oversight, follow-up of legal obligations of natural resource users, and administration of natural resources or reserves.

6.4.3.4 Fiscal Instruments³⁵

These involve the use of taxes and subsidies for meeting environmental goals. The most widely used are taxes on emissions and discharges, taxes on input and products, differentiated taxes, taxes on resource exploitation, tax subsidies, and accelerated depreciation of assets and other similar items such as rates, tariffs, and tax incentives, to be dealt with later.

6.4.3.5 Economic Instruments

Economic instruments are used to send signals to corporate users of natural resources regarding the options of costs compared to the potential benefits of incorporating into their projects actions aimed at improving their environmental performance. These instruments may be used simultaneously or individually depending on the urgency required in obtaining results. It frequently depends on national decisions whether they are also applicable at the local level as a function of the governing power that an administration has over certain instruments (for example, tax rates on property).

This model has included rates, tariffs, fines, contributions, the emissions market and the rights market. Below are

some explanations of the instruments. Some are based on the classification proposed by Panayoutu (1994) and for the Organization for Cooperation and Economic Development (OCED),³⁶ others are found in the Fundación Natura, Sun Mountain International Consulting, IADB (2004) and other documents based on general knowledge.

- Charge systems or rates are based on the principle of paying for environmental services at progressively higher rates as use increases – applied to dumping, emissions, discharges of any type and also for water, air and other resource usage – in such a way that it economically “punishes” irresponsible users of resources. The rate can also be applied to goods or services to pay the value of environmental management or the services themselves (for example, the cost of adequate disposal or treatment of cell-phone batteries). The rate should be understood as the mathematical formula or model that is applied to the use of the resource.
- Fees are the real amounts charged for the use of a resource: fees per cubic meter of water, per ton of biochemical demand for oxygen (BDO),⁵ that is discharged, fees on the property tax in function of, for example, whether the land parcel is destined or not to an appropriate use, and tariffs for excess consumption of energy, etc.
- Fines constitute a negative incentive or sign of penalization for behaviors outside of the rules. They can be progressive, in function of the dimensions of the damage, the behavior or the costs and speed of repair, etc.
- System of restitution of deposits refers to a surcharge on the price of a potentially contaminating

35 LÓPEZ Avendaño Raúl and MIRANDA, Freddy. Economic Instruments for Environmental Management and its Potential for Application to the Management of Maritime-Coastal Zones in Costa Rica. World Action Program for the Protection of the Marine Environment before the Activities Carried out in Tierra MIAE/GPA // I.

36 RYAN and Ulloa, 1995 in Sunkel, OCED (Organization for Cooperation and Economic Development) 1997.

product or one that is environmentally difficult to handle, in order to stimulate the consumer to return the spent product to the producer or to another agent responsible for final disposal of the good; this works as an incentive for recycling programs, to promote saving raw materials.

- Contributions are voluntary or non-voluntary donations by environment users, for a defined purpose, for example, the restoration of a micro-basin whose users comprise all of the contributors. Different from a tax, the contribution is for general application to the entire population, is temporary and limited in purpose.
- Assignment of property rights consists in the precise definition of the rights to property, for the proper conservation and economic administration of these resources that should be subject to the conditions of universality, exclusivity, transferability and taxation of the resources granted.
- Tax exemptions are related to fiscal instruments since their application and use by the public sector responds to the logic of marginal tax costs of the purpose for which the exemption is intended. However, from the private sector viewpoint, it means the economic benefit from the cost-benefit of environmental investments. So these exemptions apply, for example, to the use of cleaner technologies, to stimulate the repair of damages, etc. The application normally is based on national legislation.
- Social compensations are economic instruments negotiated with local communities, oriented toward dealing with possible environmental or social impacts. These compensations allow the community to receive social interest or environmental investments that they would not otherwise receive.
- Emissions market refers to an instrument that has taken shape over several decades. Only on a global level has it attained its most important and maximum expression through the Kyoto Protocol. With the acquisition of Emission Reduction Certificates (ERC), a user obligated to reduce emissions is compensated for that obligation, and if the user has any ERCs left over, they can be sold on the open market. This model can be adopted in the same or other areas at the national or local level depending on the institutional competency and the normative framework that is available.
- Environmental rights market refers to the possible transaction, in the marketplace, of licenses, permits, land usage, private space to be converted to public space, rights for construction height, etc. It includes the residual markets in the context that waste production is permitted and can be regulated or not, but it must at least comply with the Basel Convention on border crossings of hazardous materials. The rights market is in incipient development and requires certain creation of regulations to avoid possible future difficulties among the actors regarding their responsibilities.
- “Green” markets refer to the emergence of markets with the purpose of providing activities and products with low environmental impact, known as green products, which include the maintenance of ecosystems, ecotourism, organic agricultural production, and forest products. Some of these products are based on another type of green market that provides certification. These markets stimulate the exit of goods and services of high environmental impact or generate the adoption of good environmental practices by companies that are trying to keep less environment-friendly products on the market. Public environmental entities can participate in the development of this instrument by opening marketing channels, backing products, regulating or imposing certifications, etc. For this reason, it is also considered an administrative and technical instrument.
- Financial instruments are intended for obtaining resources or income to finance projects so that corporations, government organizations or

nongovernmental organizations (NGOs) might work in the area of environmental management. They can also be used as an incentive to facilitate the creation of, or access to, brand credit for those companies or organizations that work for environmental protection and which effectively comply with environmental demands or require resources to do so, especially when it concerns micro, small or medium sized companies.

- Insurance against damages is a strategy of transferring risk to an insurance company. This scheme, although long standing in mercantile practices, has become a model in full development to cover the potential environmental damages and natural or man-made risks. A first example is that of policies against risk (or of an extra-contractual civil responsibility) assumed voluntarily or under obligation by a person or legal entity, stimulated either by the reduction of the premium or by the interest in protecting the insured assets or life. A second example is the transfer of risks in a communal or massive form to insurance companies in the name of groups of persons or by the public administration (a municipality, for example³⁷). On the part of the insurer, there is always the stimulus of reducing the risk of occurrence of the insured event, which can be required through investments in risk reduction, or can be taken on by the insurer in cases of collective risks, based on pertinent studies.

6.4.3.6 Administrative Instruments

These include planning instruments, some of which are fiscal such as tax exemptions, whereby the administration may regulate the conditions of application; legal procedures for requiring, controlling, following up and monitoring the normative compliance; imposing sanctions; stimulating environmental markets; generating

knowledge through research, environmental and similar monitoring networks; environmental and risk evaluations; licensing; compliance policies and insurance against damages (risk transfer); developing indicators; implanting alert mechanisms; applying systems of environmental management, subscribing voluntary conventions with environmental users and compliance agreements; developing prizes and recognitions, strengthening and coordinating institutional competencies, delegating environmental authority to other entities; opening spaces for citizen participation, consulting, and oversight; resolving complaints and lawsuits; communicating and educating, stimulating the publication of public performance reports; and managing information systems, and are among the most often mentioned instruments.

Below is a review of some instruments that have not been dealt with in other sections.

- Environmental procedures allow entities to establish rules for relating to the users, strengthening the most complex or least likely to comply with the norms, and freeing from the procedures those that are irrelevant in environmental terms, or who demonstrate exemplary behavior, or who employ certain environmental practices that are not always cost efficient (changes in the granting of licenses or permits, or simply in the updating of information on each user in a system that tends to be public). The procedures include institutional training to exercise environmental control and all of the pertinent activities, among others, imposing sanctions. Without these skills, environmental management is practically non-existent.
- Norms are issued by the administration to ensure that environmental procedures make sense. These may take the form of laws, regulations or techniques. It is the administration that, according to its knowledge of the environment, proposes the

37 In Sabaneta, Colombia, the municipality acquired a general policy to cover the population against massive events, landslides, etc.; the insurer is progressively realizing works to reduce risks and thus reduce the probability of incurring in the payment of damages (VARGAS, Richard, 2006, personal communication).

norms, discusses them and accepts or issues the regulations on and applies them. These norms include those applicable to i) coexistence, or those that allow avoiding conflicts between persons (which may or may not be what guarantees the security of the persons, for example, the fact that the entire highway should have a protected strip of at least one meter for pedestrians and bicycles); ii) performance, or those that establish minimum standards of behavior for the users of the environment (for example, all wastewater in the urban area should be treated and be connected to a sewer system, or not allowing water consumption per ton of raw materials of more than a given amount); iii) environmental quality, which establishes the conditions in which exposure of people to the medium is considered safe,³⁸ or which establishes a minimum of vegetative cover or a minimum of public open space per person (for example, the arithmetic average of average daily concentrations of particulates smaller than 10 microns (PM10) in 365 days, which cannot exceed 50 $\mu\text{g}/\text{m}^3$, or the minimum of green space per person in a city should not be less than three hectares); iv) emissions³⁹ (for example, the maximum charge allowed of biochemical demand for oxygen (BDO) by the sewer system); v) techniques that may establish the characteristics of certain minimum technologies to be employed (for example three-way catalytic converters), as well as the characteristics of certain inputs or products (for example, minimum levels of recycled paper in new production paper).

- Generation of knowledge is important because without knowledge there can be no environmental management. Generating data and information reduces the level of uncertainty about the decisions that the state and the private sector must take, among other things, about what its relationship should be with the environment. The private sector also conducts studies that should be systematized to provide the public sector with information it needs for administration. The statistics are especially important when phenomena, for example the climate, have a dynamic quality that is understandable only over long periods of monitoring. The same goes for the hydrological behavior of an area related to the regenerative capacity of a forest.
- Environmental evaluation of projects is an administrative and analytical instrument for projects. It has two basic forms: i) strategic environmental evaluation, and ii) environmental impact evaluation.
 - The first seeks to verify the environmental viability of the project at an early planning stage in consultation with the principal actors, without entering into analytical details. Instead, it focuses on the prospective, observing the logic of the project according to the socioeconomic and political context in which it is developed.
 - The second has been promoted since the 1970s as a decision-making tool for the pur-

38 These parameters define levels of quality for water, air, soil, and scenery, as a result of the analysis of physical, chemical and biological conditions, to determine the ecosystem's capacity to absorb emissions, resist transformations and maintain a dynamic equilibrium.

39 Emission standards refer to the level of physical, chemical and biological contamination that are acceptable (safe) for a society. The main objective of these standards is to set maximum permitted limits for the emission of substances into the atmosphere, above which sanctions are applied.

pose of giving dimension to the impacts and the positive and negative effects of a public or private project under consideration for approval. If it is viable, necessary measures are recommended to avoid, minimize or compensate for the impacts and negative effects⁴⁰ it may have. This evaluation is based on the preparation of environmental-impact studies. Typically, these studies include a description of the environment (the geology, climate, geomorphology, soils, biotype, human demographics, economic dynamic, culture, archeology, norms, institutions, environmental and technological risk analyses). These analyses allow for the identification, interpretation, prediction and prevention of the consequences of actions generated by the project's implementation on the health and well-being of people, ecosystems and assets of cultural and patrimonial interest.⁴¹

- Environmental management, updating or recovery plans are mechanisms through which the public administration imposes on the environment user, a set of activities aimed at avoiding or mitigating environmental and social problems, to include environmental practices designed in accordance with applicable standards or with those required by the plan to repair damages, upgrade the conditions of the affected areas, or carry out actions for environmental recovery, etc.
- Plan for social management reflects the commitment to the community of a natural resource user in the sense that the user assumes, or has obligations imposed to assume, an approach to working

with the community or encourage its participation, or in keeping it informed on the progress and execution of the project.

- Risk evaluation (natural or technological) is carried out in projects or in the prevailing social conditions. These are frequently included as a prerequisite in the studies of environmental impact since we are usually dealing with situations that can put the population affected by the project at risk. They are also frequently carried out as a legal requirement in some cases for urban or rural land use management plans. Finally, they are implemented in areas where the occurrence of disasters has been detected and the evaluation of hazards indicates the need to go ahead and do an analysis of risks. Financial risks and those of social and environmental opportunities are also analyzed for projects.
- Environmental licenses or permits are administrative acts through which the environmental authority authorizes the execution of works, the establishment of industries or the development of any activity likely to cause severe environmental damages or considerable modifications to the landscape.⁴² These instruments serve to follow up on the imposed obligations, which normally include plans for environmental management (demands on behavior or investment, actions of impact mitigation, compensations and similar components). The instrument is a means of state intervention par excellence, which is frequently used even to intervene in the technological decisions that should be adopted unilaterally by the user; these situations sometimes lead to freeing the license or permit holder from certain responsibilities.

40 Some people sustain that environmental impact evaluations are planning instruments, and for this reason are included in this block, to the extent that they generate recommendations for acting on a timely basis, avoiding or minimizing damages. Environmental impact evaluations have become, at least in Latin America, procedural instruments required for obtaining an environmental license.

41 ORTEGA, Rodríguez Ramón, RODRIGUEZ Muñoz Ignacio. Manual for Environmental Management. MAPFRE 1994. p. 129.

42 Some authors, such as Rodríguez, M. (2002) consider environmental licenses to be planning instruments; in reality they are subsidiary instruments in the case of not having a land use management plan that is adequately designed and environmentally evaluated.

- Compliance policies normally back obligations imposed by the authorities on the beneficiary of an environmental license or a permit, or a similar environmental management plan. This policy, normally issued by an insurance company, can at times be replaced by a letter of credit or something similar.
- Alert mechanisms allow for adopting immediate administrative and police measures to reduce the problems of contamination. Mexico City is famous for these measures, when the levels of contamination pass the established limits, authorities prohibit automobile traffic and even the operation of some companies. This instrument is also applied in relation to the risks. As an example, there is an alert system for handling the situation of the Galeras Volcano in Colombia where, depending on volcanic activity, authorities order the evacuation of the persons living in the affected area.
- Environmental management systems are voluntary instruments with which environment users (companies or domestic) can adopt good practices regarding the productive processes or routine daily activities. Internationally, there are models such as Responsible CARE for the chemical industry or ISO 14000, etc. There are also models for the production sector. For the domestic sector there are manuals of good practices related to saving energy (illumination, heating water, etc); saving water with the help of efficient equipment, waste management, etc. Although the practices are characterized as being voluntary, the promotion of these administrative instruments reduces the cost of management and has significant effects on the environment.
- Voluntary agreements allow the administration to agree with production sectors on levels of compliance and environmental performance that go beyond the norms, open spaces for citizen participation, the generation of forms of financing for environmental investment, the obligation to stimulate or justify the adoption of other instruments, and other benefits. These conventions revolve around a principle connected to the cleaner production model,⁴³ and new generations of agreements to the point of foreseeing the relocation of companies with the adoption of environmentally healthy technologies.
- Compliance agreements are basic instruments for facilitating compliance to the norms, without initiating the job with sanctioning measures. They define timeframes and resources in the individual commitments of the users linked to these processes, as well as mechanisms for follow-up and consequences in case of non-compliance.
- Prizes stimulate the performance of innovative projects. There are several worldwide initiatives, such as that of the WEC,⁴⁴ that award corporate performance, without the intervention of the public sector. Certain governments have since opted for initiating similar models. Some are simple, others more complex, such as the DAMA Environmental Excellence Prize awarded by the environmental authority of Bogotá, Colombia.⁴⁵ These prizes can be, basically, recognitions for the management of one or various environment users

43 Cleaner Production (CP) was a successful model promoted by UNEP, Paris branch, since the end of the 1980s. Several countries implemented CP Centers that still support processes of optimization for corporate production.

44 World Environmental Council.

45 This prize, awarded by the environmental authority of Bogotá, the District Secretariat of the Environment (previously the Administrative Department of the Environment, or DAMA), verifies corporate performance in a set of variables; it also highlights companies that have advanced in environmental excellence and others that have remained there. The prize basically includes a symbolic element and a lot of advertising. See www.dama.gov.co.

or of an NGO or a community or a territorial authority or individuals. Several private companies already award prizes of this type, and thanks to these prizes, public administration's environmental management is made much easier.

- Certifications basically refer to certifications of environmental compliance that the authorities may issue to the users.
- Participation, consulting and oversight are reviewed in the social context, even though these instruments are also related to administration.
- Denunciations and complaints compose a powerful administrative instrument that allows the administration to act without delay in function of the interest of the population, before problems occur that can become complex to resolve. An example is the denunciation of possible landslides that should lead the administration to take immediate measures to avoid social and environmental disasters. When the citizenry makes denunciations or complains about environmental matters, the administration demonstrates whether it works or not.
- Performance reports are mechanisms of communication between the public administration and the citizenry, or between companies and the citizenry. In both cases the intention is to adequately inform the public on the state of the environment and the performance of the administration or the companies, through the use of indicators. These should be easily understood and verifiable. Performance reports have become a mechanism of expression of corporate social responsibility, in which the social and environmental management of the corporations or public administration is clearly demonstrated.
- Information systems are instruments through which the administration stores, transforms, divulges, analyzes, and constructs environmental and social information. They should contain the essential environmental indicators to follow up on the quality of the environment, at the level of

corporate compliance, and at the alert level that should be adopted, according to the data generated by the monitoring networks. These systems are based on geographic references.

6.4.3.7 Social Instruments

The importance of opening the doors of the planning process to the community, where each instrument should have an ideal mechanism, was previously demonstrated. The plan for social management as an administrative instrument was also mentioned.

- Participation: When dealing with social aspects, the essence is to connect the population to the processes and projects, in an active manner, previously documented, its implications duly analyzed and having sufficient, clear and understandable information to feed the participatory processes in all of the entities pertinent to planning, norm establishment, administration and everything else. In general, Latin America, North America, and Europe have established civil participation in the laws of the countries as an integral part of the decision-making process. In practice, participation in environmental matters is oriented toward consultation and oversight.
- Consultation: This deals with submitting plans, programs or projects to discussion, for the analysis of their environmental and social implications. The most frequent situation is that in the process of environmental evaluation, the consultation prior to granting environmental licenses takes place through a variety of media. In some countries (Argentina, for example), it is sufficient to put environmental evaluation at the disposition of the public by announcing the facts in the press; in other countries, such as Chile, Ecuador, Colombia, Costa Rica and Nicaragua (to mention a few), it requires a public hearing or something to that effect for certain types of projects, and depending on their conditions. In general, consultations are not decision-making actions, but rather provide the environmental authority with criteria. In regards to the consultations, both the World Bank and the Inter-American Development Bank can

include in their safeguard policies the programming of consultations in projects they plan to finance, especially when those projects require environmental impact (type A) studies.

- **Oversight:** This instrument also exists in almost all legislation and is intended to be a support mechanism for the government related to project follow-up. It is based on the empowerment that the state gives to the community to watch over the obligations of the contractors or whoever is carrying out the projects, normally according to the obligations imposed through licenses, permits, or plans for environmental management.
- **Communication and education:** For any process of social participation there must be communication of information about the processes and the decisions (administrative acts, norms, projects, financing, etc.). The population should be informed to exercise their rights and comply with their duties, to contribute to the performance of the projects, and to realize the follow-up of these and their effects. Communication should be progressively articulated with the informal and formal plans, in such a way that the effects of the communication (and of the participation), be achieved in an ever more efficient manner.

6.4.3.8 Technical Instruments

In reality, most of the instruments mentioned until now require a technical basis, without which the instrument

possibly becomes unfeasible. For this reason, we point to the matrix of Articulation of the Principal Components of Environmental Management, the tool that requires the most technical clarification.

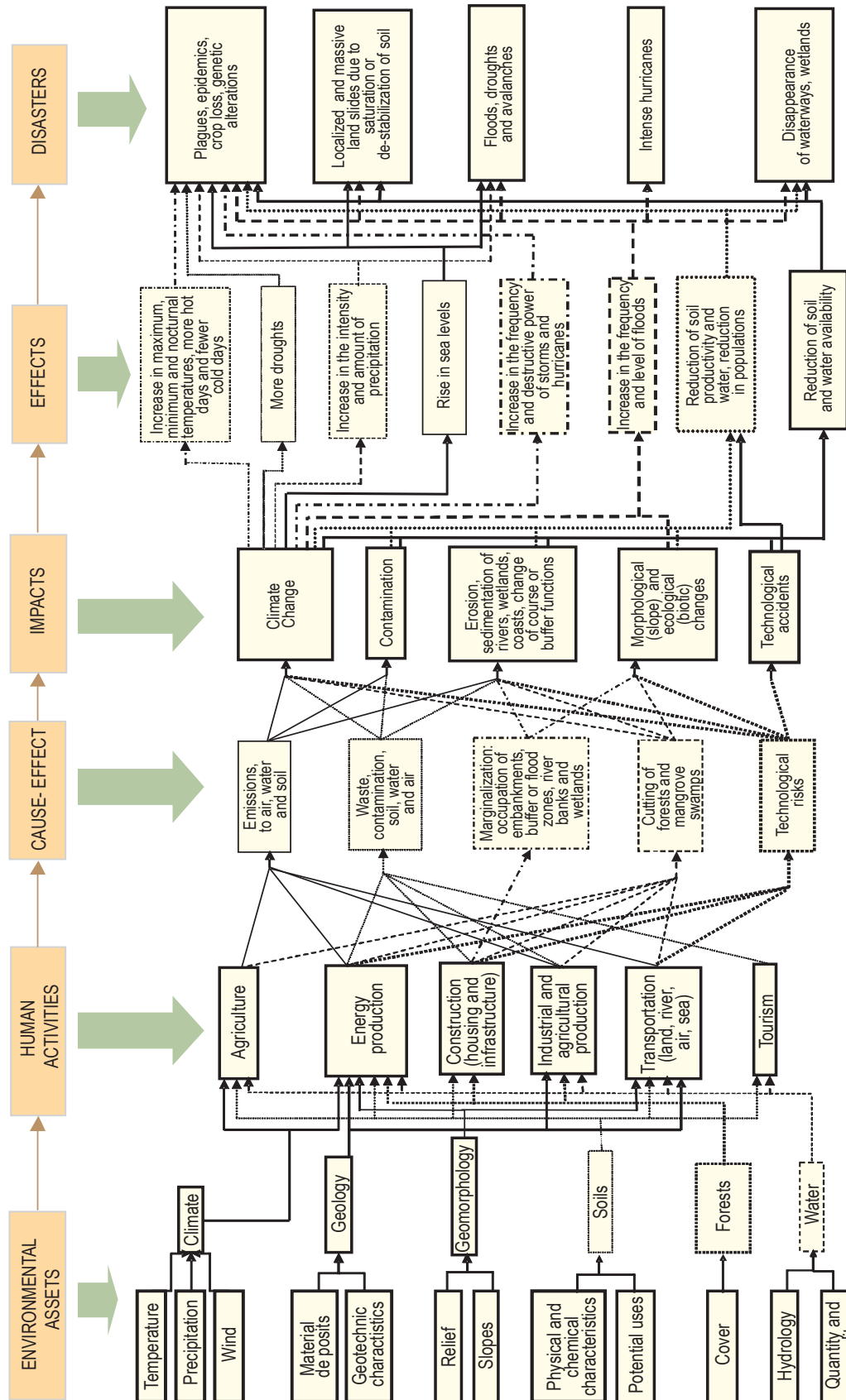
6.4.3.9 Instruments for Self-Management

This is the stimulus for private initiative regarding the improvement of its environmental management and the reduction of risks. Although this family of instruments tends to have greater application among large corporations, it applies to small and medium companies to the extent that they clearly see the value added of the opportunities that they face. These instruments have been explained in previous chapters, but it is important to stress that, when they work, the level of effectiveness of the environmental management increases significantly with a minimum cost for society.

7. ENVIRONMENTAL ASSETS, ENVIRONMENTAL IMPACTS AND THEIR RELATION TO THE GENERATION OF RISKS AND DISASTERS

As seen in the model that contains the elements of land use transformation, humankind requires the use and transformation of resources that nature offers, which are known as environmental assets, for the development of activities that allow humans to improve their quality of life, through processes of economic and social development. These activities have effects on the environment, the most classic of which are highlighted in the following graphic.

Figure 5. Environmental Impact and Disasters



The previous figure, created especially for this document, makes it easy to identify the niches whose connection allows participants to advance toward an integrated plan for risk and environmental management.

This figure is neither exhaustive nor detailed in regards to environmental assets, nor in regards to the list of possible disasters that occur in reality. However, it does allow an understanding of how the relationship of disasters is intertwined with environmental phenomena and human activities, one of the most important forces, together with the natural dynamics of disaster generation. Finally, the reality is that disasters produce damage to people, goods and services (including those of the environmental type).

The figure also articulates various levels of resolution, whose comprehension is based on different space-time dimensions. For example, although it is true that the process of climate change is a slow phenomenon having global effects, it is also true that it has specific effects that can bring about problems whose dimension are strictly local and frequent. This is the case with landslides, frequently induced precisely due to human activities.

This scheme also allows an understanding that human activities, as simple as they may seem, are not disconnected from numerous phenomena, induced by human beings, whose effects end up generating social, economic and environmental costs, usually quite relevant for society, and especially those societies that have marginalized populations, such as those of Latin America.

In this sense, it is quite relevant to reconsider the concepts that emanate from the history of human settlements, especially from the intense processes of urbanization that humankind has experienced over the last six decades. This deals with social marginalization associated with the localization of their settlements. Irregular land occupation has prevailed in practically every city of the Third World, given that the lowest income populations settle in areas where the value of land is lowest, coinciding with places of difficult access, unstable conditions or little productive value, such as embankments, swamps, wetlands, river banks and other similar places. And this is precisely where disasters most frequently occur, in other words, where the population tends to suffer most from

the effects of catastrophic events, causing deaths and damage to goods and services.

Although this has been documented by numerous authors (see, for example, Aysan 1994; Wisner 2002; UNDP 2004; Cardona 2004; World Bank 2005), it is well worth remembering the validity of Aysan's conclusions (1994, p. 14) to the effect that "vulnerability to disaster occurs at the local level and needs to be understood and mitigated at the local level," in spite of which, little effort is made to understand local hazards and local conditions of vulnerability, since the vast majority of attention is focused on major events. And these analyses of local vulnerability require dynamic and flexible approaches, including approaches that can go beyond those suggested by Wisner (2002), since they frequently involve not only diverse social conditions, but also numerous environmental aspects, as indicated in the figure above.

These suggestions make it possible, as exemplified in the rest of this document, to contribute to the structuring and articulation of instruments based on which environmental and risk management are able to act in function of a single purpose: to minimize the threats to persons, goods and services and to improve the management of their natural and man-made surroundings.

8. THE ORIENTATION OF INTERNATIONAL POLICIES AND NORMS

The following table presents a relationship among the principal international meetings that have generated guidelines for dealing with environmental problems, as well as those of disasters and the economic and social losses associated with them.

What it shows is that, in spite of the fact that recommendations generated by a wide range of inter-governmental conferences have motivated institutional and normative changes in each of the themes in the different countries, there is still a conceptual divide between the management of risk and environmental management. Despite the fact that the conferences dealing with the environment may include an occasional principle related to risks or disaster prevention, there is still no perception of a strategy with recommendations of integrated management.

Table 3. International Guidelines for Environmental Management and Risk Management

INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION (Activities)	YOKOHAMA STRATEGY (Principles)	HYOGO ACTION FRAMEWORK (Priorities of action)	OBJECTIVES OF THE MILLENNIUM	AGENDA 21 (Chapter 7) ⁴⁶	JOHANNESBURG
<p>Identification and evaluation of risk.</p> <hr/> <p>Evaluation of the vulnerability and danger, analysis of the cost-benefit ratio for investment in mitigation and prevention.</p> <hr/> <p>Provide adequate information for adopting decisions and general policies.</p>	<p>Evaluation of risk is an indispensable step for the adoption of a policy and appropriate and positive measures for disaster reduction.</p> <hr/> <p>Disaster prevention and preparation for disaster events take on importance, fundamental for reducing the need for help in case of disaster.</p> <hr/> <p>Disaster prevention and preparation for disaster events should be considered integral aspects of planning and development policies in national, regional, bilateral, multi-lateral and international plans.</p>	<p>Ensure that disaster risk reduction constitutes a national and local priority having a solid institutional base of application.</p> <ul style="list-style-type: none"> - National institutional and legislative frameworks, - Resources, - Community participation. <hr/> <p>Identify, evaluate and watch over disaster risks and activate early warning.</p> <ul style="list-style-type: none"> - Evaluation of risks at national and local levels, - Early warning, - Capacity, - Regional and emergent risks. <hr/> <p>Utilize the knowledge, the innovations and education to create a culture of safety and resilience at all levels.</p> <ul style="list-style-type: none"> - Management and exchange of information, - Teaching and formation, - Research, - Public awareness. 	<p>Eradicate extreme poverty and hunger.</p> <hr/> <p>Attain universal primary education.</p> <hr/> <p>Promote gender equality and female empowerment.</p>	<p>The objective is to put all countries, especially those prone to disasters, in conditions to mitigate the negative consequences for human settlements, national economies and the environment, from natural disasters or those provoked by human activity.</p> <hr/> <p>Develop a culture of security.</p>	<p>Participants committed to reducing the economic, social and environmental repercussions of natural catastrophes, intensifying international cooperation, deploying rational technologies and continuing with the preparation of early warning systems.⁴⁷</p>

46 Program 21 is quite wide reaching and other chapters allude to risks. Chapter 7 was chosen as the most relevant for the purposes of this document.

47 UN. Project of political declaration, presented by the president of the summit. Johannesburg, South Africa 2002.

INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION (Activities)	YOKOHAMA STRATEGY (Principles)	HYOGO ACTION FRAMEWORK (Priorities of action)	OBJECTIVES OF THE MILLENNIUM	AGENDA 21 (Chapter 7) ⁴⁶	JOHANNESBURG
<p>Vigilance, prediction and alert, as well as wide-spread publication of the warnings, evacuation plans, etc.</p> <hr/> <p>Adopt both structural and non-structural long-range measures.</p>	<p>Establishment and consolidation of capacity to prevent and reduce disasters and to mitigate their effects are matters of high priority that must be taken into consideration in the Decade in order to lay a solid base for the activities to come.</p> <hr/> <p>Early warning of imminent disasters and the effective diffusion of the corresponding information through communications, including radio broadcasting, are key factors in preventing disasters and good preparation for them.</p> <hr/> <p>Preventive measures are more effective when they involve participation at all levels, from the local community to the regional and international plans including the country governments.</p>	<p>Reduce underlying risk factors.</p> <ul style="list-style-type: none"> - Environmental and natural resource management, - Social and economic development practices - Land use planning and other technical measures. 	<p>Reduce the mortality of children under 5.</p> <hr/> <p>Improve maternal health care.</p> <hr/> <p>Combat HIV-AIDS, malaria and other diseases.</p>	<p>Activities of pre-disaster planning.</p>	

INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION (Activities)	YOKOHAMA STRATEGY (Principles)	HYOGO ACTION FRAMEWORK (Priorities of action)	OBJECTIVES OF THE MILLENNIUM	AGENDA 21 (Chapter 7) ⁴⁶	JOHANNESBURG
<p>Short-term measures of protection and preparation.</p> <hr/> <p>Measures for early intervention and response in case of disaster.</p>	<p>Vulnerability can be reduced by applying appropriate methods of design and certain development models oriented toward beneficiary groups through the provision of adequate education and training of the entire community.</p> <hr/> <p>The international community recognizes the need to share the technology needed for preventing and reducing disasters and for mitigating their effects.</p> <hr/> <p>Protection of the environment as a component of sustainable development in concert with palliative actions against poverty is essential for preventing natural disasters and mitigating their effects.</p> <hr/> <p>The primary responsibility falls on each country to protect its population, their infrastructure and other national assets against the impacts of natural disasters.</p>	<p>Bolster preparation for disaster events in order to ensure an effective response at all levels.</p> <ul style="list-style-type: none"> - Bolster normative, technical, and institutional capacity. - Promote the exchange of information and institutional coordination. - Bolster regional communications systems to prepare and ensure rapid response. - Prepare or revise and periodically update plans and policies of preparation and contingency for cases of disaster at all levels. - Promote the establishment of emergency funds. - Create mechanisms that promote community participation. 	<p>Guarantee the sustainability of the environment.</p> <hr/> <p>Promote a worldwide allegiance for development.</p>	<p>Reconstruction and planning for post-disaster rehabilitation.</p>	

This table basically gives rise to concerns of how, after so many worldwide efforts to work on two complementary themes, the two schemes for management continue to remain isolated from each other. The panorama, seen from the Latin American and North American perspectives,⁴⁸ indicates that risk management:

- i) is less analytically and institutionally evolved than environmental management,
- ii) continues to emphasize the attention and correction aspects (in other words, reactive actions),
- iii) tends to be handled by entities close to political power because disasters have political impacts of greater transcendence than environmental problems,⁴⁹ and
- iv) directly involves municipal entities more than does environmental management.

On the other hand, environmental management:

- i) continues to emphasize its work on the procedures for granting licenses or permits and pollution control,
- ii) is backed by much older institutions than those related to risks, generally on the national or regional level, and
- iii) as a consequence of the above, rarely has municipal support.⁵⁰

Taking into account these reasons, it is necessary to plot a course for promoting risk management that will allow real and timely articulation of environmental management and risk management, adopting a strategy of using

the instruments common to both, whose application can lead to actions that can be carried out by independent entities.

9. INSTRUMENTS FOR THE INTEGRATION OF ENVIRONMENTAL MANAGEMENT AND RISK MANAGEMENT

Upon reviewing the model of environmental management instruments, one can conclude that risk management also includes the definition of objectives and purposes in order to be implemented through different instruments that in one way or another are similar in both fields. To refresh readers' memory, the following table synthesizes the fundamental scheme.

Table 4. Fundamental Scheme

Objectives	Purpose	Instruments
Social Economic Environmental	Policies	Planning
		Normative
		Institutional
		Fiscal
		Econom./financ.
		Administrative
		Social
		Technical
		Self-Management

48 Observations on the ground and on the Internet indicate that the interests of environmental entities have marginal responsibilities on matters of disasters, and their relationships with those in charge of risks are scant or non-existent.

49 The importance of this fact is that when disasters have national impact, the decisions do not require different filters for the instructions issued by the President of the Republic to the pertinent entities.

50 There are certain exceptions in the large cities of Latin America: cities with populations of more than 1 million inhabitants in Colombia, Quito and Cuenca in Ecuador, Lima in Peru, and Buenos Aires in Argentina, to mention a few.

The following table shows how various instruments of environmental management are similar to those of risk

management in function of their typical lines of action and the organization for their operation.

Table 5. Articulation between Environmental Management and Risk Management

Organization for management	Management of disaster	Management of risk	Knowledge of risk	Lines of action for risk management	Instruments for environmental management
X		X			Development plans
X		X			Plans for usage*
X	X	X			Action plans
X		X			Programs
X	X	X			Projects
X	X	X			Budgets
X		X			Project evaluation
X	X				Taxes
		X			Rates
X		X			Tax exemptions
X		X			Social compensations
X		X			Norms of coexistence
		X			Norms of performance
		X			Quality standards
X		X			Technical norms
		X			Requirements and sanctions
			X		Knowledge generation****
			X		Environmental evaluations
X			X		Risk evaluation
X		X			Mgmt. update, restoration
X		X			Social management plan
X		X			Insurance against damage
X		X			Control
X		X			Follow-up
X		X			Monitoring
X		X			Indicators
		X			Compliance agreements
		X			Institutional competencies
		X			Authorities and delegations
X		X			Participation
X			X		Consultations
X		X			Oversight
X		X			Denunciations, complaints
					Communications
X		X			Information systems

* Territorial, environmental, land use, urban, resources, (water, forests, etc.): includes the restrictions for use of spaces or resources, the generation, recuperation and management of protected areas and public spaces.

**** Data, information, quality or monitoring networks, studies.

The previous table leads into the following scheme, in which the actions necessary to integrate environmental management and risk management are listed through the instruments they have in common.

Each reality is different and therefore, the actions may require more or less intensity, depending on the norms

applicable to each country, the priorities for management and their resources. Also, the actions require clearly defined objectives and the strong backing of policies pertinent to each specific case.

The following table presents the initiatives for action.

Table 6. Action Strategies for Articulating Environmental Management and Risk Management

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Development plans		Risk management and environmental management are articulated in the development plan objectives and policies.		The environmental entities meet with those responsible for risk management, especially municipalities, to support the preparation of plans.
Plans for usage*		Every type of plan should include the evaluation of risks and the actions to minimize them, including the generation of public open spaces or natural reserves in high-risk areas. Settlements at risk should be relocated. The plans shall include criteria for human settlements, in keeping with environmental criteria for conservation of areas with ecological interest.		The preparation of every type of land use plan is made with the participation of the environmental entities, the responsible parties for risk management and the municipalities.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Action plans		There should be risk mitigation projects every year.	The environmental authorities and those in charge of risk management have action plans where they define the support of the former during the attention to a disaster.	The preparation of every type of action plan is made with the participation of the environmental entities, the responsible parties for risk management and the municipalities.
Programs		Environmental programs should include risk mitigation programs.		The preparation of every type of program is made with the participation of the environmental entities, those responsible for risk management and the municipalities.
Projects		Environmental investment projects are prioritized in function of the needs for risk mitigation.	Environmental authorities execute projects to contribute to disaster management, while carrying out the directives of the disaster coordinator.	The preparation of projects is made with the participation of the environmental entities, those responsible for risk management and the municipalities.
Budgets		Budgetary processes prioritize investments in environmentally sensitive areas according to the level of risk that they generate. The environmental income is dedicated on a priority basis to risk mitigation, when it is associated with areas that generate hazards.	The environmental authorities back disaster management with budgets.	The preparation of budgets is made with the participation of the environmental entities, those responsible for risk management and the municipalities.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Project evaluation		Projects are evaluated using risk analysis, together with environmental criteria, analyzing the project with and without investment in risk mitigation.		The norms oblige project evaluation including environmental and risk criteria.
Taxes			Governments make taxes flexible or generate exemptions to facilitate the attention to and recuperation from disasters.	Norms are designed to give flexibility to tax management for disaster situations and to stimulate solutions such as population relocation.
Rates		Rates of natural resource use are studied for investment in environmental management and risk reduction; uses creating risk are saddled with high rates (encroachment on floodways, for example).		
Tax exemptions		Granted to populations requiring resettlement (property tax, for example).		Tax exemptions are adopted to stimulate the reduction of vulnerability of the population, the change of land use, private environmental investments, etc.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Social compensations		Applied to vulnerable social groups to facilitate resettlement, for example, or to ensure unstable areas are not cultivated.		Rules are established for analyzing social compensation and the cases and criteria for pertinent negotiations.
Norms of coexistence		Developed to guarantee that public sector interventions do not end up vandalized; mechanisms of solidarity are developed.		Preparation of criteria for regulating the principles of coexistence and dissemination.
Performance norms		Lines of behavior developed for disaster prevention and response; these include mechanisms for communication and preparation.		
Quality standards		Establishment of conditions of land use and limiting risk-generating activities.		
Technical norms		Review or establishment of seismic-resistant building norms for embankments, norms for intervention in rural areas (minimum forest cover).		Necessary studies are carried out to define the norms and their scope related to common themes in the areas of risk and environmental management.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Requirements and sanctions		Sanctions are established for those who fail to comply with the norms of behavior and generate risk or fail to participate in its reduction.		
Generation of knowledge*****	Environmental studies should include risk analysis (starting with hazards) including population, settlements and vulnerability; the networks for data generation should feed the models of risk indicators, including warning systems.			
Environmental evaluations	Risk analysis of the areas where projects are underway is incorporated in the terms of reference of the environmental evaluations.			
Risk evaluation	This evaluation should include environmental analysis and recommendations for land use management.			All of the evaluations are systematized and published leading to the preparation of contingency or emergency plans.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Plans for management, updating, and restoration		These should be included in the objectives of risk reduction.		Norms are issued with subject matter and minimum orientation for these plans.
Plan for social organization		Should include awareness and preparation for facing risks associated with the projects of the plan.		Norms are issued with subject matter and minimum orientation for these plans.
Insurance against damages (policies)		All projects should include policies to cover risks they might generate; The option is expanded to include risk policies for entire communities (risk transfer).		Regulations are developed to permit risk transfer and to stimulate the generalized adoption of this instrument.
Control		Environmental authorities and the municipalities exercise coordinated control over risk situations.		The norms establish control criteria, articulated among the environmental authorities and those responsible for risk management.
Follow-up		Idem (control); follow-up data is shared among entities.		The norms establish follow-up criteria, articulated among the environmental authorities and those responsible for risk management.
Monitoring		Environmental and risk monitoring is integrated into common information systems or are shared.		The norms establish monitoring criteria, articulated among the environmental authorities and those responsible for risk management.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Indicators		The environmental authorities, those responsible for risk management and the municipalities structure a shared system of indicators (risks, environmental, alerts).		Regulations are established with the requisite obligations needed for an applicable and updated system of indicators.
Alerts		Alerts of natural risks are articulated with environmental management and strengthened.		
Compliance agreements		Municipalities develop agreements with the communities to mitigate risk.		
Institutional competencies		Norms include institutional authority on matters of environmental management instruments and lines of risk management with specific responsibilities.		
Authorities and delegations		All municipalities are delegates in matters of risk management; the environmental authorities delegate responsibilities to municipalities while observing those related to risk.		

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Participation		Citizen participation processes include environmental and risk management in a current and coordinated form.		There is regulation of minimum schemes for social participation in environmental and risk management including planning instruments.
Consultation	Mechanisms of consultation are systematized to obtain information from the communities, with emphasis on natural risks.			Procedures for effective and efficient consultation and outcomes are regulated for plans, programs and projects; the results are then evaluated.
Oversight		Communities are trained to oversee environmental issues and risks; indicators and channels of communication are established to facilitate oversight.		The role of citizen oversight is regulated and minimum criteria for social training for carrying out this task are established; the results are evaluated.
Denunciations and complaints		The environmental entities and municipalities receive denunciations or complaints concerning risks as well as environmental matters, and they resolve them in an expeditious and coordinated manner.		The procedure for the citizenry to exercise its right to denunciations and complaints is regulated as well as the obligation for the state to respond and resolve them.
Communication and education	Communication is used to inform and compile information on natural hazards, vulnerability and environmental management.	Programs of communication and education are developed where criteria come together on environmental and risk management.	Programmed communication of actions is put into motion to keep the population informed on matters of environmental and risk management as required.	The obligation for communicating programs and the production of reports is regulated, and educational programs for the population and public staff members are established or revised.

INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT	KNOWLEDGE OF THE RISK	RISK MANAGEMENT	DISASTER MANAGEMENT	ORGANIZATION FOR MANAGEMENT
Information systems	Models for alert in environmental and risk management are developed.	The environmental authorities expand information systems with criteria for risk management and articulate them with those for environmental management, which are fed into alert models.		The obligation of articulating information systems, joint areas of work and the demands of opening the systems to all interested parties are regulated.

10 STRATEGY FOR THE FUTURE

So far, this chapter has basically tried to express how the concepts of risk and environmental management have been handled independently, how environmental management has marginally incorporated some type of responsibility for matters of risk, and how the two areas of administrative action dealing with a single principle can be articulated to guarantee a better way of life for the human population while respecting the fundamental characteristics of nature.

Nonetheless, participants must recognize that one of the reasons these two themes are generally kept separate is because each gives political visibility in a different way—disasters tend to be devastating in terms of a political leader's image when they unfold and the leader fails to take necessary actions. On the other hand, disasters yield very high political profits when the calamity of a population affected by a fortuitous event is addressed.

In contrast, environmental problems and their effects are old news derived from environmental management of a territory, except when translated into public calamities susceptible to being handled through a mechanism for managing emergencies. They do not generate major political profits. They have, however, come to be the object of world attention with ever more intensity, and a wide variety of instruments are now being developed.

Fortunately, social pressure and public opinion also play an important role, since these have caused, in an increasingly visible way, that the two fields must find expression in management terms. The point is that risk and environmental management clearly have numerous elements in common that could allow them to combine into a synergetic, single tool if a progressive process of articulation is promoted while respecting the position that each, respectively, has gained. The question is: How can these synergies of the two management schemes be exploited without weakening them?

Several tasks come to mind to continue a process of constructing synergies that present numerous opportunities for international cooperation, and at the same time indicate the long road ahead, still remaining to be traveled, in spite of the decades of accumulated experience in the areas. Below, a few guidelines for action:

- It is necessary to study ways to highlight the political benefits of integrated risk and environmental management in the sense that saving lives not only reflects a basic ethical attitude, but also generates more benefits when compared to the task of assistance during disaster situations.
- This work implies carrying out a strategic analysis oriented toward: i) examples of visualizing the

- benefits quantified in socioeconomic terms; ii) presentation in a way that becomes politically “profitable” to integrate risk management with that of environmental management; and iii) visualization of how it is more politically expensive to allow the circumstances to “manage” the risks or the environment independently.
- The tasks noted above will allow for strengthening the search for high-level political backing in order for them to become the means for driving the integrated task of risk and environmental management without forgetting that each one must take different paths at certain moments or actual conditions. Only when the highest decision-making levels are involved will local levels, where the essential territorial management takes place, survive the disaster and the tangible deterioration of the environment, and feel supported in promoting integrated risk and environmental management, to the extent that their authority permits.
 - Articulation will also require one or several studies on the way the risk and environmental management should be handled, specifically in the Latin American context of each country, in order to ultimately achieve an analysis of the mechanisms needed to put this integrated risk and environmental management into practice from a technical, legal, and economic perspective. The general example of that analysis is contained in this document.
 - It will then be useful to conduct a detailed evaluation of the different instruments, integrated into the management scheme for the purpose of recommending the most appropriate format for each socioeconomic context, and experimenting with the implementation of certain key instruments that facilitate acquisition of illustrative results of integrated management.
 - In order to energize the tasks mentioned previously, it will be very relevant to put “communities of practice” into motion as recommended in the Latin American Discussion Forum on Environmental Management, Land Use Management, and Risk Reduction held in Buenos Aires in November 2005, as part of the USAID/OFDA/LAC Technical Assistance and Training Program (Sarmiento 2005).⁵¹ Communities of practice make it possible to orient the tasks and to evaluate the progress in such a way as to give the final results a high degree of applicability.
 - The studies to be carried out include an intense, continued and agile training effort and dissemination of information on several levels of public officials and organizations responsible for risk and environmental management so that the results can demonstrate the complementary nature of the tasks of each working area with the other, and the way that common instruments can be employed as a function of a common purpose. Just as environmental management is non-existent without interdisciplinary views, its articulation with risk management will prove more effective to the extent that it achieves a technical level that transcends the action of isolated disciplines. In this aspect, the concept of communities of practice takes on an even more important role.

51 In both the introduction of the workshop and in the report resulting from the joint labor of all the attendees, the importance of the “community of practice” was highlighted, to become the center of debate, reflection, exchange of experiences, and information, and to proactively propose lines of future endeavors.

- Training in general produces better impact when its contents can be discussed, added to and put into practice, and also when there are incentives that stimulate the professionals, as well as individuals involved, the experts in environmental subjects and the experts in matters of risk, so that the contexts for debate, reflection and exchange of experiences become empowered, and, at the same time, new lines of action which provide feedback to their own disciplines are generated. These incentives should be studied and created in function of national or international conditions where they are able to promote the communities of practice and the training sessions.
- Training should, eventually, transcend the public sphere and blend into academia, applied research, engineering related to environmental and risk management, as well as the area of consulting.
- The regulatory frameworks, and consequently, the institutional authority require an in-depth study at the continental level in order to highlight examples where each seeks to be complementary and indicates paths for achieving important synergies. This study may also help to point out voids that remain and opportunities that still exist in different countries for the combination of risk management and environmental management.
- Multilateral banking should play a preponderant role in the articulation of these two disciplines. Just as the credit projects are viable as long as they meet the requirements of the bank's policies on environmental safeguards, the analytical criteria of risks should form a part of the same environmental studies and have equal weight in the decision-making process.
- In the case of international organizations and development agencies, their role is transcendental. To the extent that the two themes continue to be managed in a compartmentalized manner, the possibilities of becoming complementary and synergistic will continue to be lost. For this reason, it is vital to bolster a working strategy that will systematically articulate the management of risk with that of the environment and vice versa, in such a way that articulated actions or projects become routine occurrences. This will be a key subject for future working agendas to be developed among the agencies.



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*ARTICULATION OF LAND USE
MANAGEMENT AND RISK MANAGEMENT*

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Articulation of Land Use Management and Risk Management

I. INTRODUCTION

The International Decade for Natural Disaster Reduction (IDNDR) has left a legacy of a new attitude toward disasters, moving from a fatalistic outlook at the mercy of an uncertain destiny; it has become a mobilizing idea, concentrated on the capacity of communities and countries to intervene in their own vulnerability and their levels of risk. These ideas, built from the concerted efforts of the international community, are oriented toward comprehending the challenges presented by current environmental, economic, social and political scenarios; however, they have not yet become firmly embedded in Latin American countries.

As pointed out in many documents, it has been possible to broaden the outlook on the subject, and the operative level has seen important progress. It should be emphasized, for example, that new laws and government strategies for disaster reduction have been approved in certain countries; new regional approaches have been tried (regional networks, exchanges of information, university networks, etc.), and there has been a shift, albeit a slow one, from focusing on preparation for emergency situations toward reducing vulnerability and risk.

The challenges, suggested in the objectives of the Decade, of improving the capacity of each country to respond to its own disasters with speed and efficiency, to apply scientific and technological knowledge to reduce the vulnerability of its communities, to organize technical assistance and technological transfer programs, as well as educational and formative programs, has found widespread development at the theoretical and methodological levels in the field of dissemination and in the context of international cooperation. However, they are not yet reflected – to any real measure – in the daily lives of the communities, nor in the reduction of their risk problems. The fact is that there are few examples of successful experiences that can be told, such as that of the city of Manizales, Colombia. In most cases, these issues are being debated or are in the process of being installed. What are the elements that most seriously influence this imbalance?

- *A shortage of operative instruments for managing territories at risk:* The lack of a methodology for integral land use management, which includes the risk variable, severely limits the possibility of orienting adequate management of that risk with any degree of certainty.
- *A shortage of innovative policies for risk reduction:* There are no strategies for achieving the insertion of matters concerning risk into the political-institutional organization of the various countries.
- *There has been no responsible social response to risk:* It is evident, in many countries, that there is a lack of public and private sector awareness of matters concerning risk as a variable in the adjustment of development. As a consequence, the indiscriminate use of land and resources by the economic and social processes continues, and private interests are continuing to be imposed over those of the safety of the communities.
- *There is marked weakness in the management and handling of investment to counteract risk:* Many things conspire against this process, including the diversity of the sociopolitical and economic scenarios, and the structural weaknesses of Latin American countries that limit, on one hand, the possibilities of governance, and on the other, the ability to compare and make real estimates for calculating the economic advantages of building vulnerability reduction into the development process.

Each of these issues is approached along **parallel paths**, either through forums, work meetings, specialized workshops, etc., promoted by organizations of international cooperation, or, through studies by the science and technical sector of the region (university networks, research institutes, technological and social development institutes, etc.) and even by proposals from government organizations from some countries that have made progress toward these issues with greater energy because of their especially vulnerable situation, as is happening in the countries of Central America and the Caribbean.

Conclusions and recommendations are also being suggested along **separate paths**, recommending working patterns based on solid scientific processes; they produce innovations in the areas of environmental, land use, and risk management and instruments and methodologies for regional development, working with regional, local and community governments to insert these areas of knowledge into the processes of management, all of which leads to the belief that most of the problem has been solved or is in the process of being solved.

However, it is evident that this divergence of ideas and mechanisms of intervention is stumbling over the difficulty of **inserting and applying these issues to the world of public and private management** in a systematic and continual way, to intervene in the level of real risk to the communities. The results show this to be true: in general, we obtain partial, sectoral or very local results, and in other cases there is a paralyzing overlap of similar actions.

Confronted by this diffuse scenario, it becomes vital to try to **change the perspective**; it is necessary to recognize that the approach being used fails to adapt to what it is trying to correct. It is evident that the problem cannot be approached or solved along separate or parallel paths, even though that attitude can be justified in the heterogeneity of countries and environments or in the need to respond to a sectoral type of administration. It is possible to think that, respecting the ethnic, cultural, historical, economic, social and environmental diversity, we should **construct a synthesis approach** that reproduces – on an operational level – the scenario we seek to correct. That is to say, the focus of intervention should be conceived with a **criterion of convergence**.

What is the **point of convergence** among such divergent subjects?

- What is the right **strategy** for simple, timely, viable and socially acceptable intervention, for the development of safe localities, zones, cities, and territories, that are, at the same time, competitive?
- On what **scale** should this strategy be conceptualized in order to obtain better, faster, and more efficient results?

- What are the **social dimensions** that allow the identification of responsible persons committed to the strategy of risk reduction?
- What are the **environmental costs** that must be assumed, on an individual and social basis, to achieve growth in a safe, competitive and sustainable manner?
- Against what **economic values** must this strategy be arrayed in order to balance the costs and benefits in favor of development and quality of life?
- What are the **forms of power distribution**, the **type of administrative organizations** and **institutional agreements** that can guarantee a safe and sustainable territorial development process?

Even greater progress can be made: Is there a point of confluence? If not, is it possible to build one? In principle, all of the components that have been pointed out (environment, risk, management, development) have common elements at the theoretical-methodological level, similar processes in the operational environment and even overlapping reflections. That is to say, all of these processes are laid out on a **common territorial basis**, whose analysis unifies them with a complex synergy:

- Systemic relationships prevail over those of cause and effect,
- Processes predominate over components,
- There is a potential capacity for auto-construction and/or auto-destruction due to human activity, its technological development and its processes of sociopolitical organization,
- There is a dynamic linkage between systems having different forms of growth, with complementing activities, absorption, competition, submission, etc., that challenges the norms and traditional laws of each country,
- There are virtual organizations, formed by different human activities, that use new tools, such as communication, information systems and remote control mechanisms to intervene in the territory,

- There are dominant and recessive cycles in their behavior, and
- There is a manifestation of different capacities of re-adaptation and organization for overcoming these cycles.

Where does risk come from? What of all these things, generates or enhances the growth of vulnerability? What are the processes that unleash these new environmental, anthropological, technological and social hazards? In what measure are naturally existing hazards nourished by these elements?

It is evident that the problem goes far beyond the partial vision of a problem of risk, an environmental or spatial development problem, regardless of the geographical ground it covers. Everything is linked to a problem of **territorial functionality** that might be more or less successful, but that is far from stable, and is more likely to build into a chain of differentiated stages, at any given time, and that may eventually become a permanent situation of evolution/involution.

From this convergent, complex and dynamic position one must also ask: What **tools** are **available** to control these processes? Which, in turn, are the **processes** of reflection, formulation, evaluation, control and management that are best adapted to the nature of these synergies? How can one approach these dialectics in order to act in a unified manner within the territorial system, to create safer areas, reduce their vulnerability and improve on their development? In principle, there are three intervention tools that are clearly differentiated:

- **Land Use Management**, deeply rooted in European tradition, is the oldest of these tools, since it came into use in the 1960s and 1970s. The creation of the Latin American version of land use management, however, took longer to evolve and only recently, in 1990, did land use management become recognized as a strategy suited to achieving sustainable development in the region.
- **Environmental Management** came into play in the decade of 1970-1980 as a result of global awareness of the ephemeral nature of the avail-

ability of our resources and the irrationality that characterizes its collective usage.

- **Risk Management** has gained strength since the 1990s as a result of a review of the processes producing disasters, and based on the theory of reducing vulnerability, its practical application and the policies it generates.

Based on these three positions is the conception of **MAN THE BUILDER** of new synergies, capable of overcoming the limitations of his surroundings to an acceptable extent.

Each of these disciplinary tools has undergone rapid and formidable theoretical-methodological development, progressing in their application to several territorial types and scales, and tending to gain confidence through the systematic formation of human and professional resources that put it into practice. All of these tools have, as their central objective, the improvement of **territorial functionality**, in order to make it ever safer, more competitive, equitable and sustainable in the face of the imbalances unleashed by development and uncontrolled economic models.

However, in practice, each of these tools has followed its own line of theoretical-methodological development that has remained constantly **parallel** to the other two in spite of the fact that the points of contact are evident as is the overlapping of knowledge. In fact – in most cases – work is conducted on a professional level, in an effort to compete for leadership in common areas. Concepts of territory, territorial competitiveness, territorial innovation, **development styles, non-linear processes, interdisciplinary** and many others are based on this proximity. This is especially so in the case of the overwhelming concept of **networks, flow spaces** and the **de-territorialization** of human activity, which creates a virtual context of economic specialization and differentiation on a worldwide scale that has transformed the structure of human society.

In practice, we must recognize the fact that this social, economic and political construction has yet to create the **theoretical-methodological tools** to achieve, through management, an innovative articulation of the

territory. Therefore, challenging scenarios arise in a single area of reflection and multidisciplinary areas, and at the same time, contradictory actions of sociospatial construction of disorder ... or of a new order; the rapid progression from chaos to a different form of unexpected organization or vice-versa, and in most opportunities, a territorial anchoring of problems that turn the territory into an almost ungovernable entity from the management perspective.

In Latin American countries, one must add to all of this the creation of new ideologies, the recovery of social values, historical-cultural recuperation, new production relationships – among other things – that speak of the **interruption of an operational current of territorial dynamics** ... *“that take shape only as seen from the angle of human causes.”*¹ The search for territorial and cultural identity, economic progress, environmental sustainability, collective governance and personal development become the guidelines for formulating a territorial model with a value-laden and strategic approach to sustainable development. In this search, land use management, the environmental dimension and risk calculation become the **transversal issues** at the service of all of the policies as well as the public and private territorial actions.

What remains absolutely clear in the context of such dynamic evolution is that **risk management and land use management** will make the difference – in the medium and long-term – between man as a “dynamic agent in his own development” or as a “victim of his own actions.” The challenge will be resolved only to the extent that he manages or not to find the connecting points and the operational relationships within the field of management, between these two perspectives of intervention.

This document will explore these subjects in an attempt to understand **risk management from the land use**

management perspective. It will put forth the possibility of articulating these positions through common focuses that serve to formulate policies for innovative management, especially for the case of vulnerable and disaster-generating territories, of which there are many throughout Latin America, Central America and the Caribbean. The objective is to construct a new dialectic and a positive synergy between land use management and risk management, as a guarantee for sustainable development.

2. SOME DISASTERS AND THEIR RELATIONSHIP WITH LAND USE MANAGEMENT

2.1 Risk Construction in the Context of Transformation and Land Use Mismanagement

The Latin American construction scenario from the current paradigm² began to come together during the 1990s, through a sustained process of economic opening toward international circles on one hand, and a decisive movement toward **integration** on the other. The tendency to unify markets and to compete on the international scene brought about a rapid transformation in the context of the countries that joined the transformation, and whose socioeconomic effects and economic and environmental costs are yet to be calculated.

The process is analyzed from the perspective of desired progress, which allows for consolidating a better quality of life and for overcoming poverty through the formation of a common and almost single economic space. This scenario presents itself as a great **challenge** in time, since **integration** is producing profound changes in territorial structure, both within each of the countries and within the blocs of countries, whether they are new (i.e. MERCOSUR) or reactivated (i.e. The Andean Community).

1 Benko George. Regional Science. Society and Territory Collection. Original Publication by Presses Universitaires de France, Paris, 1998. Translation and publication by the Universidad Nacional del Sur. B. Blanca 1999. Argentina.

2 Contains the image of the society of knowledge, the flexibility of terms of exchange, regional integration, interdependency among the components of global society, environmental protection, intangible schemes of information and communication, regional and local diversity, all available human and natural resources, in addition to the problems accumulated in a traditional model of territorial development.

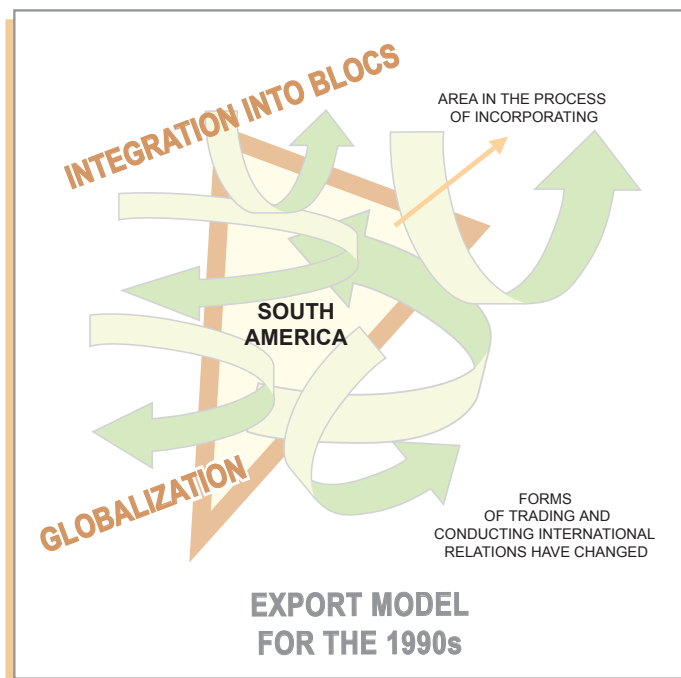
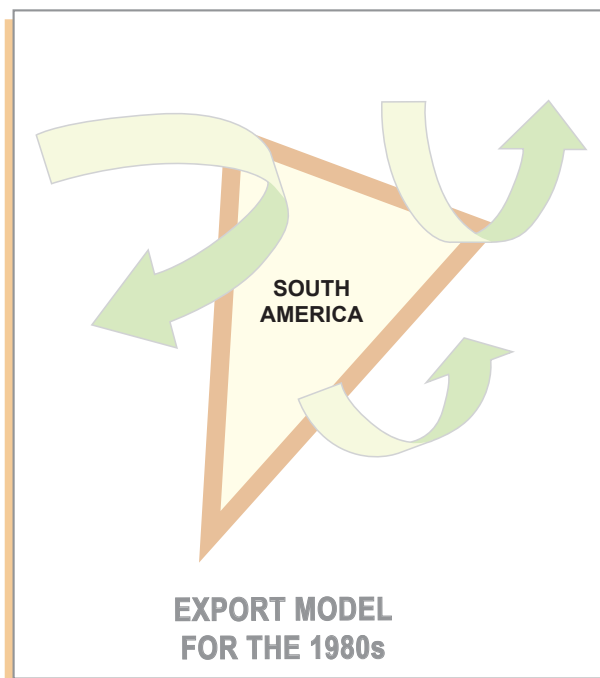
Territorial transformations take place and act on a territory, scarred by great **macroeconomic inequalities** to start with – as much between countries as within each country – the fruit of a long single-export experience and a sustained policy of import substitutions. The Latin American territory is based on a territorial structure with strong bias toward **economic accumulation** along the coastal fringes and a convergent/divergent commerce concentrated in the principal ports, as a result of a central-peripheral dominant organization on an international scale, and a scarcely developed “**rest of the country.**”

Therefore, the countries present an internally imbalanced structure:

- **Highly valued regions** linked to the international commerce system, urbanized, densely populated, having technology, capital and dynamic productive infrastructure; they are the system's

leader regions: southeast Brazil, the Argentine Pampas, central Chile, and others.

- **An “interland” with low levels of development**, rich in productive resources but having turned their value-added activities over to the above-mentioned regions and failing to receive as compensation the services needed for their development. These regions are usually known as “the interior” (northeast Brazil, the Venezuelan plains, the Argentine-Chilean Patagonia, and others).
- **Areas with low, almost no population density** that are, however, rich in strategic natural resources, especially energy, fuel, gas and with possibilities of mining and forestry development (desert regions, mountainous zones, sea coasts, river basins, highland plateaus, and other similar areas) that are indispensable for the new model of international competitiveness.



Regarding these areas, the new productive and globalizing trends of today are creating a different territorial structure that is unleashing an inter-regional competitiveness that finds its support mainly in the areas and cities that are best prepared to carry out changes and to compete.³

This scenario, in turn, is creating **new imbalances** of a more subtle nature that is more difficult to manage, since it leaves out the weaker regions, increases polarization and advances to incorporate zones with important strategic resources, but with a **high level of natural and environmental vulnerability**.

The region seems like a “fertile”⁴ ground for entering into globalization. The tendency toward **concentration** has returned as one of the most associated consequences of the new territorial dynamic, as well as in the form of a new emerging regional pattern. **Regional aptitude**⁵ is measured, in this case, by the capacity to insert itself into the free-trade economy and to compete successfully, which depends not only on the relative position of each region but also on:

- Urban demographics,
- Labor pool skill levels,
- Labor force availability,
- Industrial and service structure,
- Geographical size to justify and generate infrastructure,
- Availability of equipment and communications,
- Sense of regional identity,

- The transparency and solid foundations of its legal and judicial-institutional system.

These processes, created by aperture and integration, are responsible for the appearance of **new forms of territorial connection** that generate:⁶

- **Bi-ocean trade corridors**, with an important geographical extension that involves numerous traditional countries and regions; one can mention examples of shipping lanes: San Pablo-Montevideo-Buenos Aires-Puerto Montt (or Santiago de Chile or Valparaíso); Arica-La Paz-Santa Cruz-Corumbá-San Pablo (or Santos); Caracas-San Cristobal-Bogotá-Quito-Lima-Santiago-Puerto Montt; the Marginal Jungle Highway between Venezuela, Colombia and Ecuador, among many others. There are also railway as well as river corridors.
- **Border-crossing regions** or new bi-national territories for development and international competition. These come into being as a consequence of the reactivation of relations between neighboring territories, which until the 1980s were divided by the concept of “national security” that today has been replaced by the concept of “integration and cooperation” among most Latin American countries.
- **Urban networks**, united by flows of commerce, transportation and services that demand, almost like neurological synapses, economic and social forces committed as much to the dynamics of the current economical model as to the previous one. Cities constitute the active nodules in the new networks and together give life to regions whose synergetic behavior – for the moment – is as yet unknown in detail.

3 Gray de Cerdán, Nelly: Integration in Latin America. Moving Toward a Single Economic Space? International Cooperation Magazine. Volume 2, Pg. 67-81, Alcalá de Henares, Madrid, 1999.

4 De Mattos, C. Globalized Economic Dynamics and Metropolitan Transformation: Moving Toward a Planet of Urban Archipelagos. In Working Articles. 6th Encounter of Latin American Geographers. Territory in Re-definition: Place and World in L. America Bs.As. 1997 Symposium CD-ROM.

5 Daher, A. Geo-Markets and Transregional Policy. Working Articles. 6th Encounter... idem

6 These new regional phenomena can be seen more clearly in countries that belong to country blocs.

- **Regions that incorporate themselves into the market** as a consequence of their natural resources and their possibilities for competing within this new model, whose articulation affects interior zones – Amazon, sub-tropical, desert, minor urban areas rich in environmental as well as human resources – not previously integrated into the productive market. The search for competitiveness has brought these previously unexploited strategic resources into play.

This **territorial selectivity for competition** that is displayed in the new model generates phenomena of very marked territorial fragmentation concerning the different potential capacities of the regions to respond to emerging stimuli. A different way of operating is then produced, that, however, once again unleashes the well-known dichotomy between “winner” and “loser” regions. One can see that three types of “**winner regions**”⁷ are associated with the new model:

- Emerging Regions: areas connected to marine biological corridors or axes of commercial articulation.⁸
- Border Regions: scantily industrialized but oriented toward exports.⁹
- Urban Regions: areas that have achieved the greatest relative development in areas of productive and demographic concentration, especially in metropolitan areas.

As a counterpart we find the “**loser regions**”:

- Regional or local markets that have neither the position, the development nor the endogenous capability to function competitively within the new model, and

- Areas that are traditionally stagnant or depressed, scare away labor, have high indices of unemployment, weakness in human resource formation and few incentives for attracting investment.

We can add to this mix a natural resources endowment **where wealth and degradation coexist**, a situation that generates contrasting frameworks for development, and for the insertion of land use management policies, environmental organization and control, as well as risk management, since the population in general resolves its problems from the perspective of its own cultural, social and economic structures, with patterns of conduct and behavior that are not always completely efficient when facing new problems that come up in its territory.

The population itself presents an important quota of **heterogeneity** in the conduct involved with accepting change, globalization and the process of regional integration; the patrimony of natural and human resources available generally constitutes an inefficient base for sustaining the new organizational model, proposed on the international scale. Only the most competitive natural resources and best-prepared human resources are included.

In synthesis, this panorama of **territorial restructuring** that is rapidly imposed and powered by the strong interests of the markets is generating a transformation in the regional and sub-regional organization of Latin America. The new model is being superimposed over the previous model (center-peripheral) and values only some of the regions that have possibilities to compete.

7 Ciccolella P. and Mignaqui I. Integrated and Restructured Territories. A New Context for the Debate on the State and Planning, Inter-American Planning Magazine, Vol XXVII, 1991, 73-106.

8 Romero A. Hay A New Country in the Southern Cone: El Dorado. Mercado Magazine, Buenos Aires, 1996.

9 Gray de Cerdán N. Vulnerability and Costs in the Processes of Territorial Integration of MERCOSUR: Cuyo (Argentina) R. Central (Chile). Inter-American Planning Magazine, Vol. XXVIII, No. 11, Ecuador, 1995 p. 58.

The new regionalism, supported by the double process of regional **concentration vs. specialization in competitive microregions**, creates, along with specialized economies and economies of scale (blocs of countries), different territorial behaviors that vary in intensity or grouping from country to country; but in general can be seen as:

- An enormous effort of internal confidence-building in each country to revalue its available territorial resources and the potential to support its development,
- Rapid growth (once again) of urban areas,
- A degradation of the general quality of life due to the functional obsolescence of infrastructure and services,
- An increase in environmental problems and, above all,
- A considerable increase in vulnerability when faced with natural, technological and man-made disasters.

These forms of behavior not only provoke difficulties, but also create **uncontrollability in land use management**, due to a lack of standards and of political awareness as to the need for maintaining orderly and dynamic land use management that makes it possible to face these changes. Territorial organization becomes an account payable for all of the countries in the area, as has been verified through detailed studies, and is expressed in the figure on the following page.

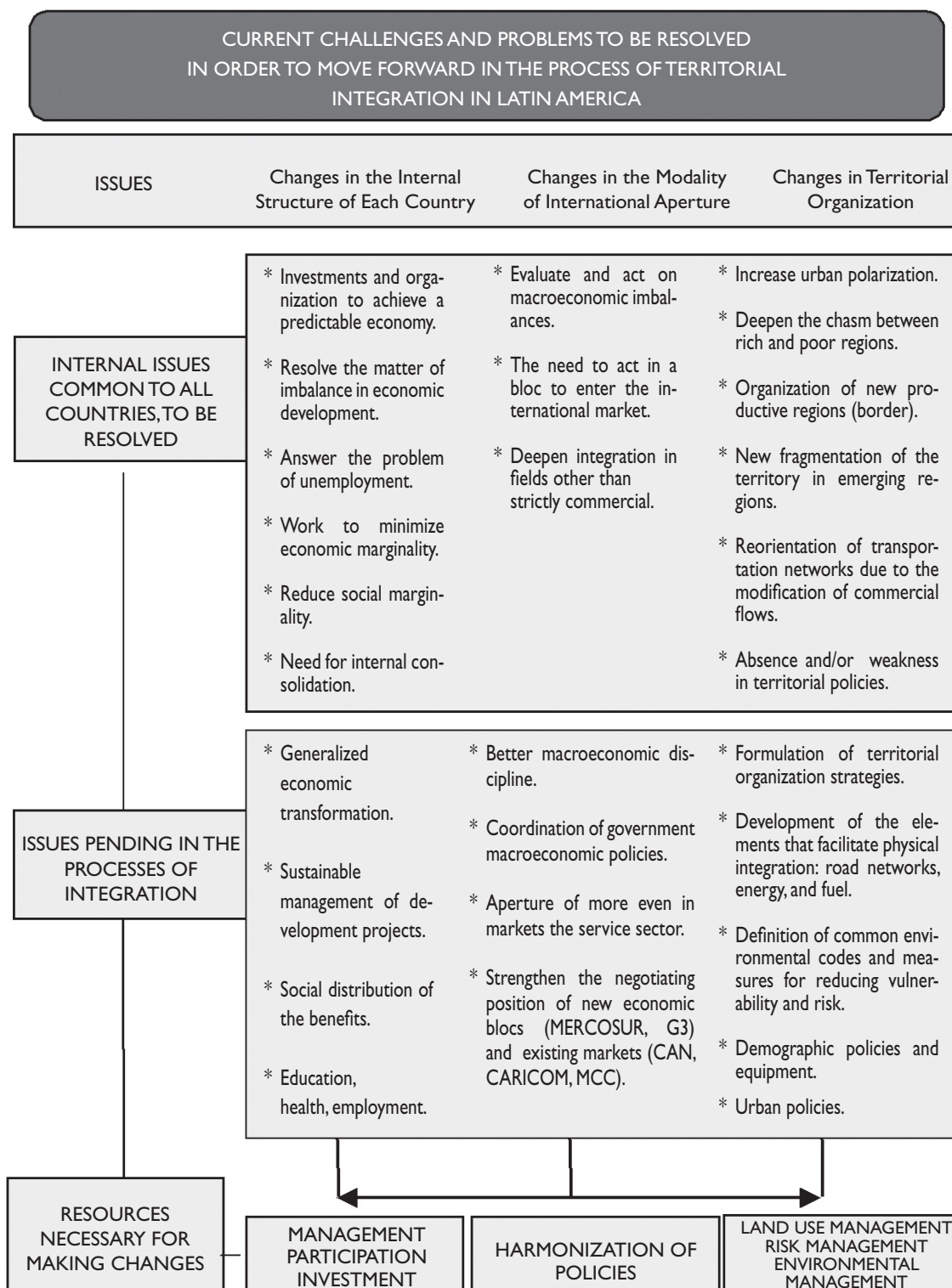
This is how HIGH LEVELS OF RISK are built, since the transition stage that Latin America is going through has brought land use mismanagement to a critical phase, provoking high marginal costs in most cases.

There is a **territoriality forming** that is under strong pressure from economic activities; rapid and concrete solutions are being sought without taking the vulnerability and fragility of some regions into account.

What is even worse is that these rearrangements and risks are rapidly becoming **financial and economic costs** that are difficult to face with the meager budgets that the countries and regions generally manage when disasters occur through lack of foresight, investment or simply of awareness of the subject. Added to this is the problem of the existing and uncontrolled risks that have characterized the regions of Latin America, managed by the center-peripheral model.

It can thus be asserted that as a consequence of the characteristics of the growth model of Latin America, which tends to unite the oceanic coastlines and their respective productive areas to each other, transportation infrastructure and strategic services for production (gas, electricity, petroleum, etc.) have become a tool for penetration and traffic into the **regions not yet incorporated into commercial life**: Amazonian areas, equatorial zones and tropical forests, mountainous areas and arid plains, marshes, swamplands, etc. The lion's share of the capital sent to Latin America is invested in these sectors.

For this reason we can assert that we are witnessing a **new period of Latin American colonization**. This time, the conquest comes from the **interior of the continent** and is not restricted to its coastal peripheries.



Sources: Grey de Cerdán Nelly, Integration in Latin America. Toward a Single Economic Space? International Cooperation Magazine.V2, Madrid, 1999, pg 77.

This situation requires the regions to reflect on their real capacities for production and development, and decide on which of these to concentrate their efforts. It is therefore necessary to evaluate the historical process that each of the different territories making up the new regions has undergone. They have a past that can reveal their potentialities. They can infer from a historical study:

- The capacity for integration, demonstrated over periods of time,
- Competitiveness developed through time,
- Current competitiveness and the factors that brought it about,
- The unique historical trends of each area,
- The trends of development and territorial interaction,
- Land use management policies with which they have experimented,
- The culture of connection to risk management, and
- The culture of connection to environmental management.

The idea is to evaluate what the **unique positive trends** of each region are and where **the powers** that have proven to be successful for their development are concentrated. These elements will serve to explain and support the measures, which they should stimulate – through education or special programs – toward an **attitude of change or no change** in response to the new organizational models, or to the contrary whether society has shown that it has the elements needed to **upgrade** itself to new organizational models.

One of the best examples we can give in this case is that of Chile, a country recognizing that:

*“The success of the export model and an opening toward the exterior is in no way foreign to the **efficient exploitation of the coast and the ports**, nor is it surprising that an important part of the good*

results obtained in economic growth are due to those phenomena. As things go, there is a stronger possibility of expansion and of increasing the efficient exploitation of the coast and the ports, but this time, projecting that expansion to the service of the foreign trade of Argentina, Bolivia, Brazil, Paraguay and Uruguay, with the countries of the Pacific Ocean.”¹⁰

In this case, the bi-ocean corridors as well as the programs of regional reactivation and the new opportunities for Chilean foreign economic policy, are, once again, based on the historical management of its ports.

But there is a change in the territorial scheme: the new perspective now turns toward the east (the interior) and challenges Chile to incorporate the mountains as well, to turn its territorial vision toward the Andean Range – to which it has historically turned its back – to organize the necessary mountain passes and transecting road network in an extremely high-risk natural setting in association with its neighboring countries (Argentina, Bolivia) with which Chile has had conflictive relations during its entire history. What are the comparative and competitive costs of this new model in a full-blown context of environmental, social, natural, political, and institutional risk?

Modern Chile has an excellent track record of managing emergencies and a growing philosophy toward the prevention of risk, and a long tradition of regionalization and land use management. The same cannot be said for its environmental policy, where it still faces serious managerial difficulties. With this new scenario, it is probable to expect that Chile will be able to reorganize these three tools in order to quickly find – in each of its regions – an adequate answer to this challenge. The same is not true of the other countries of Latin America, where these tools (risk management, environmental management and land use management) are weakly developed.

It can safely be stated that this process of territorial transformation contains emergent and growing **scenarios of risk** that do not form a part of the agendas of most Latin American countries as much as they should.

10 Ministry of Planning and Cooperation. Bi-ocean Corridors in the Context of a Port Country. Naval Center for Strategic Studies. Edit. Andros Ltd. Santiago, Chile, 1997, p. 26.

Therefore, the countries of the region should now avail themselves, on one hand, of the capacity to manage change and to capitalize the advantages, but on the other hand, create the **tools necessary for assuming the negative effects, the unwanted costs, or indeed losses** that might result from committing themselves to the process during their development.

In the context of Latin America, it should be pointed out that the seriousness of this process of territorial transformation – also associated with laying major gas and oil pipelines, installing hydroelectric and thermo-electric centers, etc. – **is that it is the product of countries whose legal, institutional and investment schemes have yet to completely develop the instruments needed for the sustainable and safe management of their territories.**¹¹

In spite of the environmental studies, the efforts to raise awareness of risk and the preoccupation for territory have multiplied in the different countries of Latin America. It is difficult to find programs that properly evaluate the territory of each region of each country in a systemic and scientific manner, and that are able to identify critical or vulnerable areas. An effort must therefore be made to clearly define the vulnerability of the new regions. Knowledge and a clear explanation of the following set of factors are absolutely necessary:

- **Natural hazards** (seismic and volcanic activity, avalanches, sink holes, floods, hail, drought, etc.) that threaten existence and generate risk for the region.
- **Man-made hazards** derived from the inefficiencies of human organization (coastal erosion, destruction of hydrological basins, destabilization of steep mountain slopes, untreated industrial waste, overexploitation of land, etc.),

- **Technological hazards** derived from accelerated progress and, sometimes, little control (chemical accidents, toxic gas leaks, oil spills, seepage in industrial plants or open mines, etc.).

Grouping, mapping and analyzing these elements will make it possible to identify **critical areas** where a series of vulnerability-reducing activities must be taken, to make use of the available resources and insure the life of human settlements and the future growth of the region.

It is also indispensable in every case to clearly define the level of **acceptable risk** that the population is willing to live with in terms of tolerance and cost. This is a reliable basis for confronting the plans and projects of land use management.

This approach contributes to managing productive investments with greater efficiency and most importantly to lower the costs of territorial growth, thus making those investments more predictable. The studies should be conducted especially in those regions where due to their nature they have been selected for the process of globalization based on their capacity and potential for competition.

2.2 Modifying the Modalities of Management Contributes to Foresight. The Example of Flooding in the City of Santa Fe, Argentina¹²

Pausing to become aware of the problems facing those territories in a preventive manner instead of just attending to the emergencies could be the beginning of a fruitful journey toward the needed transformation. If we analyze what has happened due to a lack of foresight, simple common sense brings many appropriate answers to light.

11 Gray de Cerdán N. Challenges for Sustainable Environmental Management of the Bi-Ocean Transportation Corridors. Inter-American Planning Magazine. SIAP. Cuenca, Ecuador, 1999.

12 Sources consulted: Atilio Pravisani, "Proposed Re-Zoning of the City of Santa Fe to Prevent Flooding." La Capital (Rosario - Santa Fe - Argentina), October 20, 2003; National Littoral University, "Inundation of the Salado: Natural and Man-Made Causes." Special Edition, June 2003; UNDP, Inundations in Santa Fe: The U.N. Works in the Emergency. Challenges. News bulletin of the United Nations Development Programme (UNDP). No. 4, May 2003; Ministry of Health, Presidency of the Nation, "Flood, Province of Santa Fe. System for the Analysis and Evaluation in a Situation of Emergency. Executive Summary, May 2003; Article by Engineer Adolfo Luis Cerioni, "Never Again." Buenos Aires 12 May 2003; Report drafted by Jorge Giles and Silvina Gutiérrez "Floods in Santa Fe, April 2003." Department of the Environment, ARI, Alternative for a Republic of Equals; pichy@fichl.unl.edu.ar; Ofelia Tujchneider, "The Flood in Santa Fe, Argentina."

Take, as an illustrative example, **the City of Santa Fe**,¹³ Argentina (500,000 inhabitants) built on the convergence of the Salado River with the massive Paraná River in the province of the same name, which is east of the Pampas Region of the Republic of Argentina. It is a productive agricultural, ranching, and industrial zone, traditionally rich and competitive with excellent ports, a highly qualified, hard-working population, and an extremely attractive location for investments.

The geographic position of the city shows at a glance, that an irregular increase in the flow of either of the rivers that surround it could provoke an immediate overflow of floodwaters into the city. The phenomenon has happened frequently over the history of Santa Fe. The city has suffered numerous floods caused by extraordinary rises in the Paraná, the Salado or as a result of *sudestadas*.¹⁴

The exceptional rise in river levels of 1905 was a milestone, because it brought about the beginning of the construction of important public works for containing and controlling the rivers, such as the Irigoyen dike. Years

later, after the flood of 1966, Bypass Avenue was built, a defensive work that surrounds the entire city, and that at the time of the 1993 crisis¹⁵ was not yet completed, falling short by only 1,500 meters in the western sector of the city, thus causing the entire system to be vulnerable.

During the final weeks of April 1993, the inevitable disaster happened, unleashed by the intense rains that caused the Salado to overflow, reaching a maximum discharge of 2,800 m³/second and causing disastrous flooding in the center and north of the province, especially the Capital City itself. The flood entered the city of Santa Fe in a torrent, through the unfinished stretch of the defensive works, and then stayed in the city for lack of a way out. So, as of April 29, the water covered an extensive part of the urban center and surrounding suburbs of Santa Fe. The water level was higher inside the city than it was outside in the river valley itself. To overcome this problem, they resorted to **using explosives to destroy part of the recently constructed defensive structure**, as well as **an important avenue**, to allow the water to return to its natural course below the city.



Photos: *El Litoral Newspaper. City of Santa Fe.*

Faced with this catastrophic situation, the city of Santa Fe was defenseless. The structural measures – defense works – had not been complemented by the necessary non-structural measures: land use policies, contingency

plans, insurance, warning systems, community awareness and preparation, etc. In this case, a fundamental factor was added to considerably augment the vulnerability of the population: the inhabitants of Santa Fe had a false

13 Example prepared especially for this document by Silvia Quiroga de Benegas.

14 This is the name used to describe the phenomenon of water entering the Argentine Sea (the Atlantic Ocean, upriver in the Paraná River).

15 In 1992, this zone had already been affected by an extraordinary rise in water levels, which produced a serious impact on the population. More than 100,000 people had to be evacuated from their homes, more than 3 million productive hectares in seven riverside provinces were flooded by the effect of the Paraguay, Paraná and Uruguay rivers, bringing the combined level of damages to a seldom seen high.

perception of the danger they faced, because of the false confidence they had placed on the defense works. Of course, when the artificial defenses failed, the damages were substantially greater, because they affected a population that was ignorant of the danger and unprepared to act in a situation of this magnitude.

The situation was worsened by the **problem of communications**: the formal and informal systems did not work well, nor did the system of flood alert or warning. In the case of the Salado River – which is part of a plains river basin – simple indicators can be used that allow authorities and the population in general to observe when the river has risen above normal levels and threatens to overflow bridges or roads. This can easily be seen by local inhabitants. However, when the political decision-makers and the technical establishments received the news, they failed to take the necessary measures, which resulted in an unacceptable amount of losses. According to the United Nations Development Programme (UNDP), when the flood crested, 25% of the city of Santa Fe was under water; nearly 130,000 people had been driven from their homes, between those that were evacuated by the authorities and those that self-evacuated; 25 people lost their lives and there were nearly 500 missing,¹⁶ according to official reports. Around 24,000 homes were affected by the current and hundreds of productive hectares were rendered useless. One hundred and forty eight emergency assistance centers were installed and it was calculated that nearly \$100 million would be needed for reconstruction.

The analysis of this case reveals several important factors that should have been included in an integrated plan, taking environmental matters, risk and land use management into account, which would have helped to prevent this serious and repetitive situation from happening. It not only **put the population at risk, but also, in reality, placed the entire Argentine economy in dire straits. The port of Santa Fe exports 25% of the total national production.**¹⁷

- In the **environmental** context, we can find certain answers to these extraordinary floods, which have long been denounced by society as well as the scientific establishment. For years they have known that these floods are produced because of the mismanagement of natural resources, specifically due to the deforestation of the native forests that line the riverbanks in the form of “galleries” since historic times. Even the agricultural population has complained, since a study carried out by the Campesino Movement of Santiago del Estero (MOCASE) reported that *“one of the factors that increases the dangers of flooding in the littoral zones of the Chaco Santiaguense and Santafesino and the Salado river basin, is the progressive destruction of the Algarrobos, Quebrachos, Mistoles, Breas, Itnes, forests and the exploitation of their immense nutritional and logging wealth.”* There can be no doubt that some of the remedial measures originated as a result of these complaints.
- Regarding **risk**, it must be emphasized that the study of hydrologic hazards that cause recurrent flooding in the city and province of Santa Fe can be explained by the way the Paraná River Basin functions, the characteristics of its flood plain, and the variability of its flow throughout the year. This makes it possible to predict calm, alert and hydrological emergency seasons on an annual calendar that the population should know by heart. The first work on the lower basin of the Salado took place in the year 1978, and was carried out by what is now the National Institute of Water and the Environment (INNA), an organization of the government. Because of the importance of this river to the Argentine economy and its dangerous nature, a network of level and flow meters was installed. It ceased to function, however, in 1989, thanks to a decision by the government itself due to financial problems.

¹⁶ This refers to persons who, in principle, were considered missing, but, with time had been found to have self-evacuated, yet were unable to rejoin or communicate with their family group or with the authorities, to know of their whereabouts. Terminology in use in the Argentine Littoral.

¹⁷ 20% of the yearly exports of the country come from Santa Fe. Of every \$5 that leave the country 1 is produced in that province. The provincial production is very high: 2007 records show 17.5 million tons of agricultural production: wheat, soy, corn, etc. (20% of the country's total) 7.5 million head of sheep (600,000 m.t. of meat production) 600,000 head of milk cows in production, pork and an important amount of avian activity. Santa Fe is considered the port of exit for the Pampa region, since 25% of all Argentine exports are shipped out of that port.

The greatest weakness is that the **city is not prepared to overcome such events**, which are constantly becoming more dangerous. The last significant flood occurred in 1998, and was further complicated by the El Niño events that provoked torrential and continuous rainfall. This not only increased the level of flooding, (which was already extraordinary), but also rendered useless all of the defense mechanisms of the riverside cities. Once again, they became virtual “wash basins,” difficult or impossible to drain. Flooding now covered urban areas that had formerly been safe from the rising waters.

INHABITANTS AFFECTED BY FLOODING IN THE ARGENTINE COASTAL REGION (includes evacuees, self-evacuees, stranded and assisted)¹⁸

Provinces	No. of People
Corrientes	33,591
Misiones	3,500
Formosa	32,360
Chaco	20,842
Entre Ríos	17,174
Santa Fe	14,903

Even today, the most critical factor continues to be the **vulnerability of the population**: a lack of information and of organization, a false image of a safe city surrounded by hydrological defense works and erroneous official messages.

Add these factors to the continuous failures in the early warning system and it all comes together to guarantee that the damages will reach their maximum potential, and the population remains helpless before these disasters. No progress or improvement has been made in this respect.

- Finally, from the point of view of **land use management**, right after the floods of 1993 the municipal government came up with a **new preventive zoning** project for the urban areas located in the flood valleys of the Paraná and Salado rivers. The document is a self-criticism of the municipality for its decades of erratic and permissive policies generally applied for pre-electoral convenience on urban matters, not only in the western fringe, but also in the Paraná River zone. It recognizes the fact, among others, that the rising waters and territorial organization of the city requires rethinking, including the relocation of the poorest neighborhoods settled in the most critical zones. It also points out the need to eliminate clandestine garbage dumps, which, in addition to the damages they generate in normal circumstances, enormously worsen the situation in flood conditions, given that they are focal points for contamination spread by the flow of the water to far-reaching areas.
- What is even harder to believe is that the entire province of Santa Fe has, for more than a year (2005-06), been participating in the elaboration of the strategic territorial plan (STP) promoted by the national government. This is a document – Argentina 2016¹⁹ – that proposes going forward with the implementation of land use management plans in all Argentine provinces, and the creation of a government guiding framework that will put land use management in context, making it possible to overcome regional imbalances and achieve equity and sustainability in the project of national development. One of the objectives of the STP clearly states: “Incorporate the environmental dimension and the variables of vulnerability and risk as transversal issues into all of the territorial policies and actions, public and private, at the federal, provincial, and local levels.”

18 National Department of Urban Development. Socio-residential Strategies in High-Risk Areas, Federal Ministry of Planning, Public Investment and Services, National Government, Bs. As. 2004.

19 Federal Ministry of Planning, Public Investment and Services. Argentina 2016. National Policy and Strategy for Development and Land Use Management. Executive Branch, Bs. As., Argentina, 2004.

Government technicians from the province of Santa Fe have participated in numerous government and regional STP workshops: they have drafted a provincial diagnosis and have defined the desired scenario for the province, but in none of the cases have they included the subject of risk in their studies. In other words, their diagnosis has not included the concept of the lack of security that permanently compromises productivity and the lives of the populations of several of its municipalities, and not only in the city of Santa Fe. When asked about this matter, they considered ... again!!!! ... that this aspect should be evaluated by other institutions and that these were not really matters that they (the municipalities) could resolve They have the necessary tools in hand, but lack the conscience that would enable them to integrate these policies into a single vision-action.

In the context of our analysis of this example, clearly reflected is the urgent need to generate instruments of action to produce an integrated response that would allow us to avoid repeating the errors of erratic, uncoordinated interventions that generate excessive environmental costs and increases in risk to levels that are almost impossible to assume. The need to control and to permanently monitor the situations precipitated ends up being a function of political, economic, environmental, and social support, which is indispensable for guaranteeing permanence and sustainable growth.

As with the case of Santa Fe, it must be recognized – now more than ever – that in other cities and regions undergoing the process of transformation in Latin America, there is no fixed or permanent social apparatus. Instead, there is a complex of socioenvironmental, economic, and political relationships that are constantly being modified over time.

In this sense, each territory **constructs** the conditions of progress, competitiveness, inertia, security-insecurity, vulnerability and risk, regression etc., according to the level of aperture and organization that it decides to assume and support with its activity. The levels of dependency are diluted in the joining of relationships that transform – from being mono-directional and simply cause and

effect, as they are traditionally understood – to being **multi-directional. VULNERABILITY AND RISK** are rapidly converted into growing social, economic, and environmental costs that must be assimilated with great difficulty into the budgets of developing Latin American countries.

It is, therefore, strategic to generate a **clear, working methodology** for designing the new territorial scenarios in a context of **SECURITY AND SUSTAINABILITY**. The conditions of success are associated with becoming aware of certain premises that are the foundation of the construction of these less vulnerable and more secure territories:

- Explicit acceptance of **diversity** as a foundation for the process of transformation,
- Acceptance of **territoriality** as an interactive factor of human organization in its different scales, and
- Acceptance of the principle of **self-organization** as a fundamental dynamic for land use management and decision-making.

The SUSTAINABILITY AND SECURITY of emerging regions are associated with the joint and permanent construction of flexible, open, and self-managing territories, where situations of conflict should be considered a constant source of opportunities for transformation, adaptation, and updating, in search of new balances, to attain the development expected in each stage of the territorial system.

It is, therefore, necessary to correct organizational errors, to reduce vulnerability and risk, and socially construct safer scenarios for human life, and at the same time invest in development with guarantees of success by adequately combining the components of the territory with a pre-emptive strategy and a clear ideology.

This territorial policy can be drafted and put into motion in Latin America, using the tools of risk management and land use management, with a viewpoint of integration and collaboration between the two.

3. WHAT IS RISK MANAGEMENT AND WHY IS IT NECESSARY?

In spite of their short span, many efforts and years of international solidarity-oriented work have been fused together to conceive and design this concept of risk management with a clear **vision of pre-emptive, probabilistic and concerted intervention.**

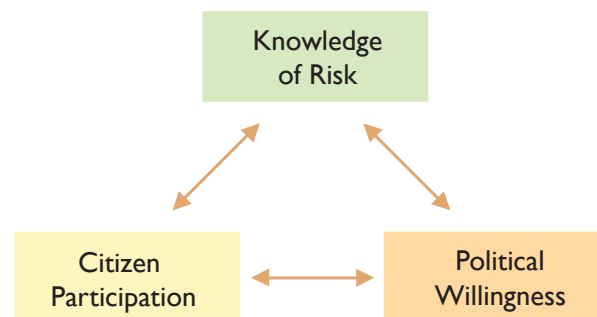
Everyone agrees that risk management works in situations of possible occurrence (risk/undesirable costs) if certain conditions (hazard/vulnerability) and certain fundamental scenarios or situations (lack of knowledge, social weakness, disorganization, political aloofness or ineptitude, among other things) present themselves in the process of constructing a territory. Risk management works to reduce the impact of these synergies in the territorial function to socially acceptable and assumable levels by those responsible for management. Risk management is, therefore:

“A process of adopting policies, strategies and practices oriented toward reducing the risks associated with dangers or in minimizing their effects. It implies interventions in the processes of planning for development, in order to reduce the causes that generate vulnerabilities...”²⁰

“Risk management refers to a process in which society recognizes and evaluates the risks to which it is exposed, formulates policies, strategies and plans as a consequence, and carries out interventions aimed at reducing or controlling existing risks and avoiding new ones. To the extent that we seek to improve the living conditions of the community and to protect both life itself and individual as well as the community’s collective patrimony, risk management forms an important part of social policy. Given that risk management

forces a social group to review its relationship with the environment, and to intervene in benefit of certain types of land usage, and of its resources, and to restrict other uses; risk management may be seen as a part of environmental management.

“Risk management includes activities of identification, monitoring, prevention, mitigation and risk transfer, and of preparation for attending to, recovery and reconstruction from damages caused by emergencies and disasters... To the extent that different social actors commit to the issue, risk management will become a political fact. As such it will require three fundamental conditions to become effective:”²¹



With this perspective, be warned that risk management cannot continue working on its own, because the risks arise from all of the territorial components and interact as part of the synergy, which is unique to the process of global development.

Risk management should, therefore, impregnate the actions destined to improve the operation of all of these territorial components, all territorial processes and human activities conceived from the sector-related point of view in search of building more sustainable and secure surroundings and scenarios.

20 German Technical Cooperation Agency GTZ: Concepts Associated with Disaster Risk Management in Development Planning and Investment. General Directorate of Multiyear Programming of the Economy and Finance Ministry, with the support of the Rural Sustainable Development Program, 2004, p. 19.

21 Directorate of Urban and Environmental Policy Development (DNP-DDUPA) Guide for Orienting Action and Investment in Local Risk Management at a Municipal Level. Program for Reducing the State’s Fiscal Vulnerability in the Face of Natural Disasters. Cali, Colombia, 2005.

3.1 Risk from the Perspective of Land Use Management

As a result of a situation of “complicity”²² between hazard and vulnerability, we define a level of specific risk that is dynamic, changing, differentiated, quantifiable, and perceived by the community and its government from different perspectives, according to current imagery. Unmanaged, unidentified, unmeasured risk over which there is no adequate action taken increases the possibility that disaster will occur.

Risk is conceived, generally, as the possibility that there will be losses or damages, as a result of the interaction between hazards or dangers and vulnerabilities of different origins, within a given territory and time. We can find an infinite number of definitions of risk. All of them, however, coincide in the fact that it is necessary to recognize the **complexity** of the problem, analyze the **factors** that act in its configuration, identify the **actors** that participate in its formation – as much at the global as at the national, regional, and local levels – and above all, examine to what extent these actors are also able to participate dynamically in its correction and prevention. This can be considered a good point from which to launch an efficient risk management program.

A dynamic equation between hazard and vulnerability, in the context of management, defines the components of risk as:

- **Hazards or Dangers:** the probability of the occurrence of one or more potentially damaging phenomena, of diverse origins, that may be dangerous for the population and the activities installed in a region exposed to them, in a defined social, temporal and spatial context. In general, one can define different types of hazards and classify them, according to their origin, as natural, socio-natural or man-made;
- **Vulnerability:** a condition in which each social unit (families, community, society), physical, envi-

ronmental structure or the economic activity that sustains that unit, is susceptible to suffer damages due to dangerous or hazardous events. This includes a concept with pre-emptive and potential components that are expressed in terms of weakness or relative fragility that should be studied with a multidisciplinary view and within the synergy that produced it. Different **types of vulnerabilities** can be identified: **technical** (involved with the forms of construction and the application or upgrading of technologies and regulations), **political-institutional** (weakness on the part of the authorities responsible for recognizing problems, and either allowing them to occur and/or acting to correct them); **social** (the level of awareness of the situation of exposure and the capacity to assume or overcome it), and **economic** (capacity to orient investments to modify situations of fragility or weakness).

It is rare for land use managers to analyze these components or the processes that lead to creating risks. They usually make a list of environmental, social, economic, legal, administrative, political, organizational, etc., problems, prioritize them, and try to establish functional correlations among them without digging into the fundamental cause of the risk, with all of its components and unique synergies. In most cases, these are issues that never even show up in their analyses.

However, the plans and projects that they recommend, and the actions they prompt, modify the dynamics and structure of the territory and, in many occasions, unexpected “accidental” combinations spring up that become undesired costs. Land use management defines the territorial characteristics through analysis, and generally on the margin of the important advances that studies on risk and disasters have developed during recent times.

Very recently, beginning with the strong interest manifested by international organizations – especially the UNDP, OAS and specialized organizations (ISDR) – land

22 Zilvert Soto L, Acquaviva L and others: Risk Management: Training Support Material, UNDP/COSUDE, Nicaragua, 2004, p. 21.

use managers have been invited to participate in meetings to share these visions. We can safely say that they go through a period of “mutual discovery” between both disciplines. They discover reasons that explain this approach from the risk management perspective.

“...Risk is the product of particular processes of social and economic transformation, or of the country’s economic accumulation, and therefore, is a direct or indirect result of the application of models of growth and development.”

“...The vision that has prevailed up till now is that after each disaster, it has only been possible to achieve a lesser degree of development, in economic, social, institutional, etc. terms, than that which existed before the disaster occurred... the reduction of the risk of disaster becomes an indicator of development and of sustainable human development, by reducing the losses that the disasters would have caused and by maintaining the levels of welfare that have been achieved prior to its occurrence.”²³

Land use management, as a discipline, as an operational intervention, as a technology of organization and as territorial policy, was a “discovery” of risk management. What is needed now is for an inverse total discovery to occur. In the meantime, the hazards are analyzed by land use management as simple natural phenomena that characterize environmentally complex surroundings, but fail to take into account its effects and territorial impact and risk to which the population is subjected. Land use management lacks the tools proven to make these analyses and, above all, lacks the capacity to generate the types of policies needed for correction and prevention.

3.2 Risk Management Model

How are these situations managed from a risk management perspective? The process generated by risk management includes various stages of territorial risk reduction:

- It starts with the **dawning of awareness** on the part of the community or of its authorities,

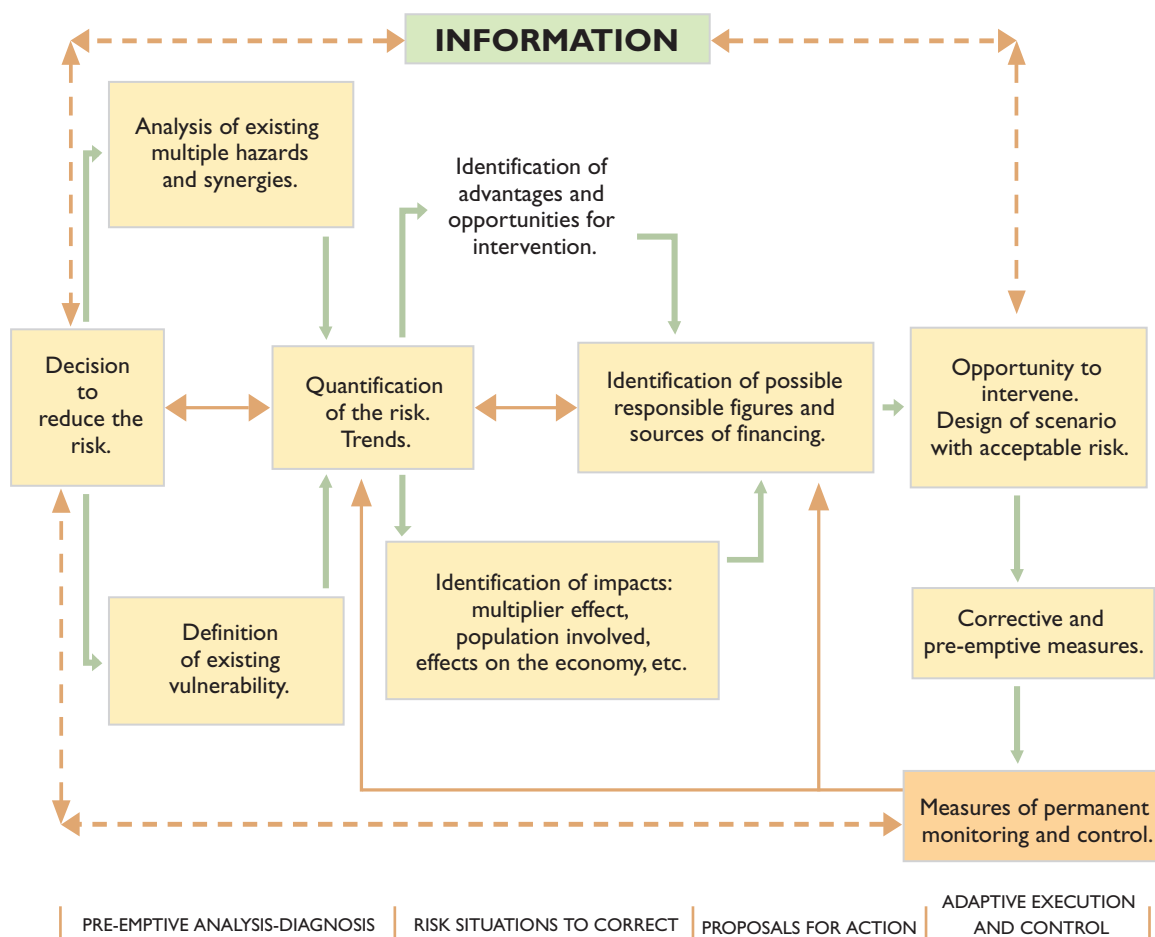
regarding the need to modify situations that due to their characteristics, recurrence and effects on the population, goods and activities, create a real or potential risk scenario that compromises territorial development, quality of life and the security of the population.

- A **decision** to intervene emerges.
- The problem is put into perspective through **risk analysis**: hazard x vulnerability = risk.
- Acceptable levels of risk are defined and a **potential scenario** is suggested with those conditions.
- **Financial, political, social, technical cooperation support**, etc. is sought to resolve the problem and to progress toward the objectives of improving on the territorial situation.
- Possible **alternatives of intervention** are generated and the ones best adjusted to the environmental, sociopolitical and economic-financial context are chosen.
- **Corrective and pre-emptive policies** needed to modify the situation creating the hazard are proposed, which reduces the vulnerability and the possibility of risk to acceptable levels.
- The **plans and projects** are installed.
- The **results are evaluated and monitored** on a permanent basis, using the most adequate mechanisms for each type of policy applied.

The process is nourished by a constant flow of reliable **information** that is available for consultation by each of the intervening actors and is kept as a control and management tool, since it can accumulate the information and control indicators needed for each stage. All of this reflection and action is constantly present in the context of the territorial development model (spontaneous or planned) adopted by the region where the intervention is taking place.

23 GTZ. Associated concepts.... op. cit.

THEORETICAL MODEL OF RISK MANAGEMENT



Source: Author

3.3 Corrective Management and Pre-emptive Management

Apparently there can be semantic similarities between the enunciation of the policies that put land use manage-

ment and risk management in motion, but the contents differ substantially due to the objectives that each pursues:

TYPES OF INTERVENTION POLICIES FOR RISK MANAGEMENT AND FOR LAND USE MANAGEMENT

	RISK MANAGEMENT	OBJECTIVE	LAND USE MANAGEMENT	OBJECTIVE
INTERVENTION POLICIES	Preparations for responding to the emergency.	Preventive measures meant to prepare settlements and their populations to withstand the impact of hazard events.	Policies of conservation and maintenance.	Policies destined to preserve the components and synergies of the territory and that have positive results for territorial development.
	Corrective measures.	Measures or actions that promote the reduction of existing vulnerability.	Corrective policies.	Policies aimed at improving the response and assimilation of certain components or processes, to new organizational situations.
	Pre-emptive measures.	Measures or actions that promote the avoidance of new vulnerabilities or dangers.	Development policies.	Policies aimed at introducing new elements or developing new synergies to produce changes in territorial configuration.

Source: Author

Corrective measures allow for identifying the problems of exposure of people and goods to the latent hazards in the territory's operation. They allow us to visualize and establish mechanisms of intervention such as the relocation of populations at risk, reconstruction, adaptation or recovery of vulnerable structures, recovery of degraded areas and/or river basins, improvements in elements of water drainage, channeling and dredging rivers, as well as interventions aimed at improving the behavior of the community by making better information available to them, training, participation, and coordination to resolve these problems. In this view, corrective measures are a vital support for improving the interpretation of land use management problems, particularly components and processes, their hierarchy, and above all, in the way these interactions are resolved.

Pre-emptive measures, on the other hand, have a clear orientation toward anticipating situations that have yet to happen and have the advantage of being able to measure the undesirable cost of future investment and development initiatives. With this perspective, strategic support is provided for land use management that, indeed, has the capacity to promote territorial development through public and private investment, regulations, promotional and developmental policies, plans and projects for rearranging the territorial components and other mechanisms.

If, indeed, pre-emptive management is aimed at undeveloped areas, land use management assigns functions and activities to these potential areas in the context of the land use management plans; the combination of both perspectives allows foresight into the **potential risk** that is accu-

mulating in these areas, and provides the tools to calculate the economic, social, environmental, etc., losses that each plan might entail. Risk management, in this context, is also able to calculate **acceptable risk**, a concept that permits adjusting the activities in the plans – of risk management as well as land use management – to the needs brought about by the losses or costs that each community is willing to assume in its process of development.

3.4 Characteristics of Local Risk Management

This form of reflection/action can be applied on different territorial scales (international, national, regional, local, urban, rural, etc.), but finds its natural habitat in the context of **communities and local governments**, where the dimensions of the problems, the direct contact with the community, the possibility of collecting real information, the ability to identify persons responsible for each type of proposed strategy, etc., presents the best conditions for development. Therefore, this is the most favorable context for producing efficient risk management and reducing the conditions of vulnerability that have been detected. The local level (municipality, district, city, etc.) is ideal for insuring an increase in the conditions of security and could be conceived as a guarantee of sustainability in their developmental processes.

Concerted effort, however, is important, since there are also many challenges at the local level: a shortage of specialized professionals, the limited capacity of local governments to impose their strategies in the context of higher politics, little ability to generate financial resources

needed for control and modification of the territory, and limited capability of institutional management, etc.

However, in the context of today's territorial transformations in Latin America, described in detail in point 2.1, local communities play a very important role in competitiveness. Their resources and capabilities for making the economy grow are part of a **decision network** that is not always supported in its territorial form within the municipal area, and similarly to the way these “**external**” decisions control the circuits of competitiveness (multi-governments, foreign companies, investment organizations, etc.) they also generate risk scenarios ... that is to say, many times, the decisions that mobilize the territory and generate risk are taken at the planning levels to which the municipal authorities have little or no access. In most cases, the difficulties in coordinating these actions nullify the utility of making the effort. They are frequently beyond the institutional and legal capacity of local governments, whose weaknesses become one more element of vulnerability in the risk scenario.

We can use the situation of the Municipality of Luján de Cuyo (Mendoza-Argentina)²⁴ as an example. This municipality has generated a strategic action plan (SAP) for its municipal development, through a set of land use management, risk management and environmental management policies, together with the strategies for economic and social development²⁵ for the department of the same name. Within this municipality (department) lies an area of extremely complex geography: the **Districts of Ugarteche, Carrizal, and Perdriel**, which have a high strategic value because they contain:

- 24 Example prepared especially for this document, by Silvia Quiroga de Benegas. The Province of Mendoza has no integrated land use management plan or any organizations for risk management tasks. Sources consulted: www.dsostenible.com.ar. Argentina Environmental Situation. Prodia Program. Norms for Spillways and Quality Guidelines in Hydrological Bodies. Province of Mendoza, Engineer León Kotlik, December 26, 2006; Los Andes Online, Mendoza, Argentina. Friday, September 22, 2006; General Department of Irrigation. Preliminary Diagnosis on the Management of hydrological Resources in the Province of Mendoza. Hydrological supply. Mendoza, 1994; Jorge Fernández Rojas special to Los Andes Newspaper, Mendoza, Argentina, July 22, 2003; National University of Cuyo, Municipality of Luján de Cuyo, “Strategic Action Plan for Integrated Management and Sustainable Development. Action Program IV.” CETEM, Mendoza, 2003; Department of Health Care and Environmental Control, Technical Report October 1, 2001. Undersecretary of the Environment, Ministry of the Environment and Public Works, Government of Mendoza.
- 25 Gray de Cerdán N., Quiroga S., Guiñazú E., Lopez M. Strategic Action Plan for Integrated Management and Sustainable Development. Luján de Cuyo 2004-2016. CETEM / Municipality of Luján, Mendoza, Argentina 2004.

- The most important underground water reserves in free aquifers,²⁶
- The most important petroleum refinery in the country and one of the largest in Latin America,
- Important natural gas reserves,
- The most complex industrial district of the province, with extremely hazardous industries,
- Oil fields in full production,
- Agricultural development for the international market based on the binomial “vid-vino” for export, that is rapidly gaining markets and competing in quality with countries such as Chile, France and others,
- The western capital of the Central Bi-oceanic Corridor of MERCOSUR in its Andean segment,
- The multimode inter-rail transportation terminal of the Trans-Andean Railroad that will connect Mendoza to Regions IV and V of Chile (currently in a public bidding process).
- Danger of losing high quality arable soils through petroleum contamination,
- Danger of uncontrolled land development due to the lack of provincial land use management standards,
- Danger due to the general lack of training for businessmen, public officials and the community for assuming shared responsibilities in matters of risk and sustainable management.

There is **environmental danger** because of the proven water contamination of the subterranean aquifers in the Carrizal sub-basin that is part of the recharge zone with an approximate extension of 545 square kilometers. Beneath this sub-basin flow 25,000 cubic hectometers of water. In the extreme northwest of the zone is the Luján de Cuyo industrial district with corporations such as the REPSOL- YPF Refinery, Cuyo SAIC Petrol-chemical company and more than 30 other large corporations that process hazardous materials. Its location coincides with the sub-basin’s maximum aquifer recharge zone. South of this area lies an area of conflict resulting from the contamination of the underground water supply. This water supply provides for the irrigation of the First Agricultural Zone of the Mendoza River Highlands.²⁷

The inauguration of the Luján de Cuyo refinery dates back to 1940, while the Petrol-chemical Park was installed as a development pole in the 1970s. In both cases, their installations failed to take into account basic environmental conditions such as wind direction, the location of the accessible aquifer and the natural recharge zone of subterranean water supply.

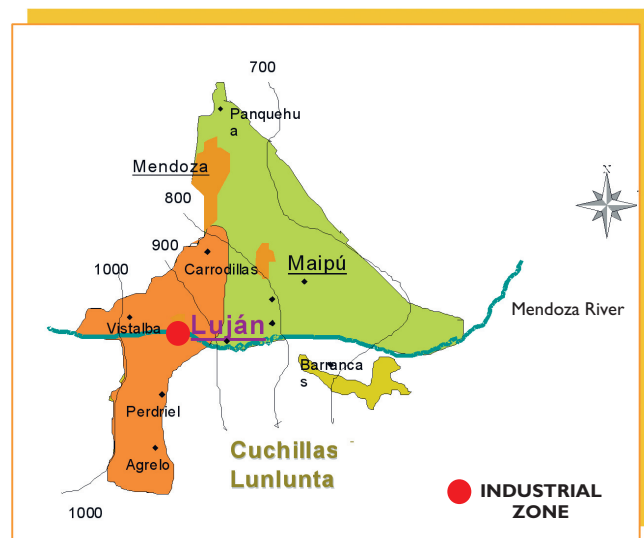
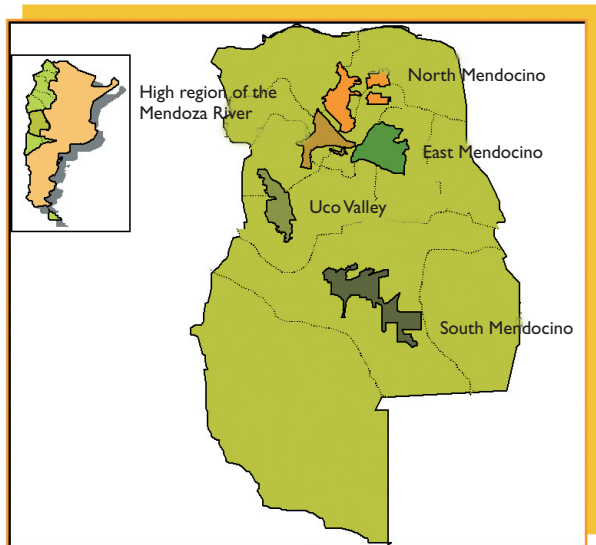
We can find an assortment of extremely high hazard and risk situations of different origins in this zone, which cannot be solved directly by the local government because they exceed its institutional management capabilities:

- Environmental danger including potential loss of water resources through contamination of underground aquifers in the arid zone,
- Potential technological hazards from high-risk industries located very near densely populated areas,

26 The province of Mendoza is located in the west-central sector of the Republic of Argentina. It is characterized by the aridness of its climate. (200 mm annual rainfall). However, it is a zone of high productivity, using artificial surface irrigation and intense exploitation of underground water, for a variety of uses. This resource comes from the snow melt in the high mountain ranges, its eventual infiltration into the sources and beds of the rivers and a well-cared for irrigation system that supplies water to the cultivated oases of the province, pertaining to Mendoza, Tunuyán, Diamante and Atuel rivers.

27 This zone is currently in a process of explosive growth due to the planting of vineyards for wine exports, in which the province of Mendoza has achieved a high degree of quality.

WINE-PRODUCING AREAS OF THE MENDOZA PROVINCE



This is partially due to the fact that in the province of Mendoza, legislation on the environment is very recent: Law 5961 on Environmental Preservation was ratified in 1992, and its Regulatory Decree No. 2109 is from the year 1994. These legal difficulties have contributed to the environmental impact caused by petroleum activities and other connected industries that affect the soil, air, and water. Exacerbating this is the lack of functionality of the institutions in charge of control since there is a history of numerous denouncements from producers that accuse the REPSOL-YPF Petroleum Company of contaminating subterranean water supplies. A few key points in the evolution of this problem are as follows:

- For more than a decade, state and private organizations have conducted studies on the quality of water from this aquifer. More recently, a report in 2006 from the National Institute of Water (INA) was revealed. It had been ordered by the REPSOL-YPF Petroleum Company, and was not made public for seven years thanks to a confidentiality clause. The report indicated that petroleum contamination had been detected in water wells located in the El Carrizal sub-basin. The document points out 11 sites on a map of the zone where “the presence of total hydrocarbons and certain

aromatic compositions has been determined. In some wells selected for testing, heavy metals were found.” The Luján de Cuyo Refinery, property of REPSOL-YPF, insists that its refinery is not the origin of the contamination, although the General Department of Irrigation considers this report to be an extremely important background document for the evaluation of the refinery’s impact on the aquifers, and has fined the companies on several occasions for “manifest contamination” upon finding hydrocarbon concentrations 2,600 times higher than the accepted levels in sources similar to those monitored.

- Other critical elements located in the same zone are the potential sources of not only hazards but also contamination of underground aquifers, given their location in the zone of maximum hydrological recharge.
 - The flare well found in Gas Plant “Con 2” in the Luján de Cuyo industrial district is a well that periodically burns off gases liberated for safety reasons, and the fact that it is located two meters beneath the ground level of the plant increases the risk of filtration of residual

materials into the subterranean aquifer after each flare-off. Criminal complaints have been filed against the responsible functionaries of REPSOL in Mendoza regarding this situation. The province's Office of Environmental Control considers that this trench should be replaced with a vertical wicking chimney of 60 meters, which is already included as part of a construction project.

- The "Yacimiento Lunlunta" pilot project for natural gas storage involves an underground formation for storage of natural gas located in the sub-strata of Luján. It is one of three such reserves owned by REPSOL in the country and has been in operation since 2005, although it has yet to comply with the requirements imposed by Law 5961. Problems of contamination have been detected and although official technicians accept that the gases identified in the water are not directly noxious, they represent a risk to public security, since they represent highly flammable gaseous elements. This gas deposit currently is in disuse, but it has not been decommissioned.

The local government has confronted the control of all of these problems through a policy of coordinated land use management. It has also decided to train its professional staff in matters of land use and **risk management**, and is committed to the systematic execution of projects planned in the SAP. However, it constantly collides with the interests of large corporations whose decisions for intervention are made outside of the country (for example: REPSOL is Spanish), or at the national level (capital investments in corridors without consultation), or at the provincial level (decisions on educational curricula in high schools – 90% of the establishments depend on the provincial government).

On the other hand, the example shows that in the case of industrial parks or districts established prior to the legislation regulating environmental matters, the local organizations should implement measures of control and regularization of all those establishments that fail to comply with the legal requirements, setting deadlines

and corresponding sanctions (police force). Furthermore, although it sounds inconceivable within this framework, some of the installations that were established following the environmental legislation also fail to comply. This results in a very high degree of vulnerability in the institutional system, which is not exercising an efficient control function in the face of the blossoming private activity. In this case, the provincial government – being the legal entity in charge – is not guaranteeing the rights of the citizens to a clean and secure environment. The provincial industrial park, which has the greatest number of technological hazards, is managed by the province like a virtual island within the industrial district. The local government is unable to intervene because the law fails to provide it with the necessary power.

The local government is confident that, via its land use management plan, it can resolve its problems through the coordination of local, provincial and municipal policies. It is evident, however, that even if all the activities in the territory were to be correctly undertaken, and adequate environmental management were to be exercised by the municipal government, it would still be necessary to carry out risk management actions in coordination with the petroleum companies installed in the zone and the industrial district on a permanent basis, considering that these are hazardous industries due to their technological components and their potential for contamination. It would be necessary to prevent and/or mitigate the hazards, whether these are natural or man-made, that could affect the population, its goods and its activities. It is in the municipality's best interest to carry out a joint and coordinated program of training and awareness with the multiple public as well as private actors.

For now, however, there is no communal action supporting education and prevention in the department in particular, nor in the zone adjoining or in the immediate area of influence of the industrial pole. Therefore no control or prevention mechanisms, nor responses necessary to prevent situations of risk or emergencies have been developed. There is only one case, the industrial district corporations themselves, that have organized an inter-corporate organization called COZAPI, whose function is to respond to emergencies within the district and to give assistance to the installed group of corporations.

In conclusion, one can be sure that the role of the municipalities is as extremely important for risk management as it is for land use management. The tendency toward decentralization of functions, the stimulus of the participatory processes, and the need to assume processes of coordination and negotiation between different sectors, has elevated the municipality to a **highly favorable political and management status**.

But together with the strengths of having a context for facilitating the processes of direct participation, concerted decision-making, and more precise negotiation and actions, there appear **structural weaknesses** such as the lack of economic and human resources, weakness in the organization and administration, the lack of quality in management, the high rotation of staff, budgetary limitations, etc. that make the municipal scenario a challenge, and at times, a critical venue for achieving the objectives of risk management and land use management.

4. WHAT IS LAND USE MANAGEMENT AND WHY IS IT NECESSARY?

4.1 The Evolution of the Concept of Land Use Management: From the Distribution of “Industrial Districts” to “Social Construction of Competitive Territories”

Land use management is justified by its own conceptual content as a planned method of aggressive action to correct and prevent territorial imbalances, the disorderly occupation and use of land, and the social and environmental externalities that provoke spontaneous economic growth over which the market’s control mechanisms are insufficient.²⁸ Starting with the idea that, as with any system, the territorial system needs control and regulatory mechanisms, these functions correspond to the planning

and management system implied in the process of land use management.

As a discipline, land use management is not a new policy in Latin America or in the rest of the world. Since the 1970s, Latin American universities have come to recognize the concepts of “*aménagement du territoire*”²⁹ born in France, where it emerged in association with the theories of regional space strongly marked by the theories of the Perroux poles of development:³⁰

*“Regional science went through a period of euphoria during the 1950s and 1960s, in connection with a favorable economic and social context: ‘the glorious thirties.’ Based on a Ford-styled (production line) model, becoming the hegemony of the developed countries, land use management and planning occupied a central role in political and social life. The techniques and tools were developing rapidly in order to assist the decision makers. There were fewer social problems and growth was in the best of health.... during the 1970s and 1980s came the economic crisis and the worries changed: growth came to a standstill, unemployment mounted, planning lost its importance. The Ford model evolved into the post-Ford model, based on very diverse principles in the Western countries... The productive system changed, flexibility appeared in all realms of the economy as the answer to the crisis. New centers of growth emerged, based either on industries of new technology, artisan activities, or corporate services. Social demand increased... **environmental problems** were discovered through ecologist movements, which became political movements.”³¹*

It was at this moment in time, around the end of the 1980s, when development began in the Latin American experience. It was strongly connected to the need for

28 Gomez Orea D. Land Use Management. An Approach from the Physical Medium. Geo-Mining Technology Institute of Spain Series: Geo-Environmental Engineering. Editorial Agrícola Española. S.A.

29 Lajugie J., Delfaud P., Lacour C. Regional Space and Land Use Management. Paris, Edit. Dalloz, 1985.

30 Perroux, F. Note sur la notion de pole de croissance. In Applied Economics, 1.2 307, Paris 1955.

31 Benko, George. Regional Science. Society and Territory Collection.... op cit. p. 161.

defining a global position on the problem of the environment and territorial development. The first reference to this phenomena is Venezuela,³² which approved its Organic Law of Land Use Management in 1983.

Meanwhile, in **Europe**, a lengthy discussion was under way to find solutions to overcome the problems created by these new organizational paradigms. The failure of development policies applied in the Third World countries, and the new economic context of the countries of the North oriented the reflections on land use management and raised doubts about the types of organization and management linked to the concentration of the industries, the focal point of the center-peripheral territorial model:

- From the territorial concept of **industrial districts**, there was a move to the concept of **localized industrial systems** that link the territorial aspects of industrialization and innovation (**techno-poles**) based on the cost of transactions, to the role of the political or quasi-political agents. So a recovery of the metropolitan areas was presented as part of the industrial strategy.
- Parallel to that concept was the development of another line of thought that considered **territorial matters as “innovative media” and as the scenario for the publication of innovations**, in and of itself.
- After the first half of the 1980s, as a consequence, the tendency to return to the **metropolis** was evident. A **worldwide urban hierarchy** was proposed (Claude Lacour) that would serve as

a base for the installation of multinational corporations; the accentuated de-formalization of the era was suggested as the cause for the de-territorialization of the economy and of society. This led to the **space-flow** concept (Castells, M. 1989). These flows were dominated by the great corporations and by a social elite, since information and new technology were the key “inputs” for the accumulation in the new capitalism. In this context came the appearance of another concept, that of the “informational city” and later, that of the “global city” (Saskia Sassen 1991). In the later context, Sassen also discovered that its “arrogant wealth lay on an **almost structural poverty and chronic insecurity**”. ...

- Toward 1990 arose the concepts of **networks and governance** that link the economic processes to territory. Network became known as the spatial dimension of a type of regulation of relationships between productive units. They spoke of hierarchy, connections with contractors, propitious “atmospheres,” etc. All of this led to the concept of governance over these diffuse and complex processes, and applied to industrial or innovative districts, and later reached the point of installing themselves in the intercorporate organizational format. Around 1993, these concepts were broadened, since it became evident that they could be extended throughout the **system of territorialized human relations** and the concept of governance was consolidated as the set of regulatory methods between the market and politics (of the nation state), in other words, of civil society.³³

32 Massiris Cabeza, A. Land Use Management System in Latin American Countries. Luis A. Arango Virtual Library. Bank of the Republic, Colombia. 2006.

33 Storper, M. The Regional World: Territorial Development in a Global Economy. N.Y. Guilford Press. 1997.

- By 1995, an interruption in the theories of **social construction of territory** and the sociospatial development of modern metropolis had surfaced.

This complex path of reflection/action also came about based on the permanent debate about the **local/global relationship**, which on the territorial scale offers many dichotomies in the management and the **question of the co-existence of very different local models within a single, unique global area**. Other basic issues include the problem of identifying borders in a world without frontiers and the concentration, not only of competitiveness, but also of territorial inequality, which puts the solidarity of society to the test.

In this context, the subject of **VULNERABILITY AND RISK** also emerges as a strong challenge to the scientific community and to the territorial operators. Benko³⁴ points out:

“In our society, RISK and its management has become a major field of politics and the art of governing. In the modern world, the techniques are ever more complex and our environment is ever more artificial, which makes our society ever more vulnerable, leaving it at the mercy of unforeseen accidents. As a consequence, **it is the very nature of the risks that has changed.**”

Regional science can be found at the heart of the problems linked as much to natural risks as to the societies. After 1990, the investigations multiply in this realm, evolving on many axes: notable among them are the reflections on risk, as a fundamental part of our culture; or on prevention, sustainable economy, land use management and natural and technological risks.”

Again, in this context, one can understand the need for a direct relationship with risk management: land use management is an indispensable tool because it is capable of building a common ground of economic policy and interactive work with the perspective of environmental management and risk management needed to achieve these objectives. Therefore, it should be developed at all decision-making levels participating in the process of building the new regions.

All of the concepts analyzed – the evolution of thinking about the region, territory and its organization – have had strong repercussions on the ideas of usage put into practice in Latin America. The difference is in the fact that its importation from European sources and its eventual application to the Latin American territorial realities – so different among themselves and so different from that of European countries – has, at times, provoked irreparable fractures in the processes of territorial organization, or, simply has had no practical effect at all.

34 Benko, G. Op.cit. p. 151.

What one must remember is that **land use management in Latin America emerged from and was initially suggested as a strategy for achieving sustainable development** based on the geographical distribution of the population and its activities according to the integrity and potential of the natural resources making up the physical/biological environment – everything involved in the search to improve living conditions.

Among the objectives established as pertinent to land use management – in the first Latin American document (Our Own Agenda on Development) – the need is defined for “**protecting the occupied zones against natural hazards**” ... together with the environmental and territorial objectives that are common to this theme.

That is, that **together with land use management, and since its conception in Latin America, the need to connect land use management, risk management, and environmental management, appearing as objectives of a single discipline, has been recognized.**

However, in practice, these areas of knowledge, and the way they are developed, are dissociated and considered as independent, evolving along parallel paths, as mentioned earlier.

4.1.1 Current Concept of Territory and its Components

The practice of land use management can be clarified by defining the concept of **TERRITORY**, which is at the very foundation of this reflection/action. It is not our objective to formulate a theory on this concept – of deep geographical roots and indiscriminate usage in the lexicon of the day, especially among professionals – but only to establish a certain approximation to its principal components and relationships.

This term should be analyzed from a **complex and multidisciplinary** viewpoint, which is necessary for understanding – in a second phase – the dynamic that should be adopted into the policies for exercising land use management, with a vision of sustainability and risk

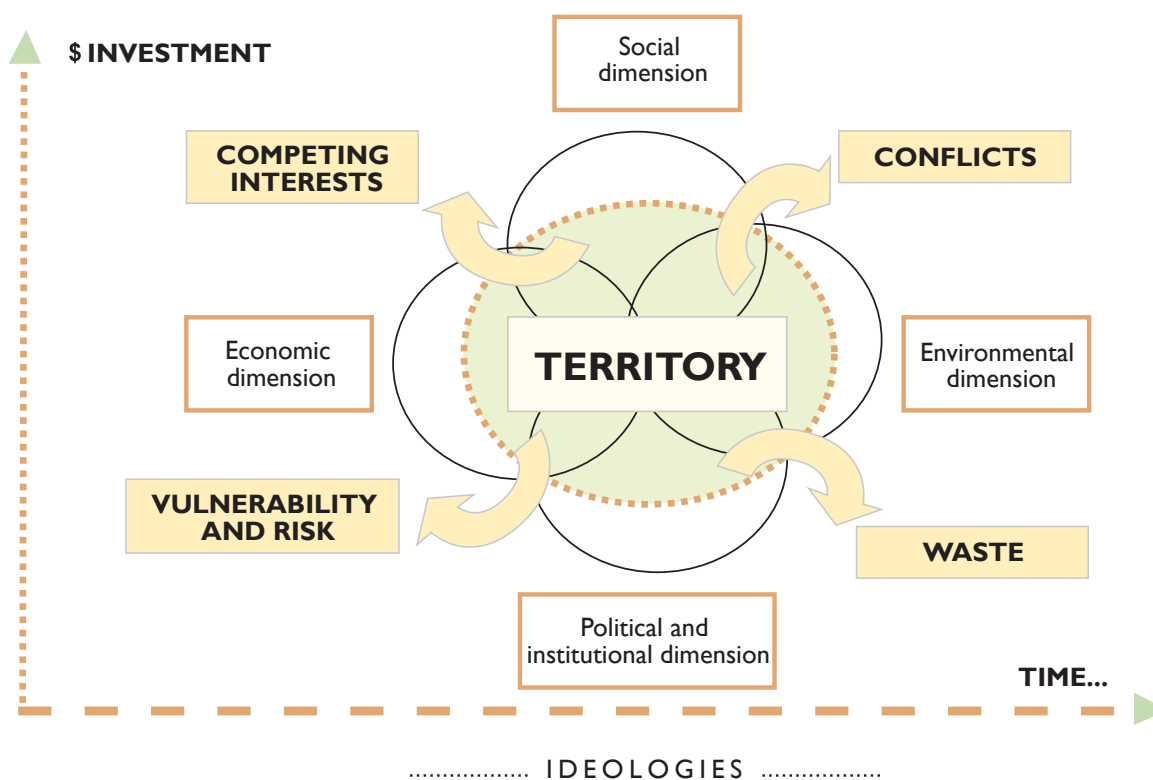
reduction. To the extent that we better understand what territory is, we will be in better condition to orient its organization.

This concept has been indistinctly qualified as “**space**” over which several definitions have been layered: a physical scenario into which human beings insert themselves, a natural medium that provides resources for human life, a singular and unrepeatable area modeled historically, a mental image, an ambience of confrontation and social conflicts, a set of productive processes that assemble a favorable environment, among many others. These are the different definitions that are registered in the bibliography. Each of these perspectives of interpretation has generated a **paradigm** of investigation, but has been unable to generate a differentiated set of **policy types** for intervention to improve its organization. Why? Because **TERRITORY** is all this and more; it is not a static element, but also:

- Contains a strong political and jurisdictional component that connects it to the levels where **power** is exercised (government, regional, local...),
- Involves a cultural force that gives it **cohesion**,
- Is inserted into a dynamic dimension, characterized by processes, and
- Involves a changing context within **time**.

We could say that **territory is the result of the interaction** of a set of heterogeneous, however insoluble, dimensions (social, economic, environmental, political, institutional) that are capable of combining the diversity and organizing the lives of the different communities into shared geographical environments, through time, according to predominating ideologies.

Territory has a **structure** composed of complex elements; it has its own **dynamic** and is organized on the basis of **processes**; it is **always organized** in some way; coherent or unbalanced, voluntary or spontaneously, as an expression of a generating idea or a political project, or as the fruit of a cultural, social or historical process. Territory is conflict, it is friction between interests, it is waste, it is vulnerability, it is risk; in synthesis,



UNCERTAINTY. Territory, therefore, is more or less “constructible,” more or less “destructible,” and more or less “transformable.” To intervene in it, one must pay close attention and not lose sight of the interactions, the combination of which is interminable:

- Economic development is inserted into social organization,
- Approaching structural inequities requires not only economic changes but also social transformations,
- Development policies commit private organizations, civil society and public management in broad terms, as well as the efficiency and adaptation of the standards and style of the development that has been adopted,
- The creation, accumulation, and distribution of wealth involves the kind of resource management and social training needed to give value to the task, the objectives of the public sector and society’s development, the joining of intra- or inter-relations,

- **Risk** emanates from defective territorial processes, disorderly conduct, uncontrolled exploitation of natural resources, deficits in investment, weak management, social irresponsibility, and a lack of information and of timely and adequate norms.

However, the TERRITORY is also – in each step of its development – a source of **OPPORTUNITIES** (social, economic, environmental, political, institutional, cultural, scientific, etc.), **CONFRONTATION** (ideological, scientific, power-based) and, being made up of elements that are themselves dynamic and ordered into **PROCESSES** (sequences, organization, interactions), it is possible to generate or construct from them new circuits and – with innovative ideas – imagine different organizational scenarios and intervene in their development and evolution.

It is therefore possible to take actions to improve and reduce levels of uncertainty, which are translated into **costs of functioning**: economic, social, environmental, political, and other costs.

4.1.2 Current Concept of Territorial Competitiveness

Globalization and the processes of integration add to this group of things denominated territory, an ideology that is the fruit of economic and social evolution, coined at the end of the 20th century. It provides territory with a **defined directionality toward COMPETITIVENESS**.

In reality this concept has always been present in the field of economic development. An **opening toward the concept of territory** is produced by the permanent verification of environmental and social imbalances provoked by economic activity that took into account only the inefficiency of the investments and the results of the financial balances, found in the concept of com-

munity welfare. This is how the Latin American scenarios of poverty, marginalization, social injustice and low quality of life, irreparable loss of strategic natural resources, vulnerability and risk, productive inefficiency and institutional disorientation have come to be generated.

Competitiveness is a comparative concept founded on the dynamic capacity of economic activity, located spatially, to continuously and consistently maintain, broaden and improve its participation in the market – both domestic and foreign – through the production, distribution and sale of goods and services in the time, place and form that they are requested, seeking the benefit of society as its end.

But the concept of **TERRITORIAL COMPETITIVENESS**³⁵ demonstrates that such capacity depends on a series of elements at the macro, meso and micro levels, both economic and non-economic. At the **macro** level, we have the intervention of aspects regarding each country and of its relationships with the rest of the world. At the **meso** level, the spatial factors stand out: distance, infrastructure supporting production, based on natural resources, organization and social infrastructure. At the micro level, we see factors related to corporate organization (quality, price, etc.) as well as spatial factors that directly condition the corporations.

In the context of territory, competitiveness ceases to be a static and lineal concept concentrated merely on economic aspects. It now incorporates factors such as culture, environmental sustainability, political and institutional structure, quality of the human resources and spatial location. In each of these factors there is **vulnerability and potential risk**, both in the operational modality and in the interactions – whether or not they are balanced – between the natural, social, economic, legal, and administrative environments in each case. **In this sense, we can also say that poorly managed competitiveness generates vulnerability and risk.**

35 IICA: Competitiveness of Agriculture: Agro-food Chains and the Impact of the Spatial Location Factor. Chapter I: Sepúlveda, Sergio. Competitiveness. San Jose, Costa Rica, 1999.

Territorial competitiveness takes the following factors into account:

- Focusing the development strategies on the functioning **territory unit**, or on the smaller units that make it up, which can be analyzed with the information that is available;
- The multifaceted nature of territories;
- The need to formulate policies with multiple objectives and integral treatments;
- The need to overcome the traditional institutional framework and the investments slanted by exclusive economic interests, and
- The establishment of institutional mechanisms that promote the socioproductive participatory system.

“A territory is competitive if it is capable of facing the competition of the market, and if, at the same time, it can guarantee the surrounding’s environmental, economic, social and cultural viability. Territorial competitiveness assumes that the territory’s resources are taken into account in the search for global coherence, incorporation of agents and institutions, integration of sectors of activity and a logic of innovation, cooperation of the other territories and articulation with regional and government policies as well as the global context.”³⁶

The **factors that affect territorial competitiveness** are non-economic, directly related to the territory, and have no relationship to the price policies. They are:

- a) The surroundings,
- b) The availability and quality of the factors, among which are included technology, human resources, natural resource availability, the cost of capital and infrastructure,

- c) The conditions of internal demand,
- d) The support sectors and other related sectors, and
- e) The organization of the market and its rivalries.

The **LEADER** focus relates the concept of competitiveness to that of territorial capital:³⁷

“Territorial capital represents the set of elements that are at the disposition of the territory, including both those of a material and an immaterial nature {...} Territorial capital provides us with the elements that constitute the wealth of a territory (activities, scenery, patrimony, technical knowledge, etc.), not from the accountable inventory perspective, but rather that of a search for susceptible specificities that set it apart.” (LEADER, 1999). In this approach, eight key factors (or groups of factors) enter into play:

- *Physical resources: natural resources (terrain, soil, subsoil, vegetation, fauna, hydrological resources, atmosphere, etc.), equipment, infrastructure, historic patrimony and architectural patrimony.*
- *Culture and identity: values shared by the agents of the territory, interests, ways of thinking and owning the environment, etc.*
- *Human resources: men and women that live in the territory, migrations, demographic characteristics, social structure.*
- *Knowledge, techniques and competencies: each territorial space has its own technological characteristics and its own capacity for research and development.*
- *Governance and financial resources: local institutions, political rules, standards of collective behavior and, in general, governing the territory.*

36 Cordero-Salas P, Cavaría H, Echeverri R, Sepúlveda S. Rural Territories, Competitiveness and Development. IICA, San José CR. 2003, Pag. 12.

37 LEADER II. 1999. Territorial Competitiveness : Building a Strategy for Territorial Development Based on Experience, from LEADER. Available at: <http://europa.eu.int>

- *Activities and companies: geographic concentration and structuring of the companies and productive sectors of the economy.*
- *Markets and external relations: integration of markets, exchange networks, commercialization processes, etc.*
- *Image/perception: image and concept held regarding the territory, both internally and externally.”*

Each of these factors is measured, compared and evaluated in terms of the current conditions of the region, and aspects that include the following are analyzed:

- a. Strengths compared to other territories that can be classified as potential competitors;
- b. Economic, social, environmental, and political opportunities;
- c. Limitations, weaknesses and problems faced by the territory's economic agents;
- d. Hazards from different external agents of territories.

RISK AND VULNERABILITY are latent in the different components of territorial capital, and in the way they function so that just like any other component, they can be measured, compared, evaluated and reformulated in their management. It is necessary only to make them explicit in the territorial analysis and diagnosis, in order to later insert them into land use management policies.

They should be clearly identified because they are components unique to the territorial system and are integrated into each process. They act as **factors that unleash competitiveness**, which constitutes the ideology of the reigning model of globalization in Latin America, because the calculation of risk and the reduction of vulnerability permit intervention for the reduction of additional, undesirable costs and improved competitiveness.

4.1.3 Capacity for Territorial Innovation

Inserting the measure of vulnerability and risk of disaster is also intimately connected to the territory's capacity for innovation and to the regional policy that is initiated to attract technology.

Innovation is habitually seen from the perspective of the introduction of new technologies at the level of productive processes within and outside of corporations. The creation of a favorable atmosphere for technological innovation aims to improve the conditions of the territory's competitiveness, and also expresses and adopts specific forms from the physical-spatial point of view. We can identify:

- Industrial complexes for technological innovation, generally associated with urban agglomerations, having important centers for scientific and technological research that produce new knowledge and processes;
- Scientific cities and regional technological hubs where these resources are concentrated, phenomena that are observed particularly in the territory of the more advanced nations (Japan, France, Spain, United States, and others) that are producers and creators of technology. Latin America depends to a high degree on the technological production of these countries. This is not a measure of innovation in Latin American territories.

Latin American territories' capacity for innovation is linked to the possibility of generating a favorable territorial organization to attract technological innovation. The creation of these environments requires macroeconomic policies that are capable of reproducing conditions similar to those of the more advanced innovative media, in emerging or traditional regions with less scientific and technological tradition:

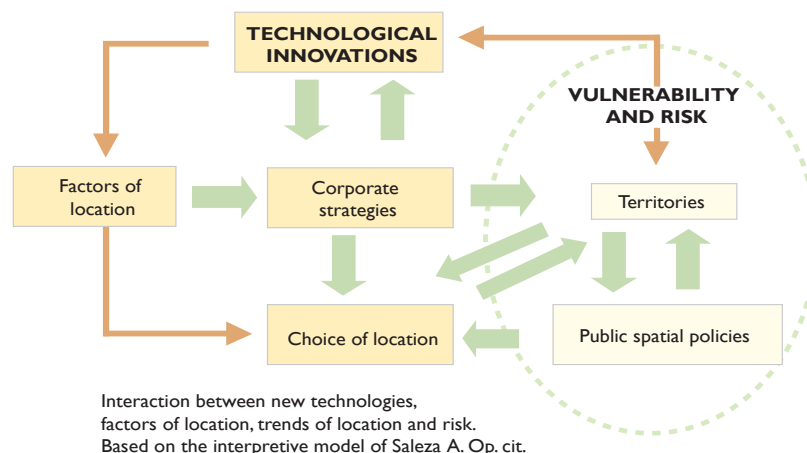
“Considered requisites for the creation of this creative and innovative atmosphere are certain adequate conditions of competition, an unstable entrepreneurial

structure that promotes changes and certain synergetic conditions between the different factors, understood as an intense inter-relationship among them, so that the combined effect of all of these factors surpasses the sum of the effects of each considered individually.”³⁸

In this context, the capacity for innovation, combined with regional politics, tends to create new **polarizations, and in these, a concentration of vulnerability, and in some cases, technological risk.** These

elements can even be foreseen as serving as a base – through land use management – of a strategy to create new spaces based on activities of high value added that broaden the regional borders and the attraction of productive investments.

“There is a reciprocal relationship between modern technologies that modulate the relative importance of the factors of location, and the corporate strategies, whose spatial translations modify the territories and induce public policy and land use management.”³⁹



Here, the environmental factors and those of risk may become blurred in light of the importance of technological development. In spite of that, it is indispensable to put them into play, to guarantee the efficiency and sustainability of these efforts, as well as their positive insertion into the context of the territories.

It is important to review some unhappy examples and not reproduce them, such as that of the Atomic Accelerator installed by the Argentine Commission on Atomic Energy (CONEA) in the peripheral zone of Greater Buenos Aires (Argentina) that has not been operated at its maximum level of yield, for presumed reasons of security that would affect the nearby population. The lack of foresight regarding the conditions of location in

this case are blocking technological development of the venture, and generating vulnerability and high risk in a densely populated area.

4.1.4. Ideological Component of Land Use Management: Territorial Problems and Processes

The quick succession of paradigms that have accompanied the development of the territory theory (see 4.1) reveals that cataloguing certain territorial situations as “**territorial problems**” has changed over time. Issues that in the past generated little or no attention suddenly became central foci for territorial concern: for example delay, poverty, unemployment, marginalization,

38 Romá Pujadas, Jaime Font. Land Use Management and Planning. Editorial Synthesis. Madrid 1998, p.111.

39 Sallez A. The New Territories of Enterprise. In P.H. Derycke. Space and Territorial Dynamics. Economic Ed. Paris. 1992.

environmental deterioration and growing vulnerability are center stage in matters of today's territorial development in Latin America, and orient territorial policies related to equity, sustainability, vulnerability, and risk reduction. As we review these issues, we can see that they have appeared in the agendas of the different countries since the 1980s, when society began to recognize and value such matters, due to their specific weight and multiplier effect, and their incidence in matters of development in general.

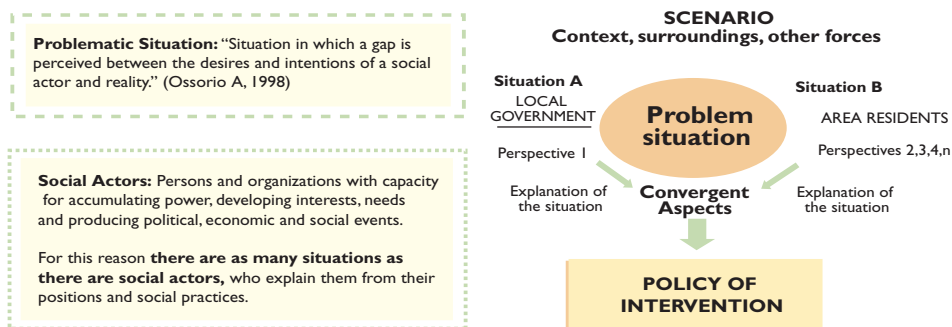
Along these lines, it is necessary to highlight the fact that land use management implies making continuous **value judgments**⁴⁰ that orient activities toward determined definitions, strategies, and policies. The election of the alternatives and the set of decisions that are made fall completely within the area of individual and social evalu-

ation of the motivations for change, conservation or development.

Today, the recovery of values and the strengthening of territorial and cultural identities create a mix of propitious cultures that allow emergent regions to occupy their natural place, even within the context of globalization.

Who are the parties responsible for making these value judgments? There are many sources of decisions within any given territory. They are especially connected to the **political sectors**, the technical sectors that participate in the construction of the territory, the **economic agents** and the **general citizenry**. Each of these reviews, recovers, and proposes values that move them to make decisions of varying magnitudes, scope, and impact. How, then, does one define which are the true territorial problems?

**CURRENT PROBLEMS
MANAGEMENT PRIORITIES**



THE OBJECTIVE IS TO RECOMMEND POLITICAL STRATEGIES THAT ARE TO BE EXECUTED BY LOCAL AUTHORITIES, BUT THAT TAKE INTO ACCOUNT THE COMMUNITY'S PERCEPTION, NEEDS AND EXPECTATIONS.

One must recognize that **behind each problem is a set of processes** that come from multiple interactions – at times simple, at times complex – among the components of the territorial system: the environmental component, the social, economic, legal and institutional components that in combination have failed to achieve a more or less efficient way of functioning.

It is vital in each case to identify this set of interactions as clearly as possible, to be able to make a distinction

between the factors that are the **origin** of the imbalance, inequity, deterioration, risk or inefficiency that has been detected. The characteristics unique to each originating situation – nature, antiquity, functional structure, the multiplier effect, the persons involved, etc., – allow one to identify the importance of the problems detected, put them into a hierarchical order, and generate proposals for efficient intervention. In reality, land use management should **correct processes** rather than problems (that are the result of the processes) in order to improve or modify the **operation** of the territorial system.

40 Romá Pujadas, Jaume Font, Op.cit. pg 25

Land use management has an important theoretical aspect that allows it to analyze – by means of a group of scientific disciplines – multiple elements affecting territorial matters, and to delve into its methods of acting and to comprehend the processes that are the foundation of its operation.

It is then possible to choose, with a good professional technical approach, the best options, alternatives, and possibilities for correcting, improving or overcoming a given territorial situation. The process of election requires a combination of scientific/technical criteria of different orders: environmental, economic, constructive, ecological, social, etc. Weighing each of these criterion makes it possible to choose the best alternative. Cost-benefit analysis, environmental impact evaluation, patrimonial accounts, social evaluation, allow those who have to make the decisions to develop and propose a refined process of scientifically founded choices.

However, it is ever more evident that the directionality of the process, that is, the election of the definitive alternatives, goes through **SOCIOPOLITICAL EVALUATION** of the proposals. In this stage, there is a combining of the environmental, social, economic, political, professional, cooperative, etc., value judgments, whose hierarchy and importance for making decisions depend on the style of development adopted (participa-

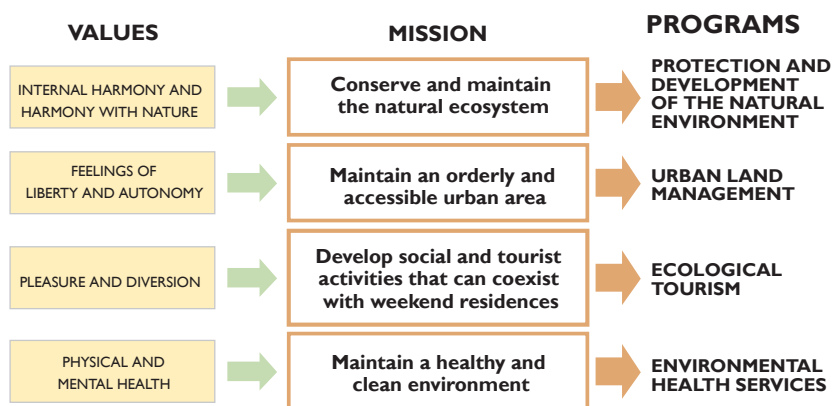
tory, democratic, technocratic, demagogical, etc.) from the basic cultural context.

This confirmation makes current land use management in Latin America attempt to explore new ways of constructing the territorial analyses, **beginning with the values that are built into the lands whose use is to be managed**. This leads one to suggest innovative attitudes regarding the analytical techniques, and to conceptualize the problems. The idea is to construct the proposals **based on the values** that the different decision-makers put into play in order to then combine the policies and actions so that these values will be integrated and can be recognized.

We can offer some specific examples, such as the Strategic Action Plan for the Integrated Management and Sustainable Development of Luján de Cuyo (Mendoza-Argentina),⁴¹ where the plans for land use management were built from **surveys of the values** that the people wanted to rescue, re-establish or simply to find in the sectors of the departmental territory that – in the case offered as an example – they frequented on weekends and during vacations, for the recreational purposes.

This type of strategy was very efficient, since the community sees its interests clearly reflected in the conception of these proposals for land use plans and projects.

CURRENT & FUTURE MISSION of the LOCAL GOVERNMENT
Example: Alto Potrerillos



41 Municipality of Luján de Cuyo-CETEM/UNC. Strategic Action Plan for Sustainable Development and Management. Luján de Cuyo, Mendoza, Argentina, 2004. PROA I

Recognizing the resident ideology in each territorial process allows Latin America to advance toward more integrated and efficient concepts in order to optimize and re-functionalize the territories into the process of change, especially when they indicate how to insert vulnerability and risk into the projects of land use management.

The subject of environment was forcibly inserted into Latin America when the community became aware of its fragility. Vulnerability and risk should be recognized as a social value and a guarantee of its subsistence.

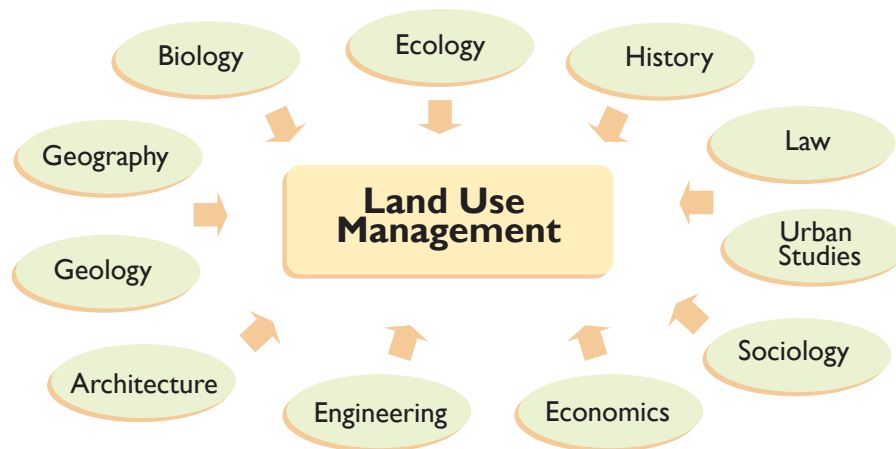
Only by transforming the knowledge of vulnerability and risk into a **strategic value for the development of society** is it possible to expect that in the final selection of the proposals for land use management, the selected priority alternatives will be based on vulnerability and risk reduction, and understand that these alternatives encompass not only economic costs that can be lowered by obtaining insurance or some other strategy, but also the value of guarantees for environmental sustainability and social equity.

4.1.5 Interdisciplinary Character of Land Use Management

The complexity of territory as an entity leads to an understanding of why such a variety of authors recognize the interdisciplinary character of land use management. There is an important and ongoing debate on the subject, since some share a position that deals with an **interdisciplinary** focus and others consider it **transdisciplinary**. The truth is that in practice, land use management is nourished by a set of disciplines that provide the basic knowledge for the interpretation of the territory's function.

As a consequence, it is indispensable for communities, technical and professional sectors, especially politicians and administrators, to gain full awareness of the **IMPLICATIONS OF VULNERABILITY AND RISK, AND RELATE THESE SITUATIONS TO THEIR DEVELOPMENT PROCESSES** through **education, information, and communication**.

LAND USE MANAGEMENT Discipline of Scientific Convergence



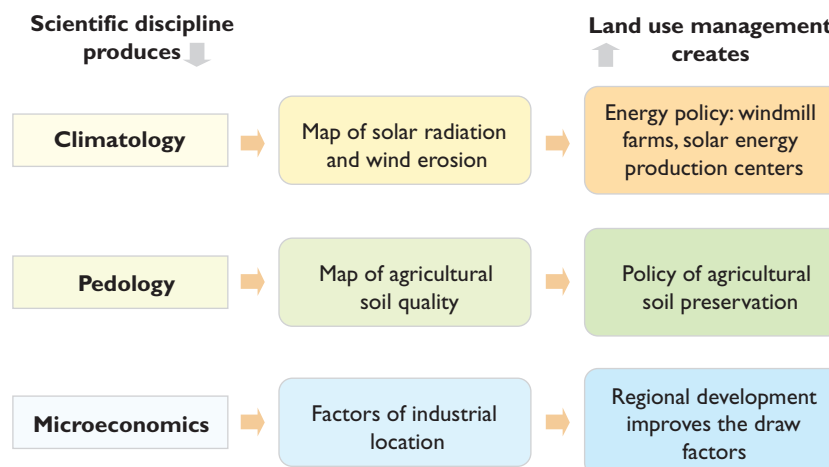
Land use management makes up a part of a “gray” area of disciplinary convergence, where there is a scientific body comprising the cooperative contributions of different disciplines that produce knowledge through their own scientific apparatus.

Land use management does not evaluate the methods and paths that each of these takes to produce this knowledge, since they are all formally accepted in their own fields of science for their methods and objects of study. Land use managers extract the necessary knowl-

edge from each discipline as **finished data**. So the task consists of **combining** this data to reconstruct the way that the territory operates to better understand and model it with the final objective of intervening in the territorial processes. Each discipline allows managers to

consolidate and support the interventions, and to define with clarity and precision the paths to be taken to correct or improve on defective processes, or to introduce new territorial dynamics. For example:

LAND USE MANAGEMENT
Discipline of Scientific Convergence



“The complexity and interdependence of the topics that converge in so-called risk management demand an equally complex approach. This can be easily demonstrated by citing only some of the most relevant topics: development, economic development, culture, poverty, vulnerability, ambience, risks, resilience, urbanization, marginalization, soil usage, politics, governance, democracy, and many other factors. Although leadership plays an undeniable role in the subject of risk management, disciplines such as engineering, geography, economy and public health continue to carry much weight; sciences such as the study of volcanoes, geology, meteorology and hydrology will continue to give invariable contributions, while others, such as sociology, anthropology, the health sciences and the political sciences, among many others, will have an enormous potential in this interdisciplinary focus.”⁴²

In this setting, one must recognize the positive **overlapping of land use management and risk management** that needs the help of the sciences themselves for interpretation and construction of its scenarios. They contain similar types of components and tasks, in spite of having different goals, since *“we can rigorously affirm that risk management is the component of the social system that is made up of an efficient planning, organization, direction and control process, that guides the risk analysis and reduction, and the management of adverse events and recovery after events that have already occurred.”⁴³* It would be convenient to build on this concept and to recognize that **vulnerability and risk form a part of the territory system in all of its components**: environmental, social, economic, legal and institutional, as discussed in previous sections.

42 Sarmiento Juan Pablo. The Challenge of Risk Management as a Strategy of Multisectoral and Participatory Intervention at the Service of Development. Discussion Workshop on Environmental Management, Land Use Management and Risk Reduction, Buenos Aires, November 2005, Pag 9.

43 Sarmiento J.P. Op.cit, p. 3

Risk Management Discipline of Scientific Convergence



4.2 Land Use Management Policy: Challenges for Managing and Governing the Use of High-Risk Territories

Defining territorial policy is no easy task, as can be seen at this stage of the analysis.⁴⁴ We can find numerous interpretations in an extensive bibliography that are still unable to clarify the problem. From the generalized concept in Latin America of the “spatial support” to human activity, to the complex and integrated concept that has been analyzed in this document, one can state that TERRITORIAL POLICY is something more generic than isolated acts and more specific than global objectives.

Territorial policy is a permanent discussion between the **ends and means** that lead to a global question of evaluating and deciding on the model of government to adopt, the territorial community committed, the type of judicial and institutional structures in play, the social project suggested and the direction of territorial development that one wants to follow.

In the operational and management field, territorial policy is the set of strategies that a judiciously organized community puts into practice to achieve its development in the context of competitiveness, equity and sus-

tainability. Land use management, risk management and environmental management are useful instruments for territorial policy, that is, they are the indicated tools for transforming territorial operation.

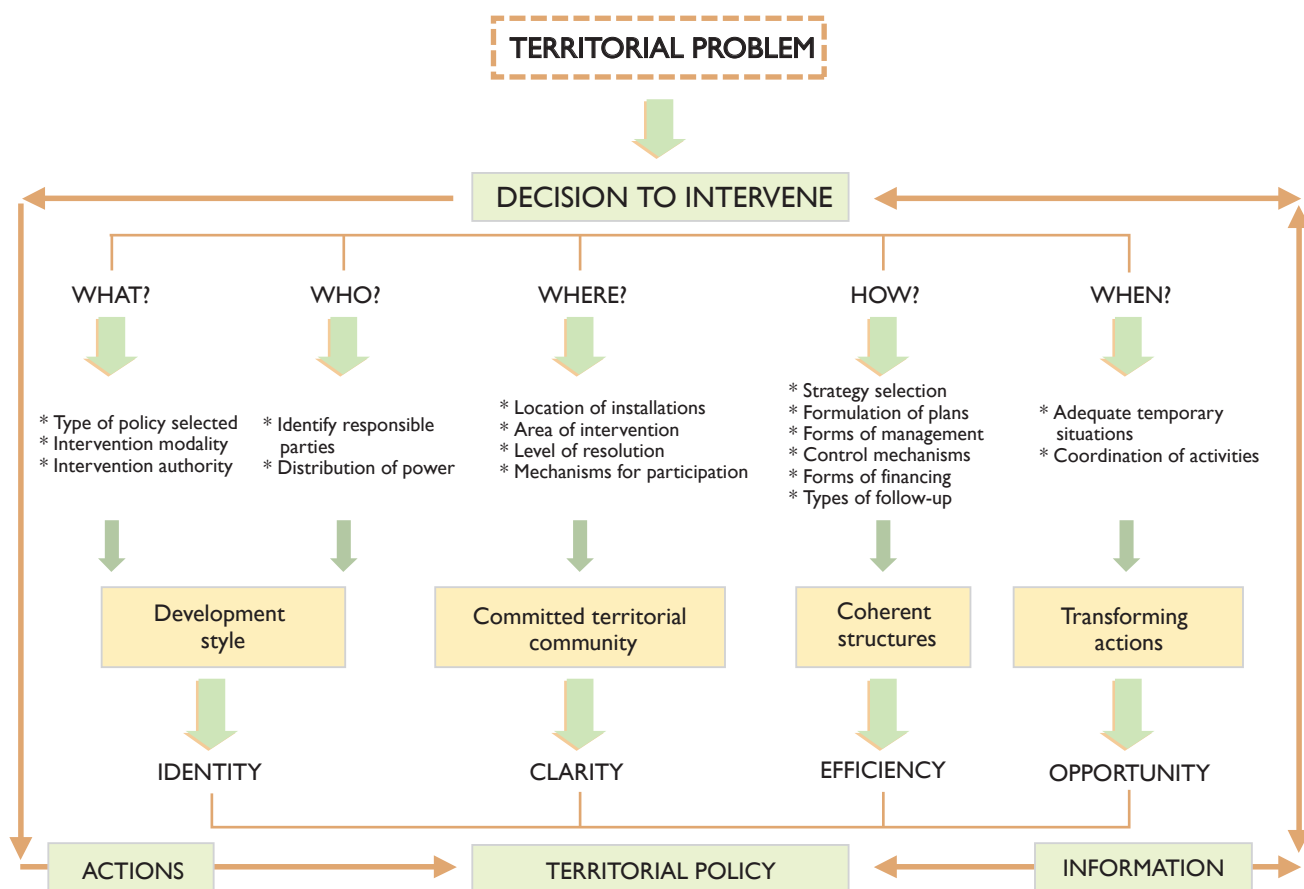
The process begins anywhere within the system, since the identification of territorial problems and needs can be detected separately by government officials, by the community or by the territory itself that offers resistance (loss of terrain, water contamination, etc.), a hazard (seismic or climatic episodes, weakness in technological controls, a lack of organization, outdated standards, etc.) or a situation of crisis (terrorism, insecurity, drug addiction, incipient diseases, unemployment, low salaries, marginalization, etc.). Another reason is because it identifies and projects an image or scenario of desired change, to optimize the existing territorial situation. These are stimuli for participating in innovative trade flows, new economic activities, processes of integration, etc. The important thing is that this demand is **recycled into the system and begins to generate adequate responses** capable of tearing down the existing scenario and leading toward another territorial venue or situation that is **predictable and governable**, improving and better adapting it to the new demands.

⁴⁴ Included in ANNEX I, where the changes in economic, technological, social and environmental policy and their relationship to land use management are described in detail to broaden this concept.

The **responsibility** of territorial policy should be shared by the public sector and the community to the point that both sectors can contribute the tools they normally use (plans, programs, investments, agreements, negotiations, human resources, knowledge, technology innovations, etc.) to a process of rationalized and ordered decision-making where administrators, professionals, scientists and citizens can participate to direct the system along the creative and efficient paths that make the actions viable.

Carrying this concept to fruition, when it presents conditions of high social, environmental, economic, legal or institutional vulnerability, demands a special effort of coordination between the community and the government, who should both gain:

- A full **awareness** of their territorial limitations and capabilities: the territorial **diagnosis** should be rich, adjusted, timely and realistic, and should integrate the variables of environment and risk.
- A **clear idea** of the desired scenarios, and the evaluation of territorial **trends**, advantages and opportunities that will help in the selection of the same.
- A **consensus** on **what** to do, how to do it, **where** to locate the interventions, **who** are the responsible parties and **when** is it necessary to intervene.



Source: Author

Territorial policy, expressed in the practice of the **POLICIES OF LAND USE MANAGEMENT**, will be transformed into actions, plans, and projects that have an **identity** on which to base their strategy selection, clarity for defining activities that establish a structure for change and for translating the public and private interests that are in play, and **efficiency** for generating agile, simple and open non-bureaucratic structures that facilitate participation, foresee transformation and provide the process with competitiveness and the opportunity to succeed (see Annex I). In this context, it is predictable that land use management will use the advantages of the democratic and participatory system to sustain, orient, manage, and control the propitiated development.

The **POLICIES OF LAND USE MANAGEMENT** have a long history and have been subjected to unprecedented transformations in Latin America. Today, however, they are the subjects of discussion, because the region is in the process of development and needs to resolve its territorial problems.

The challenge of climate change that accentuates the critical processes, and the production of ever more frequent and risk-laden natural disasters, together with defective territorial processes – described in other sections in this document – that make the population ever more vulnerable, are challenges that must be assumed by land use management to generate a creative, innovative and coherent land use policy and the possibility of sustainable development for the region.

Sustainable development of the territory depends on the ability to generate, through a policy of land use management, a process open to the acceleration of changes, and therefore uncertain in its evolution – but fully aware and in control of its critical processes, in order to manage and articulate the cultural and environmental differences.

Land use management is more a journey than a destination. Therefore, it should offer an open, flexible, and dynamic route for public and private intervention. This involves organizing, orienting and controlling the changes and conflicts in favor of a sure destination, but with an open direction.

Land use management itself constitutes a cyclical process requiring constant feedback where the environmental, social, economic, legal, and institutional components all have shared responsibilities. Today's land use management should conciliate the long term with the short, the future and possible scenarios with the crises and hazards, and public policies that are designed for implementing. It should be based on a country or regional project integrated into the global world and its principal challenges, among which **the increase in vulnerability to disasters** is very evident.

4.3 Objectives and Goals of Land Use Management

Since the inception of land use management in Latin America, Azpurúa recognized that *“the management of land use has clearly defined essential objectives: ordering of economic activities, ordering of social activities and physical ordering. In this sense, rather than a policy, it is a general framework that defines and gives coherence to a vast series of specific policies.”*⁴⁵

In the first case, land use management proposed propitiating the territory's **prosperity and economic growth**, harmoniously distributing economic activities, thereby seeking to facilitate an efficient and self-sustained economy that would guarantee the entire society's ability to consume and to bring about an improvement in the use of available resources, without damaging the physical environment, in an irreversible way, nor imposing greater risk on future generations. Basically, the underlying concept of “support space,” as pointed out previously, has varied substantially.

45 Azpurúa Q. & others, Cities and Regions of Venezuela. In “25 of 35” Editorial Latina C.A. Caracas, 1975 (Published originally in El Nacional newspaper pp 274-5 Edition 30 anniversary of August 3, 1973). Repeated in: Definition and Scope of Land Use Management. SIAP Magazine, Vol XVI, No. 62, 1982, p. 171.

In the second case, the quest was for the **solidarity of the social group** so that each of its members might realize success within their region as an individual and social being. It would be necessary ensure the creation of opportunities for developing the abilities for fulfilling human needs that were accessible to the entire group. There was no leaning toward homogenization of the society. Instead the interest was in exploiting the diversity of the **social subjects** so that each member could assume his or her responsibilities for development, according to his or her personal capabilities. Here, once again, we see the concept of “support space” that would **introduce differentiated behaviors** through the infrastructure. The persons are seen as objects of the action, but not as social actors, responsible for their territory.

In the third case, the goal is to provide **structuring equipment** to generate spaces, adapted to each of the functions: urban, productive, recreational, public services, religious, receptive, etc. For this, a strong policy of providing infrastructure and services capable of giving form to these areas was used. In this field, planning, used at the time with a strong physical component, found its place and entered the other objectives, making infrastructure and zoning processes an almost unique tool for the organization of cities, rural areas, industrial zones, etc.

Although it is true that these tools **continue to be important elements** in the objectives of land use management, it is indispensable to recognize that the basic concept has changed:

- Territory (space) is no longer conceived as a supporting element, but as the **result of interaction** between the social, economic, environmental, legal, institutional components that it is made up of.
- The communities and people are not subjects of, but **agents of their own development** in a strong contest of responsible social participation that tends to dissipate in Latin America.
- Infrastructure is very important; but on its own it does not guarantee the development of a

territory if it is not conceived as a **system for articulation** of the regional economy and as a complement between networks and flows, that is between the physical/environmental configuration, economic activities and social relationships.

Today, the objectives should be connected to the FUNCTION OF THE TERRITORY in order for Latin America to achieve:

1. **TERRITORIAL AND CULTURAL IDENTITY** to counteract the impact of globalization;
2. **ECONOMIC PROGRESS** in accordance with the real capabilities and projects unique to each territory, in a context of competitiveness and a globalized economy;
3. **SUSTAINABILITY** or present and future availability of the resources necessary for development;
4. **GUARANTEE OF TERRITORIAL SECURITY** in the face of natural, environmental, social and economic processes of change that generate risk and with it, growing vulnerability and undesirable costs;
5. **RESPONSIBLE SOCIAL PARTICIPATION** in land use management in all of its stages to guarantee the governance of the same;
6. **ACCESS** to essential goods and services enabling personal and collective development and an improved quality of life for the population in each of the managed territories.

All of these objectives should be achieved in the context of a strong **evaluative** focus and the approach and **convergence between the public and private perspectives**, that is, between the communities involved and the active role of the government at different levels.

Each of these objectives may be **transformed into dynamic territorial policies** and developed within the framework of **land use management plans**, and their

connected projects. For example: developing territorial and cultural identity is an achievement that is provided for in the commitment to the territory. It is achieved through the policies that stimulate cultural development and protect territorial patrimony in all of its forms. This allows for the recovery of knowledge, technology, patrimonial resources and motivations as elements that give dynamism to regional and local economies, in changing scenarios.

In this innovative perspective, the **different components of territory are fully vigilant of each of the objectives**. For example, in case of the desire to achieve **economic progress** in a territory, today it is necessary to not only improve the quality of infrastructure networks (roadways, railways, waterways, ports, etc.) and

info-structure (communications, information, computer networks, etc.), but also to improve in the selection of the technological capabilities and skills and the ways of educating the population, to respect the use of natural resources co-existing physically and harmoniously with the rest of the human activities integrated into the flows of commerce in an organized, safe and guaranteed manner in its functioning, both from the legal and the institutional points of view. The interrelation is so dynamic and closely linked that one element cannot exist without the other since they are strongly synergetic.

In the case of the **MERCOSUR Central Bi-ocean Corridor**, for example, this symbiosis appears quickly when the corridor's users are questioned as to which are the principal problems they have for trade.

TYPES OF PROBLEMS POINTED OUT BY THE USERS OF THE MERCOSUR CENTRAL BI-OCEAN CORRIDOR

TYPE OF PROBLEMS	DETAILS OF THE PROBLEMS	CHARACTERISTICS
1. CUSTOMS BARRIERS	Laws not compatible between destinations Policies not compatible between destinations	Common external customs tariff standards not defined Homogeneous rates for freight of different origins and types
2. NON- CUSTOMS BARRIERS	Security and transit facility	Natural hazards Technological hazards Problems with social organization Highway bandits
	Lack of freight services	No parking facilities No integrated services
	Difficulties on roadways	Narrow routes No alternative routes
	Deficient organization	Differing customs house time schedules Lack of financial institutions Excess controls Overlapping controls, etc.

Source: Gray de Cerdán N. *Reduction of Vulnerability in the Corridors of Transportation of the MERCOSUR*. Center for Territorial Strategies for MERCOSUR (CETEM), Faculty of Philosophy and Letters, National University of Cuyo-Department of Sustainable Development of the Organization of American States (DSD/OAS), Mendoza, 1998.

The **combination of all these factors** increases the cost of transportation, creates difficulties for circulation, and makes the corridor's services deficient. Resolving just one of them would alleviate the problem; but they are neither being corrected nor eliminated.

4.3.1. Objectives Proposed by the European Union

These days it is very common for projects of land use management in Latin America to propose the same objectives that the European Union has defined in its territorial strategy (ETS) formulated in May 1999. This is due to the simplicity of the definition of land use management and the clarity with which its objectives have been stated.

The ETS adjusts to the community objective of procuring **balanced and sustainable development**, especially through the **reinforcement of economic and social cohesion**. This sustainable development:

“includes not only an economic development that respects the environment and which conserves our resources for future generations but also a balanced territorial development. This especially implies harmonizing the social and economic demands of development with the ecological and cultural functions of the territory, thereby contributing to sustainable and balanced territorial development on a grand scale. This is how the EU would gradually evolve from an economic union toward an environmental union and a social union, and remain respectful of regional diversities.”⁴⁶

It is necessary to observe that these objectives are meant for the EU as a group; but each of the countries defines, within this framework, the objectives of its own regional policy. So the objectives of economic and social cohesion, conservation of natural resources and cultural patrimony, and of more balanced competitiveness throughout the European territory are of a **political character, on a grand scale and within a framework of planning that is developed “from the top down.”** This position is possible in the EU considering the historical trajectory of

land use management that the group of founding countries, each with an established economy and a high standard of living, and the imposition of certain conditions of basic organization that countries wishing to enter or form a part of that union must comply with within a certain time period (planning, institutional restructuring, land use management, the development of a legal apparatus, etc.).

If we review item 2.1 of this document, the table **“Current Challenges and Problems to Resolve in the Process of Latin American Openness and Integration,”** we can understand how no Latin American country has managed to create a sufficiently efficient model of functioning to become a significant icon that may be taken as a reference or model for the territorial development of Latin America. None of the countries, and this includes Chile, can be considered completely developed, nor as having stabilized economies, nor high standards of living...

In this context, many questions arise for reflection. Is it possible to set objectives of economic and social cohesion in Latin America over the medium term, when the internal disparity is still unresolved?

Is it possible to think of a balanced competitiveness for the countries as a group in a context where they still have not resolved poverty or the minimum levels of quality of life with the available budgets? Is it probable to conserve in the medium term natural resources in countries where there are still no adequate norms to ensure that conservation? Is it possible to propose these objectives in countries where there is no tradition of land use management or risk management, or institutions to house and promote them?

It is probable that without forgetting these macro matters of the EU, one should define with a greater dose of modesty shorter term and more achievable goals for Latin America? **What is it that we want to achieve with our territories in the medium term** from the natural, environmental, social, economic, and organizational point of view in a context of territorial sustainability and security?

46 Committee on Territorial Development. ETS : European Territorial Strategy. Toward a Balanced and Sustainable Territorial Development of the EU. Potsdam, Luxemburg, 1999.

For this reason, the previous point of this document contains a proposal of different objectives, especially for the region. The reality is that there is an important **chasm** between development based on the structure of the European territory and its form of administration – even in the countries that have joined that union recently – and the management methods common to Latin American countries. The objectives are different (although they may be expressed in similar words), and advantages may be taken of the opportunities, but along different paths. The processes of development are different, as is the cultural context.

The proposal is to **review the objectives of the land use management plans** as they stand and to formulate new ones fitted to the Latin American reality. It is necessary to explain them very clearly – leaving behind all of the fancy and copied words – and reflect very carefully on the opportunities and strengths that the territorial transformation process of our continent has to offer in each of the countries and regions.

At the same time, it is indispensable to gain awareness and to be very clear as to the **hazards and environmental, natural, social, economic, legal, and institutional vulnerabilities** that exist or are generated by the process in order to guarantee an efficient, sustainable land use management policy that can be carried forward within the medium term, with the budgets that are available... Getting into debt unnecessarily also generates vulnerability and risk.

4.4 Instruments of Land Use Management

The instruments that allow us to develop the process of land use management are many and varied. They can be ordered into three groups that are inevitably bonded to the process: the legal normative body, the land use management plans and the judicial/administrative organization.

Each of these has a special mission; if you look at the graphic presented in point 4.1, on the characteristics of territorial policy, one can see that:

- The **law** responds to the question: What should we do?
- A **land use management** plan answers the questions: Where? How? Who? When? especially at the level of project formulation.
- The **judicial-administrative organization** receives these assignments and is the body in charge of managing the process, that is, the application and execution of the directives of the plan for land use management and the nominative and executive control thereof.

The ideology that impregnates the process in each case will define the style that is adopted in the development of each case: imperative (“from the top down”), participatory (“from the bottom up”) and a multiplicity of mixed forms between the two. Interrupting the phase of strategic planning tends to moderate the rigidity of these models, creating conditions propitious for land use management better suited to the realities of Latin America.

The truth is that development and the application of any of these instruments constitutes a complex, interdisciplinary, multidisciplinary, and interinstitutional task requiring a careful methodology, which is a thread conducting the work being developed.

The processes of land use management that have best advanced as complete instruments in Latin America are rare and can be reduced to a few examples: Chile, Colombia, and Venezuela, all of which have an important history in matters of regionalization, territorial policies and land use management. In each of them, there is a legal/institutional apparatus containing land use management processes – independent of its efficiency and effectiveness – that guide and organize them and give them permanency in time.

The dominant styles of planning in these processes are from “the top down”⁴⁷ as a consequence of the centralized judicial structure in the case of Chile, and as a consequence of the ideas of “support space” common to

47 This is understood to mean the process of planning “in a cascade” that begins at the highest spheres of government and continues downward toward the units of lesser hierarchy so that the guiding documents constitute elements of reference for those at lower levels, but which are no more than the consolidation of those at a lower scale and detail.

the period in the first stage of land use management in Colombia (regionalization, urban-regional structure of the country, etc.). Today the situation of land use management in Latin America is varied and has changed.

Transformations began in Colombia when the provincial government of Antioquia formulated the first plan for departmental land use management:

“introducing the recognition of human groups in their geographical framework and a better connection between the policies of development and territory, so that the latter become an integrating and structuring element of the objectives, policies and public and private actions, aimed at improving social well-being. All of this, in the context of strategic, pre-emptive and participatory planning.”⁴⁸

This presentation coincided with the new Constitution of 1991, which established a new territorial order for Colombia based on five basic components: political/administrative organization, the organization of municipal development, environmental organization, harmonious regional development, and the organization of urban and rural development.

In Venezuela, a country with a federal form of government guided by the Land Use Management Law of 1983, regional pressure presented the need to provide an ample government reference framework that would be able to organize the tasks of the regions where, in practice, the territories are organized. There is, however, a government land use management plan that was conceived for a 15- to 20-year period, with five-year development plans that serve as a base for orienting regional and local actions.

In the countries of Central America, Costa Rica, Guatemala, and Honduras, among others, a support system for the development of land use management can be considered in the draft stage. In the rest of South America, these processes have varied organizational positions, and go from a framework of government plans validated by the administrative structure of specialized offices and

connected in particular, to environmental ministries (in Bolivia and Uruguay), through to an enormous dispersion in intermediate scale, isolated offices lacking the power to orient these processes, and governed by disperse, inadequate regulating frameworks (in Argentina, Brazil and others).

Each has its achievements and its failures, its reflections and configurations to the changing realities, but the process of territorial change the region is undergoing invites one to re-evaluate the efficiency of the tools being used. **Land use management is undergoing review not only in Latin America, but also in the European countries that have received an avalanche of new countries with differing territorial structures.**

In general, if we review the plans, laws and processes in Latin America, we can observe that, in spite of the fact that the **relationship between land use management, environmental management and risk management** is formulated into the objectives of many of these plans, laws and processes, in practice their instrumentation problems continue:

- Environmental matters are, in part, managing to filter into territorial issues at the operational level, but,
- The theme of risk still occupies a place distant from the minds of the land use managers.

The fundamental problem lies, therefore, in **how to apply this knowledge as a package to the situation of a single territory**. This is why it is necessary to evaluate the structure of each land use management tool and its possibilities of working integrally with the tools of risk control and environmental management.

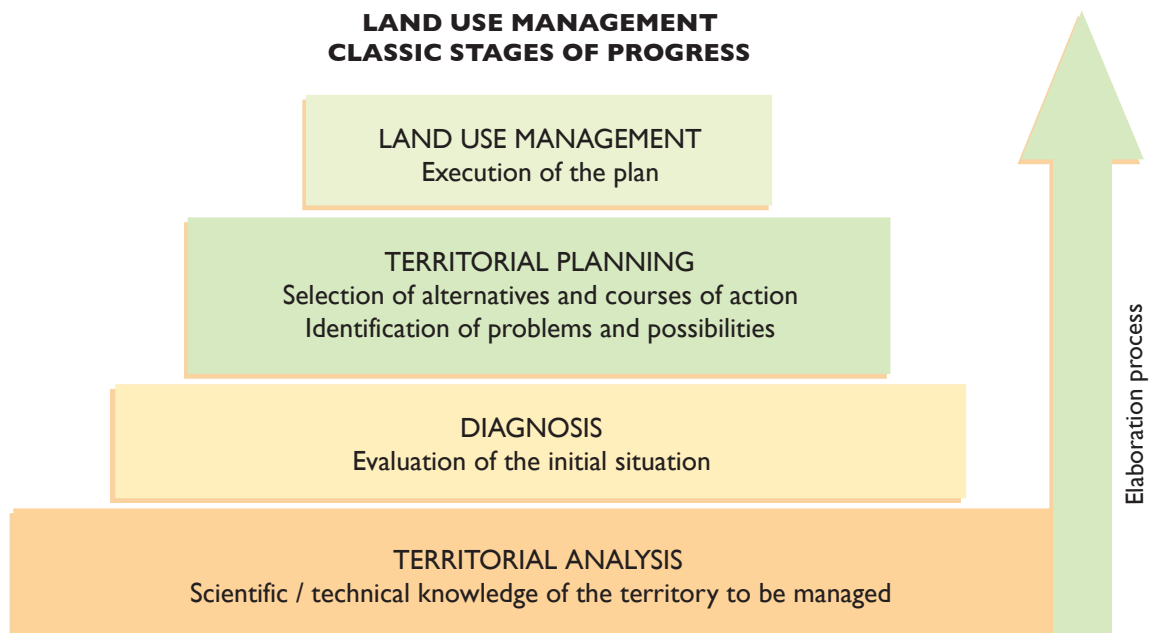
4.4.1 Plan for Land Use Management: Performance Instrument

The formulation of land use management plans at any level of performance can be divided into three phases:

48 Massiris Cabeza, A. Land Use Management: International Experiences and Conceptual and Legal Development realized in Colombia. Chap. 2. Luis A. Arango Virtual Library. Bank of the Republic. Colombia, 2007.

- **Analysis-diagnosis of the situation** of the region or place where action is to take place;
- **Formulation** of the land use management plan that includes the definition of objectives and goals, and proposals for reaching them according to the social motivations and the agreements that have been reached; and
- **Putting the plan into effect;** that is, initiating the selected territorial policy.

Habitually, these stages are preceded by a phase of prior **agreements**, a definition of the **style of development** that they wish to adopt, the **motives** that lead to the intervention, the existing ideology, etc., and the selection of the **modality** of work (forming the technical team, types of workshops or forms of participation when the community intervenes in the elaboration of the plan.)



4.4.1.1 Underlying Logic of the Land Use Management Plan

We speak of logic in the construction of the plan with the conviction that before each land use management project it is necessary to undergo an intensive process of reflection that can generate different types of paths (methodologies) for developing it. This is where the stages that must necessarily be taken into account, to achieve an efficient, orienting land use management plan with a modern territorial perspective, are pointed out. Three stages are identified.

In **the first stage**, we are dealing with analyzing and diagnosing in the pre-emptive sense the **functioning** of the scenario in which the intervention is programmed. In this context, the tools of territorial analysis take on an important role, but above all it is necessary to highlight the fact that this stage is developed on the basis of the territorial concept that is being managed. It is evident that for today's cases, the evaluation of Latin American scenarios should be analyzed from the perspective of a modern **territorial concept**, that is, as a result of the interaction of social, environmental, natural, economic, legal, and judicial-administrative components.

a) **To advance the analysis** of the territory's conditions, the process can be guided along by asking a series of questions:⁴⁹

- **What is the territory like from a natural standpoint?**

One should identify the conditions of the natural context, taking into account the natural environment, cultural patrimonial resources, installed capital in the towns and cities, especially in terms of housing, infrastructure and services, characteristics of the social medium, and the type and dynamics of the installed communities, the population, economic activities, decision-making networks and forms of organization, and the level of scientific/ technological development. Above all, there must be an analysis of the relationships between these factors, to detect the linkages of relationships, and evaluate their capacity for organizing the territory in a positive or negative manner.

In this context, it is in the best interest of land use management to learn about the different types of existing innovations, including technological, managerial, social as well as institutional innovations that can assist in land use management for the formulation of territorial policies. We should highlight the importance of the territorial networks of technological cooperation for local development. They become fundamental circuits for facilitating the dissemination of productive innovation, strengthening production, generating new companies and genuinely productive employment, affirming the identity and the unique strengths of each region.

To create competitive and dynamic territorial advantages requires **creating a favorable atmosphere for the incorporation of innovations** (see Annex 1). For this reason, land use management should also make sure there is quality basic education – the educational level for promoting creativity and entrepreneurial capacity. It should

evaluate the quality of training for response to the demands of the territorial productive system, with a leaning toward the formation of professionals with a territorial orientation, bolstering the regional research and development systems for local innovation, as well as involving the financial entities that are committed to local economic development and the promotion of a local entrepreneurial culture. Furthermore, land use management should incorporate into this atmosphere the interest to generate **safe and sustainable space**. Here the technologies of risk management and environmental management take on a special hierarchy.

- **Who or what factors can change it?**

There are forces that act as agents of change affecting the territory's configuration. Among those to highlight are social and organizational factors, management factors particularly related to the modality of decision-making and management capacity, and economic and technological factors that land use management should identify and understand.

- **Where is the territory heading with the dynamic it possesses?**

Starting with the identification of the factors of change, one must identify the **trends** for the future, that is, identify how towns and cities tend to grow or shrink, how production tends to increase or decrease, etc., and what is the positive or negative direction of these trends.

b) To continue making progress in the diagnosis, it is necessary to define existing problems and opportunities. To configure a base of certainty to be able to structure the vision of the future, it is important to ask the following questions:

- What environmental, natural, social, economic, etc., limitations does the system have?
- What are the functional advantages that have sustained it so far?

49 Gray de Cerdán Nelly. Land Use Management Course, National University of Cuyo, Mendoza, Argentina 2003.

- What will happen to these advantages in the future in function of the trends that can be observed in the territory?

From the land use management point of view, one should work especially with social reality (see Annex I), and attempt to identify the socioterritorial imbalances that can be attenuated and the situations of vulnerability associated with these scenarios. The goal is to generate via land use management:

- **A planning strategy from “the bottom up”** to restore real information and to intervene in the territorial processes. In this context, the interventions should be flexible and adaptable to the situations of each territory, because they must be conceived according to the social needs detected;
- **A territory with participatory space for** creating, recovering, strengthening and regaining functionality and/or supporting pre-existing forms of participation. In this last case, this is done in order to avoid overlapping types and models of management foreign to the local reality and interfering in the participatory forms already developed,
- **An integrating territory**, having the necessary infrastructure to satisfy the demands of the resident population, without assistentialism and, especially, limiting unnecessary migrations; and
- **A safe and sustainable territory**, making it possible to dedicate the economic efforts and investments to social development instead of wasting them on the costs associated with lack of preparedness in the face of risk.

c) **In the second stage**, to formulate the land use management plan and **elaborate the proposals for intervention** within a process managed only from a professional team viewpoint or with the participation of the community, it is necessary to ask:

- Is it convenient to intervene, or not, according to the data analyzed?

- What is the scenario we wish to attain?
- What objectives and goals can be reached in the short, medium and long range?
- Which aspects should be discouraged, which should be created, which should be corrected, which should be introduced, and which should be abandoned?
- What actions should be taken?
- How to control the process?

The possible **proposals for land use management will have to depend on the orientation given to the territorial strategy** in each of the countries' and regions' technological hubs, axes of development, urban networks, trade networks, support to emergent regions, development of coastal areas, development of river basins, etc. They must also be connected to the modality adopted in each stage of their development.

Throughout this work to answer these questions, use should be made of the **scientific/technical tools** provided by the different disciplines associated with land use management (point 4.1.5) coordinated by the land use managers to resolve the problem of learning more about:

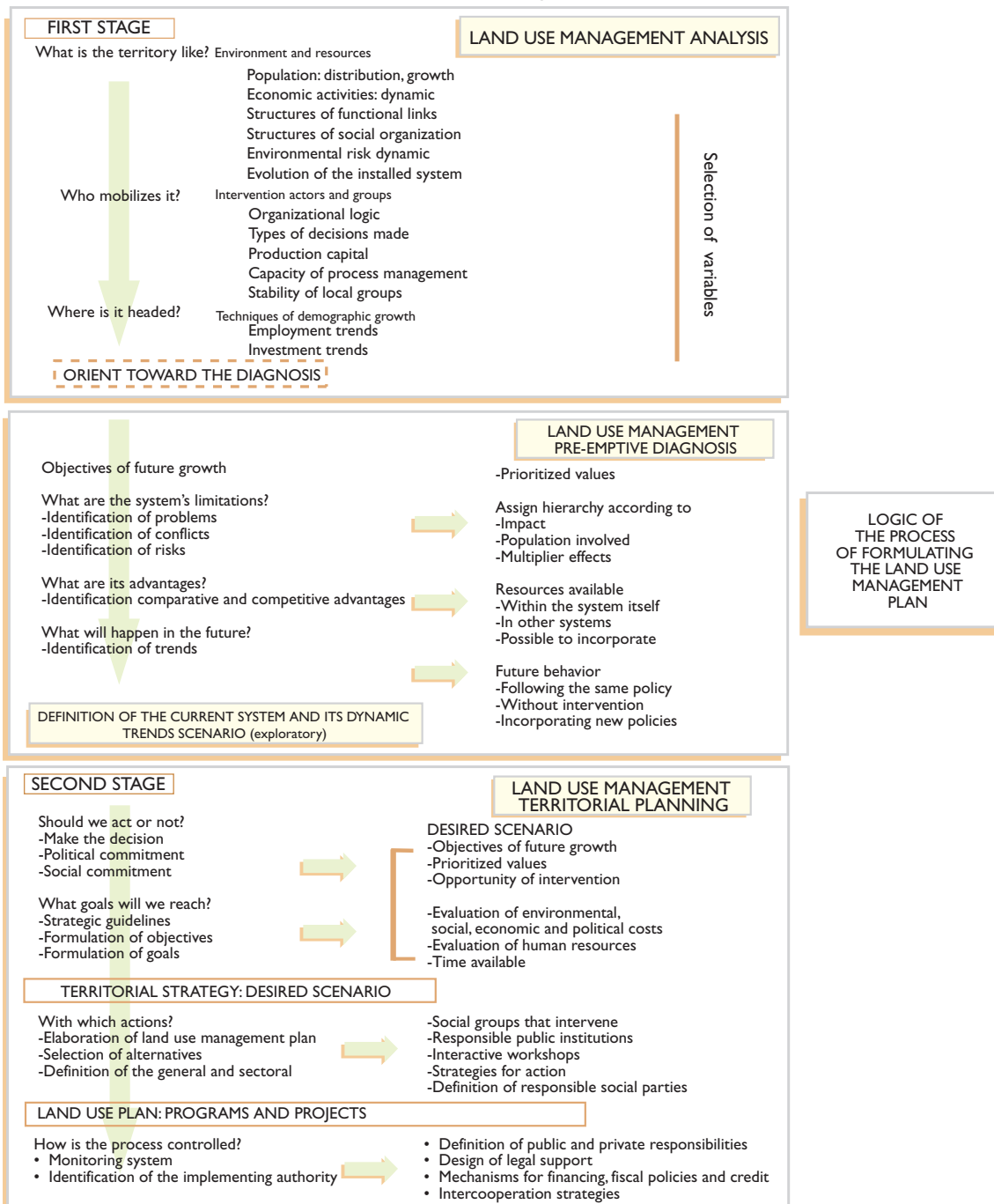
- How the system works,
- What elements stimulate it,
- What elements and processes are weakened or creating problems,
- Which should be modified,
- How the process should be reoriented toward improving the situation,
- How the process should be controlled, and
- How long it will take to complete.

All of this is in the context of the **ideology** established by the group that makes the decisions.

Up to this point the three phases that inform **the strategic planning** have been developed: What is the territory and what does the territory tend to be, what should or could it be in the future, and what instruments can be used to create the strategy for change?

The recommended land use management policies are short, medium and long range. The short-range policies

tend to be **corrective** in nature. Those of medium and long range are **developmental**. Land use management policies should incorporate environmental concepts (see Annex I) and risk management in each and every one of the projects and actions that are prioritized, taking into account that both the **sustainability of the territory and the risk are transversal** issues that require investments and specialized professionals to be able to provide the instrumentation for their resolution.



Clearly detecting the environmental problems and risk such as locating human settlements in areas prone to flooding, overcrowding in urban zones, slums, marginalized populations that occupy critical zones (seismic fault lines, tornado alleys, dry land areas, etc.), solid waste disposal in inadequate areas, the extraction of materials in areas containing rill formations, alteration of natural slopes by landslides and road networks, contamination of drinking water, etc., are indispensable tasks for defining attitudes and behaviors that hinder the application of land use management plans, and above all, for including the need to provide the instruments for environmental management and risk management measures.

In this context, one should design and put integrated strategies into action with specific plans and programs to monitor, foresee and control natural phenomena of a catastrophic nature in coordination with the organizations in charge of managing emergencies and those in charge of land use management. In this case, it is necessary to point out the **close connection between land use management, environmental management and risk management, as an integrated process to guarantee the sustainability of territorial development.**

d) In the third stage, a plan is introduced in the **legal and administrative apparatus.** This is where the main challenge comes into play. Latin America is plagued with land use management projects that have failed at the moment of their instrumentation. With this term management adopted by Octave Gelinier, reference is made to something that is, at times, underestimated because it is not so spectacular or visible as other elements, but it is the catalyst that allows the rest of the elements to behave as they should. The success or failure of a land use management operation depends, to great extent, on good or bad **executive management.**

One must consider here the technical elements connected to programming and interinstitutional relationships, and above all the influence of **human elements**, since the land use management plan is an interinstitutional project with an interconnected complex of personal relationships where a great number of interests, at times conflicting, come into play. In response to the inevitable differences that emerge within the team, there has to be a review of the organization's internal disputes when it comes time to distribute the resources it has available. There are generally several projects that may be going on at the same time in any given organization. It is therefore decisive to be vigilant of the quality of professionals who make up the work groups. The responsibility of the directing institution and of the professional managing the plan (project director) is undisputable.

As a result, at the beginning there has to be a very clear picture of the characteristics of each of the responsible public administration entities and their respective legal and administrative apparatus in order to approach the organizational variables that affect public management. The organizations of public administration in Latin America have many functional difficulties. The 1990s could well be denominated the era of **“institutionalized uncertainty.”**⁵⁰ This covers not only the kind of uncertainty that characterizes modern organizations, but also has become an obligatory reference to all matters of public administration.

This has caused uncertainty to become an ingredient of the administrative process and an integral part of the daily lives of the organizations, and therefore, part of the constant demand for strengthening public administration, for innovation of public services, for the decentralization of services and for the promotion of participation by the population and of local finances. However, in spite of all of these limitations, one is able to recognize that this situation constitutes an invaluable **OPPORTUNITY** for

50 Arellano and Cabrero, “Analysis of Successful Innovations in Public Organizations. A Methodological Proposal, in Management and Public Politics,” Vol. II, N. I, CIDE, Mexico. January-June, 1993. pp: 59-89.

introducing innovations, territorial policies understood in the form of land use management, environmental management and risk management, given that everything is in a process of change and discussion.

Today, between the bureaucracy and slowness of public administration and the speed of the innovative processes, a need has emerged for the so-called agencies for development to put the economic, social, environmental, territorial, etc., plans and projects into motion. It was in Spain during the 1980s when the regional agencies for development came into being, dependent on the autonomous communities, and under a considerable variety of judicial forms (promotional institutes, development societies, offices for industrial promotion, etc.) and in each case subject to both private and public law, that these agencies became a novel instrument of action, providing a new dimension to the traditional regional politics and generating great interest as vehicles of economic regeneration. They covered a relatively wide range of objectives, since they combined the desire to design and propel a productive, technologically advanced, diversified and competitive fabric, with the economic growth and re-balancing of the region, the pursuit of better exploitation of all of the resources available (natural, human, infrastructure, etc.), the adoption of technological policy measures and the contribution of a greater balance of the sectoral structure, especially in the case of small and medium enterprises (SMES).⁵¹ In Mendoza, one of the most successful examples is that of the Institute for Rural Development (IRD), organized legally in the form of a foundation, working, however, under the guidelines of the provincial government. One of its achievements has been the progressive introduction of land use management into the rural environment. Its experience has begun to spread to other Argentine provinces. However:

“A detailed examination of the activity displayed by the regional and local agencies for development

show that not all of them have the appropriate legal competence, sufficient financial means and strategic and integral vision of the economic development of their particular regions, municipalities or districts. But in any case, the experience of the last few years says much in favor of their management capacity. In fact, the agencies have led the process of change toward today’s model of territorial policy, incorporating objectives and innovative programs, and they have done so through organized support with a shift in vocation from administrative configurations toward those of a more entrepreneurial nature.”⁵²

4.4.1.2 Technique of Scenario Anticipation

The technique of scenario anticipation is intimately associated with the **pre-emptive concept** of land use management. It emerged in association with the French *aménagement du territoire* and had a strong projection throughout Europe. It persists today through strategic planning that renews its use as an indispensable working tool for land use management.

One may speak of two types of analysis that lead to the construction of scenarios: **synchronic**, referring to the state of the system at any given moment (scenarios at the outset, for example) and **diachronic**, having a dynamic character that describes the chain of events that, step by step, lead to scenario anticipation.

This is how we find **“exploratory”** scenarios that are linked to tendency perspectives, that is, that assume the permanence and predominance of stable trends of the territorial system itself and of the mechanisms that explain those trends. They lead us to find **“scenarios of anticipation”** that start not from the current situation but from the image of a possible and desirable future.

51 Echevarria Carmen, Agencies of Development and Territorial Policy. University of the Basque/ Euskal Herriko Unibertsitatea. Pg. Web 2007

52 Echevarria, Carmen, *ibid.*

The concept of **SCENARIO ANTICIPATION** therefore, defines a **desired territorial model** from the scientific/technical perspective that gives form to a **VISION** that adapts the values, motivations, desires, ambitions, and expectations of the region to be organized and that can be constructed by the public sector in a unilateral manner, or by society as a whole when the participatory process model is selected. This vision assigns a **MISSION** to the public decision makers that will have to be developed through concrete territorial plans and projects, scaled over time.

This territorial model (or models) is connected to a set (tree) of objectives that are desirable and that reflect the expected value or chain of values. Furthermore, the different scenarios may be related and differentiated, studied from different points of view and enriched with information and with the incorporation of different variables. These are valuable tools for identifying possible situations, above all, because each of them obliges one to think through the answers and the possible initiatives required to make them happen. **Each scenario has its corresponding alternative land use management plan** that should be analyzed for its political, social, economic, environmental, legal, and institutional viability.

**Example: The Department of Junín (Mendoza, Argentina); Land Use Management
Junín 2004-2014
Formulation of the Desired Scenario in a Participatory Form⁵³ (Scenario Anticipation)**

The text with the definition of the desired scenario anticipation is included; the table of values was elaborated (in part) by the community and the institutional proposal for land use management was designed on this basis.

DESIRED SCENARIO
2004 – 2014

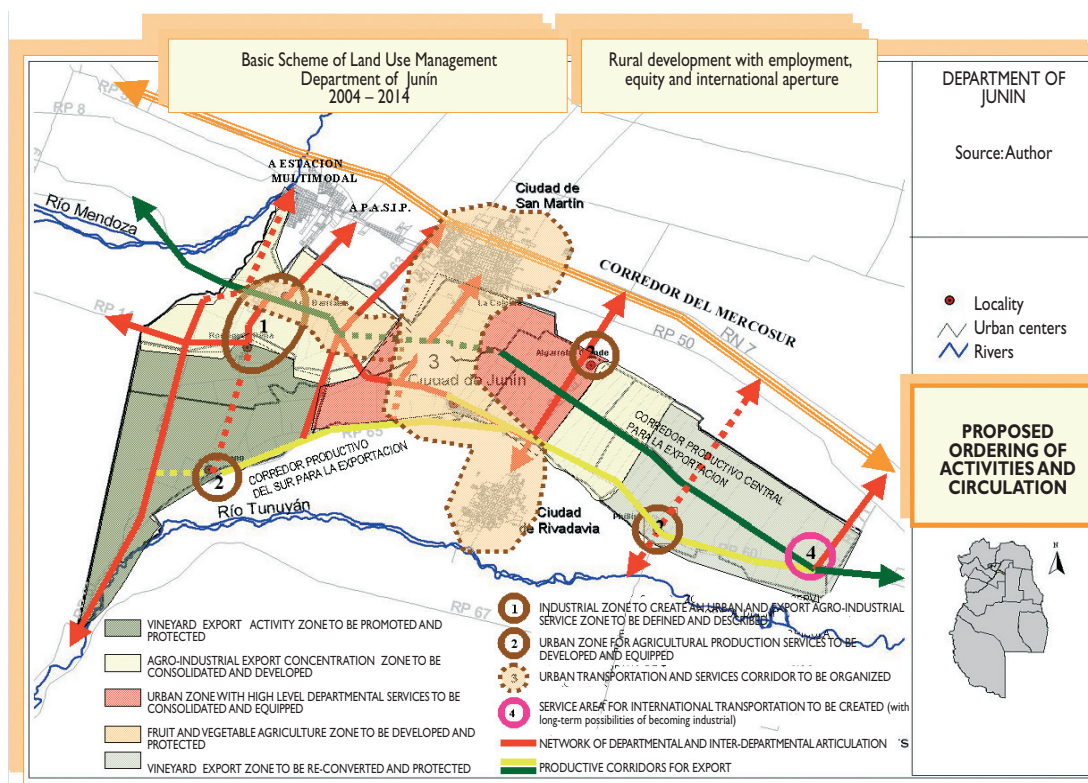
“We, the people of Junín, want our department to become a competitive rural territory in the next 10 years with a agro/export profile of diversified and efficient agricultural activities, complemented by agro-industrial activities, as well as activities and services in associated fields (rural tourism and services, handicrafts, etc.) and strict control over the evolution and development of our urban areas.

We wish to give priority to rural over urban activities and to stimulate the sustained development of support services for these activities, and to maintain our identity, the internal cohesion of the territory, the competitiveness of our economy, the improvement in the quality of the lives of the people of Junín and the protection, safety, and sustenance of our resources, our environment, and our landscape, over the short, medium and long term.”

53 IRD-Municipality of Junín. Land Use Management Plan, Dept. of Junín. Mendoza 2004. Direction: Dr. Nelly Gray de Cerdán. The text and the values of the desired scenario were defined and drafted with the help of the community of the department, during the course of three workshops whose results were then coordinated by the work group. The first workshop was attended by professionals and Junín municipal staff members; the second by the general community (neighbors, businessmen, centralized and decentralized institutions, guilds, unions, banks, etc.); and the third by young people ages 18 to 25.

VALUES TO KEEP	VALUES TO DEVELOP	FORMS OF LAND USE MANAGEMENT	TYPE OF ECONOMIC ACTIVITIES	SERVICES AND INFRASTRUCTURE	FORMS OF COMMUNITY PARTICIPATION
WILLINGNESS TO ASSOCIATE	AFFINITY FOR WORK	RURAL PREDOMINANCE	DIVERSIFIED AGRICULTURAL ACTIVITY WITH IMPROVED VARIETIES AND A VISION FOR EXPORTS	CONNECTION WITH NATIONAL ROUTE 7	PRODUCERS ASSOCIATIONS
HONESTY	SOCIAL COHESION	MANUFACTURING AND AGRICULTURAL INDUSTRIES	NON-TRADITIONAL PRODUCTIVE ACTIVITIES IN SMALL FARMS	PUBLIC LIBRARIES, RECREATIONAL SPORTS ACTIVITIES, CULTURAL ACTIVITIES TO CONTAIN, FORM AND EDUCATE AND RESTORE	MUNICIPAL COUNCILS
RESPECT FOR INSTITUTIONS	CREATIVITY FOR FINDING NEW WAYS OF ADAPTING TO CHANGE	RURAL AND AGRO-INDUSTRIAL SERVICES	AGRO-INDUSTRY	SCHOOLS WITH QUALITY FACILITIES AND RESOURCES. APPROACHES THAT RESPOND TO THE DEMANDS OF THE COMMUNITY, WITHOUT UNUSED CAPACITY	COOPERATIVES
RESPECT FOR THE FAMILY	A CULTURE OF EFFORT AND WORK	RURAL, AGRICULTURAL AND BALANCED URBAN TERRITORIAL DEVELOPMENT	MANUFACTURING INDUSTRIES	GREEN SPACES FOR PUBLIC RECREATION	SERVICE COOPERATIVES
	SOCIAL EQUITY	BALANCED AND CONTROLLED URBAN DEVELOPMENT	HANDICRAFT PRODUCTS	URBAN AND RURAL IRRIGATION NETWORK	NON- GOVERNMENTAL ORGANIZATIONS (NGOS)
	STRENGTHEN THE NORMS THAT FACILITATE PEACEFUL CO-EXISTENCE	FAMILY NUTRITIONAL SELF-SUFFICIENCY	BUSINESS SERVICES	HIERARCHICALLY ORDERED ROADWAY NETWORK	PRODUCERS, INDUSTRIALISTS, WAREHOUSE WORKERS, PACKERS, EXPORTERS, INTEGRATED INTO GUILDS OR ASSOCIATIONS

In the original text it follows.....



4.4.2 Standardizing Instruments for Land Use Management

The application of land use management plans is associated with the need for having legal documents that back up the decisions made, since these decisions constitute interference, or at least provoke a transformation in the **status quo** of the life of a community; they also produce a **modification in the structure of territorial relationships** over the medium and long range.

Therefore, it is not only necessary to formulate norms that **orient the actions of public and private actors** toward the models that they seek to adopt for land use management and to identify clearly the distribution of capabilities, the committed territorial entities (persons, institutions, communities, etc.), and the acceptable approaches for the intervention of each actor, but also, the legal status and the principle of legality which confer on them the obligatory nature by which the participants and actors adjust to the norms that regulate these relations.

4.4.2.1 Principal Components of Land Use Management Laws

A land use management law constitutes the maximum aspiration in legal matters for land use management. It constitutes a fundamental normative act for the planning of development in that it allows for ordering the process and gives it a character of permanence, continuity and stability in time. This law should be classified among the constitutional principles of each country, respecting the attributes that this guidance document grants to the different government bodies – national, regional, provincial, local, etc. In the case of countries with a federal structure, one can see the need for coordination and connection to the legal structure of

lower levels of government (provincial, state, etc.) to achieve compliance of the defined goals, or to create the federal pacts needed for carrying out the policy of land use management.

To formulate this law, it is necessary to consider that these norms generally emerge when a state of **social maturity** and social, economic, environmental, political, and administrative principles have been reached with an important **normative** context and a determined situation of **social awareness**. For this purpose, one enters into a context that contains profuse experience in territorial projects and initiatives that can ill afford to be ignored. Provincial, regional, and state laws with territorial impact (urban, rural, environmental, local or industrial, tourism, mining etc. promotion) as well as those that regulate the organization of new networks (for example the Federation of Argentine Municipalities, FAM, the MERCOSUR City Network, Integration of South American Regional Infrastructure, IRSA, etc.), should be respected and adequately contained in the new law, clarifying those situations that could generate confusion, omission or legal overlapping.

In the same way, all of the Latin American countries now have a long-standing tradition of **international, bilateral and multilateral pacts** that have been signed on different occasions and circumstances and that weigh heavily on territorial behavior. These, too, cannot be ignored. Quite to the contrary, they must be considered and taken into account when formulating a law of land use management so they contribute to regulating the organization and avoid producing legal voids that generate uncertainty or difficulties in the context of trans-government relations or territorial integration.

A law of land use management must have the following **minimum components**:⁵⁴

54 Ministry of Federal Planning, Public Investment and Services. Argentina 2016. Policy and National Strategy for Development and Land Use Management. Executive Branch, Bs.As., Argentina, 2004. p. 37.

- Object and purpose of the law,
- A clear definition of the concepts involved: development and land use management, among others,
- A definition of the different agencies involved and those of general coordination (ministries, bureaus, public and private organizations),
- A definition of the different agencies, formulators of plans and projects (government, provincial, municipal),
- A definition of the expected country model,
- Types of plans involved in the territorial policy (government, provincial, municipal, urban, rural, regional, microregional, transnational, etc.),
- Conditions of viability of the plans from the socio-political point of view (approaches to participation and their applicability), the economic/financial point of view (human, natural, financial, technological resources and others), and the technical viewpoint (instrumental knowledge, preferential technologies, etc.),
- Responsibilities of the provincial governments at the territorial level, authority and complementarity with the government,
- Responsibilities of the municipal and local governments at the territorial level, authority and complementarity with the province and the government,
- Responsibilities of sectors at the territorial level and application with the previously mentioned levels,
- Responsibility of the territorial entities: a definition of the entities (private actors) that must be recognized, and their authority, approaches to participation, and complementarity with public administration.

Additionally, it is pointed out that the law should simplify the legislation of existing development and land use management, clearly regulate this material, and orient the actions that are put into motion on different scales, both in the public and the private sectors, with precision and simplicity.

It is in the context of these laws where the need to connect land use management to environmental management and risk management should be explicit, in order to ensure the sustainability of territorial development, independent of the standard that may have been generated to support these issues in each of the countries and regions (environmental laws, emergency management, etc.).

The law on land use management should stress in its principles its **preventive and pre-emptive nature** and its forward vision from the active and committed present, since conflicts generally arise between public and private interests, contradictions between conservation and the use of resources, between local and global vision, and between many other factors. The differentiating lines are at times very subtle.

In many regions, provinces and countries of Latin America, these difficulties have meant that the projects of drafting land use management laws have been abandoned as soon as they were initiated, or remained dormant for long years in the storage files of legislative organizations. Generally speaking, with few exceptions, land use management plans are carried forward without the existence of a standard to regulate them in an integral manner. This explains the erratic behavior regarding the instrumentation of the plans and the discontinuity in development of territorial projects.

4.4.3 Management Tools: Sociopolitical Organization and the Administrative Apparatus

*“Territorial policy and land use management attempt to incorporate the territorial dimension into the government’s operation.”*⁵⁵ Considering that **land use management is a public policy**, the most important part of a land

55 Roccatagliata, Juan: Geography and Territorial Policies. Space Management. Edit. CEYNE, San Isidro, Bs.As. 1994. p. 41.

use management project is to design the way to institutionalize the plan being proposed, and the actions that the process unleashes. The **institutionalization** of the plan implies the concrete possibility of carrying it forward successfully.

The process generates the need to update the jurisdictions, whether they are a national, regional, provincial or municipal authority, to the needs of a territory that habitually grows beyond the possibilities and the limits of each jurisdiction, suggesting the eternal challenge of identifying the **power bases**. To comprehend this concept requires mentioning the innumerable cases in which a local, urban or regional government has been unable to resolve a territorial problem that affects its jurisdiction because the management of this space is under the auspices of a government authority or that of a decentralized organization and therefore outside of its competence.

Overlaying functions and actions over a single territory must be ordered in such a way that each action finds its place and adequate opportunity to insert itself, without slowing or conditioning the development of the zone, as scheduled within the pre-established land use management plan.

Therefore, taking the **power structure of the area to be managed** into account in order to update its organization and establish a hierarchy of the necessary components for installing the land use management plan is not only a strategic action, but also a basic requirement for being able to implement a process of **sustainable development**. In that sense, one must remember that progress toward sustainable development is conditioned by three aspects:

“The first is the lack of consensus as to the definition of the concept itself”... The second is the difficulty over which governments stumble to fulfill political promises aimed at achieving a certain balance between economic, social, and environmental goals... It requires

profound adjustments in the structure of institutions, in the distribution of wealth and in the management of natural resources... The third reason refers to the management capacity and institutionality, comprehended as the set of collective agreements needed to carry out policies that tend to achieve sustainable development. It is not enough to have laws and regulatory frameworks; one must also have the effective participation of society in addition to a reliable organization.”⁵⁶

The United Nations Development Programme (UNDP) carries out follow-up on sustainable human development (HDI) with the intention of empowering human aptitudes (social capital) and subordinating certain interests and ambitions to the needs of social groups, whether these are present or future generations. It has long pointed out the need to put certain recommendations into practice:⁵⁷

- Recover the value of formulating land use management plans in a participatory manner.
- Reinforce the activities of environmental management at the municipal level where several levels of decision interact.
- Create entities of special organization for managing complex ecosystems (urban zones, coastal strips, etc.) under stable and coordinated institutional figures.
- Create compatibility in the actions of the managing authorities, at levels and in territories defined by political/administrative reasons (municipalities, districts, provinces, etc), with those of the authorities in charge of environmental management.
- Implement information systems and situation rooms to facilitate communication and decision-making by inhabitants to improve their ecosystems at the river basin and municipal levels.

56 Dourojeanni, Axel: Reflections on Territorial Strategies for Sustainable Development. Institute for Environmental Studies. Pontificia Catholic University of Lima, 1997.

57 Harla S.A: Report on Human Development. UNDP, Mexico 1995.

The strategies should be designed in such a way as to be applied gradually in order to be able to assign and administer limited resources efficiently, and increase the sources of financing as required to reap the benefits of good territorial management, both by public and private sectors.

The first step of the institutionalization process for the land use management plan is to define, in each region or country where the land use management is to be installed:

- The **level of government** in which to insert the land use management plan;
- Whether those levels of government have **common sections** regarding environmental matters and risk, to reach a sustainable development profile;
- Whether **sufficient information** is available to make decisions with an acceptable level of uncertainty;
- Whether the agents at that level of decision-making are **sufficiently prepared** or whether they need training to be able to carry out their functions; and
- To what extent the **channels of participation** are open to other levels of public and private sector decision-makers.

Regarding the **first item**, it is necessary to consider that in projects of this nature, new organizations are usually created within the public administration to handle the matter. However, in addition to the fact that the entity may already exist, it is convenient to insert the plan into the context of all components of the responsible government, in other words, that each organization and sector of the public administration be concerned with the subject of the territorial and environmental impact of its actions. To the contrary, it is usually the case that an organization, created for a specific purpose, sets its own objectives, designs its own plans and programs, and in practice, no one else complies with them because they have not participated in their creation.

As a result it is opportune not to create organizations but rather to generate a context for intervention by entities that already exist and have similar assigned functions, and they, in turn, incorporate the functions into their own of coordination, articulation and harmonization that are needed to develop land use management projects – planning offices, urban development, etc.

In the case of the **second point**, one must define whether the selected level of government has common points related to the subjects of environmental management and risk management, that is, between **land use management, environmental policy and risk prevention**, in order to define a profile of sustainable territorial development. These policies should be complementary and the organizations that develop them should strengthen the ties that connect them in order to unify the actions and coordinate their programs.

The **third point** involves defining whether there is enough **information being gathered to allow for decisions to be made within an acceptable range of uncertainty and risk**. Experience developed in several countries indicates that there is a good amount of territorial information, but that it is usually spread over a wide array of public and private institutions and distributed within the technological/scientific system, especially in universities and research centers that are disconnected from the actions of the government.

This situation provokes an adverse result for the land use manager, who needs to gather consistent and reliable information in order to resolve a specific problem. Therefore this **input ends up being critical** in Latin America, especially when dealing with an emergency or with reports that need to be prepared quickly in order to make a strategic decision.

The **fourth point** deals with the level of **personnel preparation** that gives staff members the ability to better carry out their functions. In all of the land use management projects we see the need to start with training human resources in four areas considered fundamental: handling and management of territorial information, handling and management of the territory, environmental management and integrated management of critical situations. In this setting, it is vital to carry out joint actions through agreements with **university organizations**, where it is most probable to find qualified personnel, to conduct the required training.

At a minimum, the training courses should cover the following subjects:

- Theoretical and methodological bases for land use management.
- Methodology and techniques for the analysis of territorial information.
- Analysis and diagnosis of the socioeconomic components of the territorial structure.
 - Guidelines for environmental management and the protection of natural resources, and
 - Guidelines for risk management (reduction of vulnerability before natural, technological and man-made hazards).
- Formulation, execution and evaluation of land use management projects.
- Strategic planning.

As a foundation for all training programs, special attention should be given to the **VULNERABILITY** that the territory generates in the process of transformation, and to which it is subjected by the changes in the environmental, natural, economic and social areas. A permanent effort should be made to ensure that every investment project – whether public or private – is based on the **CALCULATION OF RISK** as a guarantee of the economy's sustainability and of the safety of communities over time.

Finally, regarding the **last point – community participation** – it is necessary to work on decentralization processes, moving power toward local governments, and

the modernization and professionalization of these local governments in order to obtain a territorial administration capable of promoting **active social participation** (community groups, NGOs, professional organizations, companies, producers, neighbors, etc). This is an unavoidable mechanism for providing land use management with greater pertinence and adjustment of territorial activities to reality, above all, providing it the **legitimacy** it needs to operate effectively.

“The processes of urbanization, community development, advances in education and, in general, globalization of society, brought to light the crisis of the legitimacy and efficiency of the state governments and their model for regional development up to the 1980s. The centralist, protectionist model of sectoral, paternalist and representative democratic development gave way to a new model capable of facing the new coordinates of development, established with the internationalization of the economies and the demands for democratic ideals to take root... following this recognition of the crisis, reforms have taken place throughout Latin America, moving it toward a new model, which require a decentralized, democratic and modern public sector that promotes development of ever more open and competitive economies by harmonizing the participation of communities' private-sector resources, and the regionalization of specific actions...”⁵⁸

In this context, it is evident that the **decentralization toward the municipalities**⁵⁹ indicates a transfer of responsibilities and competences as an option for also re-assigning concrete resources to those jurisdictions that are able to orient them toward solving the real problems of each community and satisfying its needs through the exercise of local power. Therefore, land use management plans for enabling community participation in territorial policies should include decentralization based on rewarding the capacity of local governments,

58 Ramírez M., Proaño J. Strengthening the Municipality and Decentralization as a Strategy for Moving Toward Autonomy and Local Development, Year II, No. 6, Municipality of Córdoba, 1995.

59 Decentralization is understood as the process of transferring competence and resources to the local governments, initiated by the central government, giving them conditions of supplying more and better goods and services to satisfy the needs of the local jurisdictions. This includes encouraging a judicial-legal framework that redefines the relationship between the central government and the local governments. This process makes it possible to move from a centralized to a decentralized state.

not only for adequately providing services, but also for directly controlling the **evolution of their territories, a task involving land use, the implementation of new activities and exercising control over the environment and risks.**

5. INSTRUMENTS AND MECHANISMS FOR THE INTEGRATION OF LAND USE MANAGEMENT AND RISK MANAGEMENT

5.1 Possibilities of Integrating Risk Management into Land Use Management Policies

Dealing with all of these subjects has made it abundantly clear that risk management is a working model that is closely connected to the process of land use management. If we review the vast bibliography on risk management – in spite of the newness of these ideas – we can be sure that nothing, in reality, has been said that has not been proven successful before in other working contexts.

What, then, is the difference with this document? Here, what we have tried to do is to change the perspective of analysis, since **risk management is being analyzed from the viewpoint of land use management**, from its concepts, from its analytical categories, and from its possibility for implementation.

In other words, we have analyzed the extent to which territorial policy relevant to land use management **“needs”** the support of the studies that have been carried out among scientists, professionals and experts in their study and application of risk management as the fruit of a long history of reflection. The concept of risk itself has been abandoned as a phenomenon of study. We have advanced to a different perspective, based on the identification of the territorial processes that generate risk situations, distortions in the territorial **processes and difficulties in the ability to function, which can be corrected by using the tools of risk management.**

This new way of looking at risk from the land use management perspective, **finds in risk management an indisputable ally** that, on its own, has been able to develop extremely valuable analytical and diagnostic instruments and proposals for action in direct relationship with the current concept of territory and its dynamics. Risk management is a new partner that enables land use management to study and program secure territorial scenarios with a dynamic of low costs, and to minimize or eliminate unforeseen additional costs. It also allows for the identification of potential situations of productivity, association, occupation, land use management and control that can make for difficulties in managing the territorial system and its usage, as well as its ability to produce strategies and proven working mechanisms for measuring and reducing these vulnerabilities, and programming actions to increase the security and capacity of the territorial system.

In this innovative context of Latin America, it is fair to recognize that risk management has found a privileged place within land use management⁶⁰ because:

- 1- **It is related to a potential situation**, that is, to something that has not yet happened and therefore is susceptible to programming.
- 2- **It can be measured**, since it is possible to calculate in detail the possible unfavorable economic, social, environmental, institutional and legal consequences that can arise because of the occurrence of a damaging event in a vulnerable context.
- 3- **It is the product of a social construction process**, and as such, it is possible to intervene in its development through organized actions, carried out by public and private decision-makers.
- 4- **It analyzes and individualizes the effects on all components of the territory:** its economy, its society and its environment.

60 “Risk management should be wholly incorporated into the processes of development; it cannot be an addition or an annex to the proposals for development that are desired to be implemented. The focus of risk management should be inserted into each and every phase of programming, identification and formulation of development projects and programs to be implemented.” GTZ. Concepts associated with disaster risk management in planning and investing for development. Lima, Peru, 2006. p.50.

- 5- **It is the object of investments;** it produces losses or earnings according to the type of management that is established.
- 6- **It is changing and variable** since the development process can produce unexpected changes due to a lack of detailed knowledge about the different types of hazards and vulnerabilities.
- 7- **It is susceptible to the application of scientific and technological knowledge** through the intervention of prepared professionals who identify the processes from which the risks originate and worsen.
- 8- **It demands social and personal conduct and behavior** that can be organized through the legal apparatus (norms and laws) and managed through the administrative system.

Dealing with risk, therefore, complies with all of the conditions for converting it into a mandatory objective of land use management, especially in Latin America where the territories are in the process of transformation, and as a consequence, are continually constructing new conditions of risk that must be managed and controlled.

This perspective obliges us to think that risk management should orient its activity toward a process of interdisciplinary collaboration with land use management, to gradually introduce in a second stage, the methods and instruments it uses into each of the phases of the land use management process.

This also implies clearly explaining that risk is no longer seen as a unique object of the study discipline, but as a philosophy of interdisciplinary cooperation, intended to INCREASE THE SECURITY OF HUMAN SETTLEMENTS, in every modality of their territorial expression.

5.2 Instruments of Intervention from a Perspective of Interdisciplinary Collaboration

If we link the table “LOGIC OF THE PROCESS OF FORMULATING THE LAND USE MANAGEMENT PLAN” (section 4.4.1.1) to the “THEORETICAL MODEL OF RISK MANAGEMENT” (section 3.2), we can build bridges that facilitate the application of a new **combined methodology between land use management and risk management.**

Land use management is recognized as having a dialectic and practical relationship at the institutional and legal levels on the patterns of sustainable development in the countries and regions of Latin America, and on risk management as being aimed at mitigating, diminishing, and controlling existing territorial risks. This position allows for joining efforts into a single path, that is, into a logic of coordinated intervention. In this sense, we will be accrediting and enabling the reflections made in the most recent meetings:

“...the discussion on the status of risk reduction carried out in Manizales, Colombia, in which the conclusion was: risk management is an essential and integral component of sustainable human development, in the framework of a universal agenda whose goal is to increase the well-being of the majority of the population. Although this was the proposal in Cartagena and Yokohama, sadly, there is in practice a conceptual and operative segregation between development policies and the management of risk. To overcome this artificial separation, we can guarantee that risk management will be recognized and incorporated as an essential element in the practice of development. Achievement of the Millennium Development Goals will be possible only if risk management is effectively articulated with the management and practice of development.”⁶¹

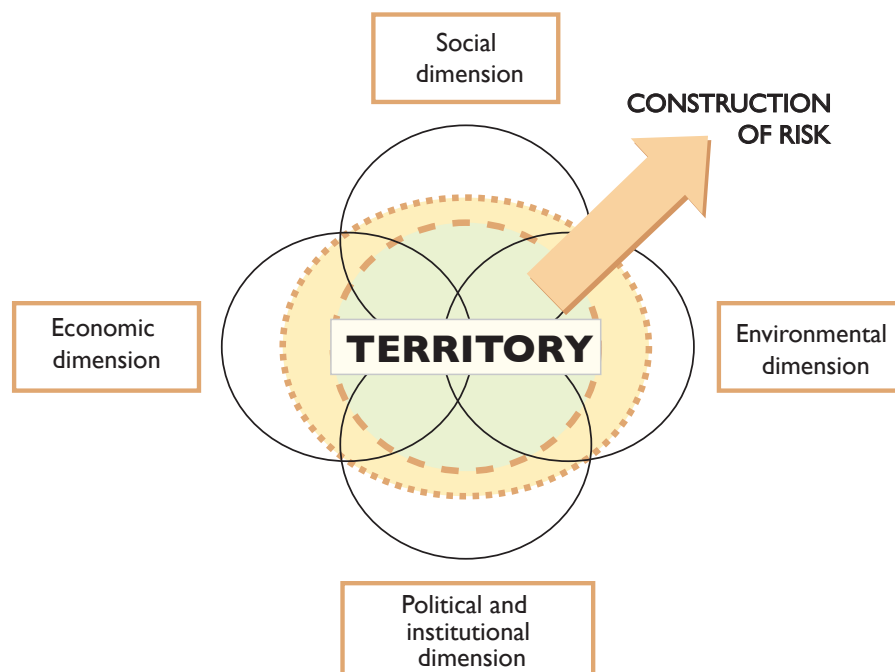
At the current level of land use management and risk management’s theoretical development, it is evident that the conceptual segregation of the two is difficult to overcome. Generally speaking, one can consider that this situation calls for delving deeply into each

61 Sarmiento, Juan Pablo: The Challenge of Risk Management as a Strategy of Multisectoral and Participatory Intervention at the Service of Development. USAID/OFDA. Discussion workshop on environmental management, land use management and risk reduction. Bs.As. 2005.

case; but on the operative level, it is necessary to devise an approach that allows us to generate **common operational guidelines** to make sustainable development viable.

This could be the **first step** toward combining the concepts, methods, and procedures. But above all we

need an approach that will insert **professionals into the management of both disciplines in teams with a transdisciplinary view**,⁶² capable of working efficiently with the programming and management of Latin American territories that are in the process of transformation today. To accomplish this, we must fulfill certain conditions:



1. Accept the fact that risk is the result of the **INTERACTION BETWEEN THE COMPONENTS OF THE TERRITORIAL SYSTEM**: the environmental, social, economic, political/institutional, and legal components;
2. Recognize that the actions of territorial development activate the synergy between these components and constantly generates **NEW POTENTIAL HAZARDS** (technological, fires, explosions, environmental degradation, wastewater, oil spills, watershed deterioration, defective management of dangerous zones, etc);
3. Admit that these developmental processes in Latin America, brought about by an excessive and growing concentration of the population with a very low quality of life, generate situations of **EXTREME VULNERABILITY**;
4. Gain awareness that the interactive links between these elements produce **RISK SITUATIONS** or a series of small problems that can generate significant **DISASTERS**. These risk situations and small problems pose limitations, increase costs, and at times can go so far as to altogether block the process of territorial development;

62 Sarmiento, Juan Pablo: Ibid. "The transdisciplinary approach allows for interaction of different disciplines to develop a common perspective, while conserving the wealth and power of their respective areas of knowledge."

5. Recognize that some situations should be permanently controlled with special systems (early warning, etc.) and therefore require the use of **SPECIAL METHODS AND TECHNOLOGIES**;
6. Accept the fact that risk management should be in the hands of **SPECIALIZED PROFESSIONALS** in the formulation of prevention, mitigation, and contingency plans and projects;
7. Accept the fact that these tasks should be done in **CONJUNCTION WITH THE PLANS AND PROJECTS OF LAND USE MANAGEMENT** in each of the countries;
8. Recognize that the **ABSENCE OF LAND USE MANAGEMENT IS, IN ITSELF, AN INSTITUTIONAL VULNERABILITY** in Latin America that increases its weakness, reduces its competitiveness and limits its conditions for sustainable development;
9. Recognize the need to **STIMULATE THE USE OF LAND USE MANAGEMENT AND RISK MANAGEMENT IN AN INTEGRATED MANNER** as a basic tool for sustainable development;
10. Establish the possibility of using a **COMMON METHODOLOGY** to carry out these tasks, through the formation of interdisciplinary teams that involve the figure of a risk manager together with a land use manager. This methodology could take the shape – in a preliminary and exploratory way – that we propose in the following tables.

In this perspective, land use management and risk management not only come together to work in close collaboration in common projects, but also allow us to recognize the fact that – to the extent that the dialectic, conceptual relationship and the related studies are strengthened – risk management is a substantial part of the policy of land use management, collaborating with it to minimize the impacts generated by natural, environmental, economic and man-made hazards that unleash vulnerability and risk, with the objective of reducing these impacts to acceptable levels for the social groups involved.

Risk management shares with land use management:

- **Its working methods:** analysis, identification of problems and resources, building probable scenarios, setting improvement goals and instrumentation plans and projects for intervention,
- **The focus of anticipation,**
- **The strategy of prevention,** and
- **The need to establish integrated and participatory policies for intervention.**

It is dissimilar, in practice, because of:

- **The specificity of its areas and components:** hazards, vulnerabilities, and risk,
- **The special nature of its interventions and types of plans:** prevention, mitigation, handling of adverse events (preparation, warning and response) recovery, rehabilitation, and reconstruction.

The following is a proposal to blaze an exploratory trail for bringing land use management and risk management together at the practical level. The tables attached attempt to define the **moments and processes in which the two subjects approach each other and can fuse together without losing their respective identities**. This is indispensable, since each scenario requires making use of the instruments that have been developed independently by each of the two disciplines in order to approach the joint thematic area of **TERRITORIAL FUNCTIONING** and resolve it.

Land use management, for example, has no adequate instruments for reacting to a disaster situation. Risk management does. Risk management does not have the instruments to generate territorial development policies; land use management does. However, both share, and are able to generate, corrective and preventive policies.

These tables are the result of a long history of experience, developed from 1990 to the present in the CETEM-FFyL (National University of Cuyo) in the atmosphere of preparing professional human resources at the

graduate level on the subjects of land use management, environmental management and risk management.

- In the first case, this proposal was offered during the courses for the master's degree in Land Use Management and Organization, taught in the Faculty of Philosophy and Letters of the National University of Cuyo in 1990-1992, now imparted on a regular basis at that institution.
- In the second case, it was included and adapted to the Master's Program in Environmental Management, organized and offered by the Engineering School of the same university in the 2004-2005 school years.
- The third case saw an increase in the context of the Career for Specialization in Prevention, Planning and Management of Disaster-Prone Areas, offered by the Faculty of Philosophy and Letters between 1998 and 2002, with the intervention and under the auspices of the Department of Sustainable Development of the Organization of American States (DSD/OAS), Pan American Health Organization of the World Health Organization (PAHO/WHO), COFES (Argentina) and the Argentine Office of Civil Defense. It was

applied in their final theses by government attendees of several Argentine provinces and attendees from Chile, Costa Rica, Nicaragua, Guatemala and Colombia, who studied through scholarships from the OAS.

It was adapted for the Latin American Forum, with the Proposal for the Technical Municipal Guide: Proposals on Criteria and Recommendations for Land Use Management in Areas of Risk, in the SINAPRED "Formation of Human Resources for Integration" project (UNDP-COSUDE) in January, 2003, delivered by architect Laura Acquaviva (UNDP). This is the same methodology taught in the workshops of the Professional Geographer Career, a new major created in 2004 in the context of the Geography Department of the Faculty of Philosophy and Letters, National University of Cuyo.

At the **professional level**, the subjects have been dealt with through numerous consulting and technical assistance jobs, especially in the municipalities of Mendoza Province (Luján de Cuyo and Junín, to mention a few) and recently in the province of San Juan, Argentina, for designing the Plan for Urban and Rural Land Use Management 2006-2016, requested by the provincial government and financed by UNPRE/ Ministry of Economy with IADB funds.

WORKING LOGIC FOR FORMULATING INTEGRATED LAND USE MANAGEMENT AND RISK MANAGEMENT PLANS

Territorial Analysis with Risk Management				
	Territorial Components	Risk Management Products	Analysis Variables	Some Types of Data to Collect
What is the territory like?	ENVIRONMENTAL (atmosphere and resources)	- Natural resource maps - Map of environmental assets	Physical structure of the territory Geo-morphology, soil, climate and atmospheric conditions, Slope, Underground water	Type Units Characteristics Dynamic and synergies Resilience
	* Natural resources	- Maps by type of hazard - Maps of multiple hazards	Earthquakes, Volcanoes, Hurricanes Tropical storms Rains Landslides Floods, Droughts	Recurrence Severity Duration Coverage
	* Human elements	- Zoning of multiple hazards	Fires Plagues, Terrorism War Contamination	
	BUILT ENVIRONMENT (installed capacity)	- Map of physical assets installed in cities and towns - Map of critical infrastructure (MCI)	Housing	Location Status Age Level of sufficiency Levels of vulnerability
			Basic infrastructure and services	Type of services Levels of coverage Scope of services Quality of service Types of infrastructure Status of maintenance
	SOCIAL ENVIRONMENT (quality of life)	- Map of social and cultural assets - Vulnerability map	- Demography - Situations of vulnerability - Capacity for reaction and recovery - Level of participation	Structure and growth Poverty indexes Migration Values: social and cultural views Access to health services Access to education Social organization
	ECONOMIC ENVIRONMENT (wealth and competitiveness)	- Map of risk scenarios	- Productive dynamics - Vulnerability - Competitiveness - Level of attraction	Types of activities Levels of employment Economically Active Population (EAP) Business organizations Investment levels
	JUDICIAL-ADMINISTRATIVE ORGANIZATION (governance)	- List of institutions responsible for land use management and risk management	Political organization Development styles Characteristics of the organizations	Autonomy and dependence Spaces of power Capacity for innovation
LEGAL NORMATIVE ORGANIZATION	- Inventory of norms and laws for land use management and risk management - Normative voids	Available normative judicial framework Possibilities for updating	Territorial prevention norms Corrective norms Level of application of the judicial framework Capacity for regulation	
Who can bring about change?	SOCIAL ENVIRONMENT	Social cohesion Capacity for response by cultural level Culture of prevention Level of informal organization	Dynamic factors of the society Pressure groups Leadership	Types of political decisions Public decisions Types of private decisions Individual actors and social groups Community organizations
	ECONOMIC ENVIRONMENT	Investment decisions Business decisions Scientific innovations Technological innovations	Decision profiles	Demographics Prioritized values
			Development projects Production capital	Employment growth Public investment growth Private investment growth Investment dynamic and mobility Growth of used and usable land areas
Where is going to?	SOCIAL ENVIRONMENT	Map of possible areas for development by type of activity	Growth trends	Demography priority values
	ECONOMIC ENVIRONMENT	Territorial investment map	Growth and valuation trends	Employment growth Public investment growth Private investment growth Investment dynamics and mobility Growth of used and useable land areas

CURRENT SCENARIO- DIAGNOSIS			
	Products for Risk Management	Process	Criteria
	<ul style="list-style-type: none"> - Identification of territorial problems and conflicts - Risk map - Map of critical areas - Risk situations included in the territorial diagnostic map 	<ul style="list-style-type: none"> - Establishment of Classification and hierarchy establishment - Possibility of intervention 	<ul style="list-style-type: none"> - Types of potential impacts - Involved population - Multiplier effects - Land areas affected - Potential costs - Inability to respond locally - Institutional incapacity for prevention - Unawareness of risk
	To be taken into consideration, among other factors, the following:		
	<p>The population:</p> <ul style="list-style-type: none"> - Risk levels by type of hazards, exposure and conditions of vulnerability <p>Inhabitability conditions</p> <ul style="list-style-type: none"> - Limitations of the natural environment for development - Level of exposure to hazards - Level of existing risk <p>Availability of infrastructure</p> <ul style="list-style-type: none"> - Existence and condition of strategic infrastructure - Risk level of installed infrastructure - Risk level of productive and commercial systems 		<p>Land supply and demand</p> <ul style="list-style-type: none"> - Level of exposure to natural phenomena of the vacant land for future occupation - Real estate market pressure (important component in city growth) <p>Socioinstitutional strengths and weaknesses</p> <ul style="list-style-type: none"> - Awareness and vision of the problem - Erratic character of investments - Public and private irresponsibility <p>Inefficiency of the legal framework for control</p>
What comparative advantages does it have?	<ul style="list-style-type: none"> - Competitive advantages - Identification of safe areas - Resources available without the risk of over-exploitation 	<ul style="list-style-type: none"> - Classification and establishment of hierarchies 	<ul style="list-style-type: none"> - Within a single system - In other connected systems - Possibilities of being incorporated without risk
	To be taken into consideration, among other factors, the following:		
	<p>The population</p> <ul style="list-style-type: none"> -Social capacity for reaction and rehabilitation <p>The economic sector</p> <ul style="list-style-type: none"> -Aptitude of the natural environment to respond to the objectives of development <p>Inhabitability of the territory</p> <ul style="list-style-type: none"> -Availability of safe areas <p>Spatial structure</p> <ul style="list-style-type: none"> -Territorial distribution of residential, tourist, industrial, productive, etc. activities, without conflicts or risks 		<p>Land supply</p> <ul style="list-style-type: none"> - Availability of land that complies to the conditions of safety and habitability <p>Infrastructure</p> <ul style="list-style-type: none"> - Capacity of the infrastructure to develop in conditions of safety <p>Sociopolitical organization</p> <ul style="list-style-type: none"> - Recognition of the problems, definition of acceptable risk - Channels of participation - Propensity for social participation <p>Availability of norms for control</p>
PRODUCT: CURRENT RISK SCENARIO INTEGRATED TO LAND USE MANAGEMENT			
	Products for Risk Management	Process	Criteria
What might happen in the future?	<ul style="list-style-type: none"> - Identification of trends in the situation of risk - Risk scenario in the process of future development 	<ul style="list-style-type: none"> - Expected behavior and conduct 	<ul style="list-style-type: none"> - Following the same policy - No intervention - With strategies adopted for reducing risks
	Some of the many things that should be taken into consideration, by:		
	<p>The population</p> <ul style="list-style-type: none"> - Localization trends and future risk conditions associated with them - Migratory movements - New demands for educational, commercial and health etc. services <p>Functionality</p> <ul style="list-style-type: none"> - Functional capacity in the case of impact on service centers or strategic nodes <p>Infrastructure</p> <ul style="list-style-type: none"> - Level of risk associated with impacted critical infrastructure <p>Land supply</p> <ul style="list-style-type: none"> - Potential conditions of risk coming from urban sprawl into exposed areas <p>Investment</p> <ul style="list-style-type: none"> - Impact of investments in generating risk conditions <p>Socio-governmental organization</p> <ul style="list-style-type: none"> - Impact of public or private sector correctness of choices and omissions in the construction of risk <p>Norms of control and development</p> <ul style="list-style-type: none"> - Impact on the organization of the territory and in the generation of risk 		
PRODUCT: POTENTIAL RISK SCENARIO (exploratory scenario) INTEGRATED INTO LAND USE MANAGEMENT			

PROPOSALS FOR LAND USE MANAGEMENT WITH RISK MANAGEMENT			
	Products for Risk Management	Process	Criteria
Should we act or not?	<ul style="list-style-type: none"> - Make decisions - Social pacts - Institutional pacts - Concerted efforts - Negotiations 	<ul style="list-style-type: none"> - Definition of values <ul style="list-style-type: none"> - Definition of objectives for sustainable development - Definition of opportunities for addressing risk 	<ul style="list-style-type: none"> - Evaluation of social, economic, environmental, and political costs - Evaluation of professional, scientific–technical, economic, and investment resources - Available time
What goals can be reached?	<ul style="list-style-type: none"> - Definition of the DESIRED, RISK-FREE SCENARIO (pre-emptive scenario anticipation) - Definition of the acceptable level of risk for the project 	<ul style="list-style-type: none"> - Formulation of strategic guidelines to maintain safety and eliminate risk - Formulation of objectives and goals with acceptable risk for the territory 	<ul style="list-style-type: none"> - Evaluation of incorporating zones without risk - Types of projects necessary for risk management <ul style="list-style-type: none"> - Evaluation of training and dissemination - Generation and updating project information
PRODUCT: FUTURE SCENARIOS WITH ACCEPTABLE RISK INTEGRATED INTO LAND USE MANAGEMENT			
With what actions?	<ul style="list-style-type: none"> Corrective actions Mitigating actions Developmental actions Adjustments in the level of acceptable risk 	<ul style="list-style-type: none"> - Choice of the technically viable and economically feasible alternatives in the context of integrated policies that are proposed in land use management plans - FORMULATION OF CORRECTIVE PLANS - FORMULATION OF PREVENTIVE PLANS (integrated into land use management) - ALERT MEASURES 	<ul style="list-style-type: none"> - Identification of: <ul style="list-style-type: none"> - Actors - Social groups - Responsible institutions - Action strategies <ul style="list-style-type: none"> - Selection of risk-free development alternatives or those with acceptable levels of risk - Formulation of necessary norms
PRODUCT: RISK MANAGEMENT PLAN INTEGRATED INTO THE LAND USE MANAGEMENT PLAN			
How do you control the process?	<ul style="list-style-type: none"> Responsible organizations Associated organizations and actors Necessary norms and jurisprudence 	<ul style="list-style-type: none"> - Intervention authority - Levels of inter-institutional coordination - Levels of coordination with the private sector - Monitoring system 	<ul style="list-style-type: none"> - Definition of ACTORS for monitoring and follow-up - Definition of responsible persons - Normative framework - Mechanisms for financing and cooperation - Indicators for follow-up and control
PRODUCT: MONITORING PLAN FOR RISK MANAGEMENT INTEGRATED INTO LAND USE MANAGEMENT CONTROL PROGRAMS FOR ALERT SYSTEMS			

5.3. Applications Models: Land Use Management around the Lakeshore of Potrerillos, Mendoza, (Argentina)⁶³

The methodological logic in this document has also served as a basis for the development of a complex project, “Integral Exploitation of the Mendoza River. Land Use Management Plan (Law 6498 Art. 52), Lakeshore and Zones of Influence of the Potrerillos Dam,” developed under the responsibility of the Office of Environmental Management and Urban Development (DOADU) of the Ministry of Environment and Public Works (Government of the Province of Mendoza, Argentina) between 2000 and 2002.

In order to regulate and control flooding of the Mendoza River (50 to 60 m³/second), authorities decided to construct a dike/dam in the river at Potrerillos, whose valley serves as the interlink with Regions IV and V of Chile (the Cristo Redentor - Los Libertadores Andean Corridor). It is the only mountain corridor adequately prepared for international commerce from the MERCOSUR to Chilean ports.

The river, through a dense network of irrigation canals, also gives life to the northern oasis of the province of Mendoza (Argentina), which is home to 1.4 million inhabitants, agro-industrial production, mining and tourist activities that are based on ecosystems also having important gas and petroleum resources. The environment is complex from the geo-morphological perspective. (Andes mountain range reaching an average of 5,000 meters above sea level and highland plateaus), and climatic perspective (cold dry climate: 200 mm annual rainfall). The zone is also highly earthquake prone with steep slopes, violent summer storms concentrated in a short season, frequent landslides and contrasting periods of drought.

The strategy has been to exploit available water to the maximum, applying it to multiple uses: agricultural irrigation, electric energy production and tourism, given that the project has created an **artificial lake** with a surface

area of 1,300 hectares and 420 hm³, which prompts the possibility of situations and scenarios along its shores different from those that exist today: tourist centers, services for the Andean Corridor, cargo transfer area for the Trans-Andean railroad, all of which will add to the already traditional usage of recreation and secondary weekend residences, which was its original function. The objectives of the project were as follows:

PRINCIPAL OBJECTIVE

To formulate the Plan for Land Use and Management involving the Tourism and Recreational Development Project of Potrerillos to develop the area using the strategies, programs and projects that would make it possible to preserve the ecosystems, optimize the use of the area, reduce the risks inherent to the area, minimize the costs of facilities, and ensure the proper operation of the Bi-oceanic Corridor, thus exploiting the benefits produced by the investment carried out to harness the Mendoza River.

SPECIFIC OBJECTIVES

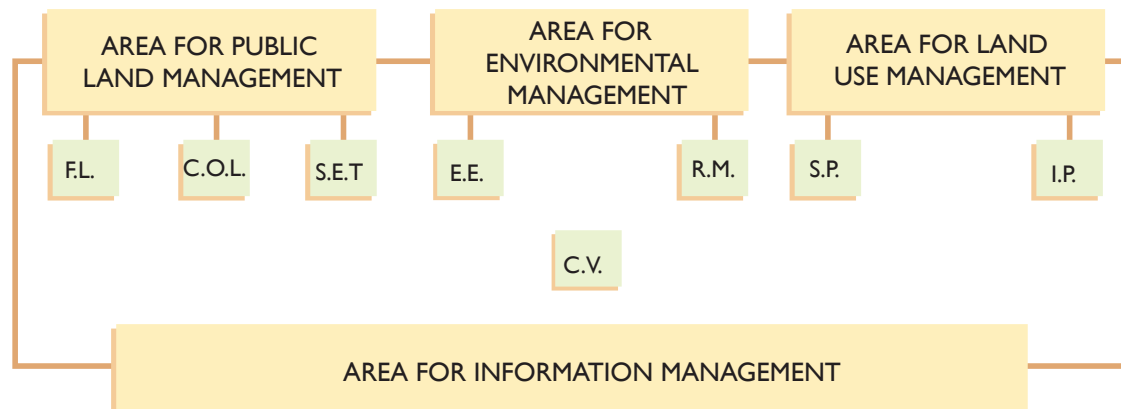
1. Obtain clear, orderly information and sufficient basic studies for defining the possibilities of developing and ordering the lakeshore area.⁶⁴
2. Define a plan for land use management that allows for orienting the investments and organizing the area into a scenario of sustained and secure growth.
3. Obtain a complete legislative proposal to be put into motion and define the functioning of the authority that will be in charge of coordinating and managing the area.
4. Formulate a tourist development plan for the combined area and alternative schemes for public bids on the possible investments along the lakeshore.

63 Developed under the direction of Nelly Gray de Cerdán, Director of the Office of Environmental Management and Urban Development (DOADU)/Ministry of the Environment and Public Works, Government of the Province of Mendoza, Argentina. 2000-2002.

64 Lakeshore: a strip 1,200 meters wide from the highest water level.

For the formulation and development of this project, it was necessary to carry out several activities beforehand:

- I- **Reorder and improve the internal structure of DOADU**, generating appropriate new working units and work plans for the mission.⁶⁵



FL.: Fiscal Lands; C.O.L.: Colonization Program; S.E.T.: Settlement Program;
 E.E.: Environmental Evaluation; R.M.: Risk Management; S.P.: Stand-Alone Projects;
 I.P.: Integrated Projects; C.V.: Environmental Cartographic Library

- 2- **Train DOADU personnel** by conducting courses on land use management and risk management. The first of these courses were given by professors from the Masters in Land Use Management Program (Faculty of Philosophy and Letters, National University of Cuyo); in the second instance, two professionals (a geographer and an architect) signed up in the field of Specialization on Prevention, Planning and Management of Disaster-Prone Areas at the same institution. The professionals of DOADU already had a very good education in environmental management, because this entity is the authority responsible for the Law on Environmental Protection of the Province;

- 3- **Organize the environmental information system (EIS)**, built on a geographic information system (GIS), that supports the processing all of information, generating maps and indicators for monitoring the performance of the project.

- 4- **Carry out an exhaustive profile of the working zone:** environmental, natural, social, and economic variables, to build databases, statistical information and mapping. In this profile, data on hazards and the potential vulnerability of the entire area are included.

65 CV: Carta Verde: Cartographic library on environment and risk open to public and private users, organized to recover/disseminate existing and project-related information.

- 5- **Take inventory of the legal documents** related to the province’s land use management, risk management and environmental management.
- 6. **Begin to create complementary links with the institutions** of the provincial government, the government and the municipalities involved in order to create an interdisciplinary and intersectoral team to design the project.

- 7. **Create channels for participation and committed relationships with the local community** through workshops, given that there is a group of 76 families that would have to be relocated.

They also defined the major stages of the task to be carried out, which were debated and approved by the Minister and the Governor.



Once these actions were completed, work began on the analysis of the area based on four initial documents:

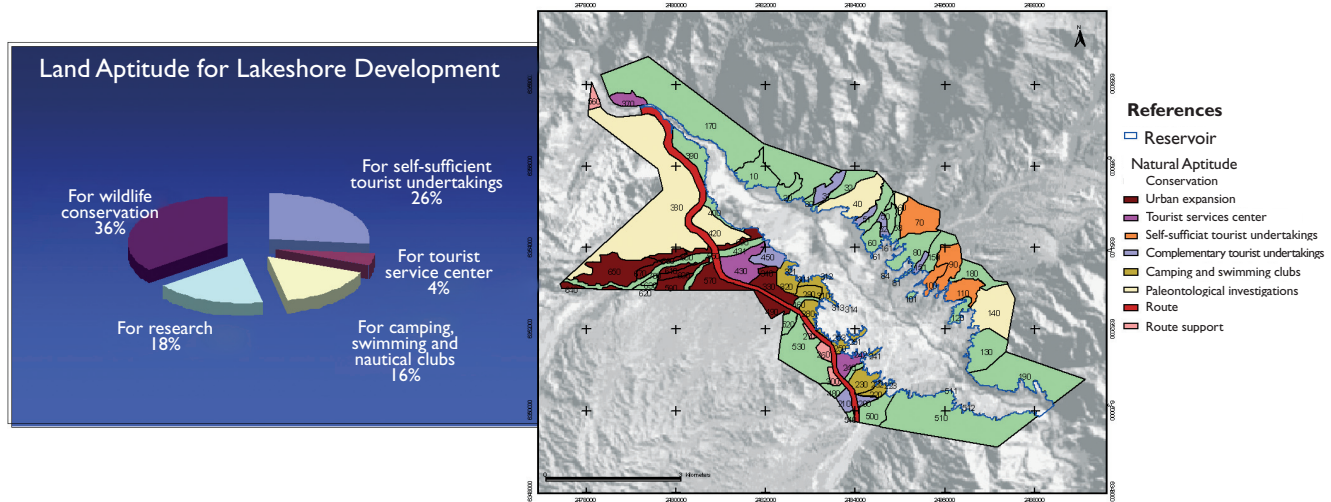
- Natural resource aptitude and carrying capacity of the resident ecosystems
- Multiple hazard map
- Critical infrastructure and vulnerability map
- Map of potential risks

These four documents served as the basis for preparing the diagnosis upon which the analysis of the remaining social and economic components was prepared. A pilot program was conducted for the zone to which the population would be relocated, where a small, traditional tourist/railroad village was moved, and then the methodology was broadened to cover the entire lakeshore area.

Special indicators were developed for the map of natural resource aptitude and carrying capacity in order to document the characteristics of the area, then a companion map was produced.

ORDER	VARIABLE	WEIGHT
A	DISTANCE TO THE LAKESHORE (at minimum water level)	10
C	ENVIRONMENT	9
D	QUALITY OF PANORAMIC VIEWS	9
B	LANDSLIDE RISK	8
E	RELIEF	7
F	ACCESSIBILITY	7
G	SURFACE FEATURES	6
H	PARCEL SHAPE	4

10	FREE OF RISK
7	LOW RISK
4	MEDIUM RISK
1	HIGH RISK



Available parcels and land were numbered and their appropriate uses were identified – self-sufficient tourist undertakings, tourist services centers, camping, nautical clubs, swimming areas, roadway support, complementary tourist undertakings, conservation of ecosystems

and research, and on the basis of the carrying capacity of each area, calculations with certain precision could be made as to possible development investments. For example, the following information was calculated for one of the possible uses:

Aptitude for Self-Sufficient Tourism Undertakings

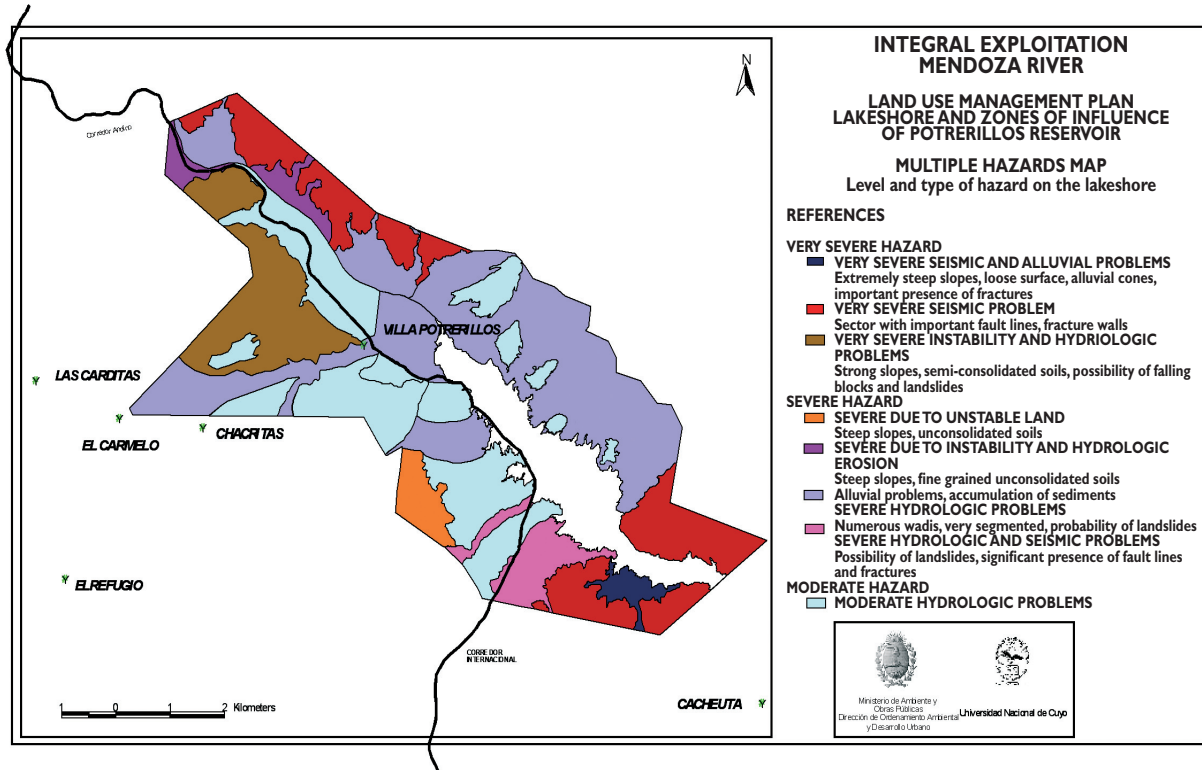
ORDER OF APTITUDE	LOTS	SURFACE HA.	OBSERVATIONS
6	50	44,316	Important landslide defense works are required. Use of the area limited by the topography.
4	51	9,404	Little surface area.
4	52	9,689	Little surface area.
3	70	73,657	Fragmented parcels cut by numerous stream beds.
1	90	50,739	Optimum use of the area is conditioned by the future placement of the lakeshore road.
2	110	35,300	Optimum use of the surface is conditioned by the future placement of the lakeshore road.
5	100	18,039	Use conditioned by topography – rolling hills – and the form of the parcels (jagged coastline).
4	151	7,060	Little surface area.
TOTAL		248,204	

The task of defining the risk was carried out by specialized personnel from Center for Territorial Strategies for MERCOSUR (CETEM), Faculty of Philosophy and Letters, National University of Cuyo, through an agreement of interinstitutional cooperation,⁶⁶ and the previously trained DOADU professionals. Multiple hazard, vulnerability and risk maps with their respective

analysis of detail and integrating letters were elaborated. This risk management task served as a basis for defining the land that would be used for relocating the population,⁶⁷ and later allowed for advancing toward the provincial document defining the zoning of the area that would be approved by the Governor’s decree in October 2001.

66 Quiroga S., Guiñazú E., Videla C., Acquaviva L., and others: Program of Integral Land Use Management of the Bi-oceanic Corridor, Mountainous Segment between Potrerillos and Las Cuevas. Agreement between the Center for Territorial Strategies for MERCOSUR (CETEM), National University of Cuyo and the Provincial Government, Volume I. Mendoza, 2000.

67 Five workshops were held, allowing the population to choose the location of the villa, the lot that they agreed upon, according to their type of activity, the model of housing and the financing they could comply with. As a basis for credit, an evaluation was recognized on the construction each had made in the zone without provincial government support for the personal contribution to the patrimony of the villa that would henceforth remain submerged.



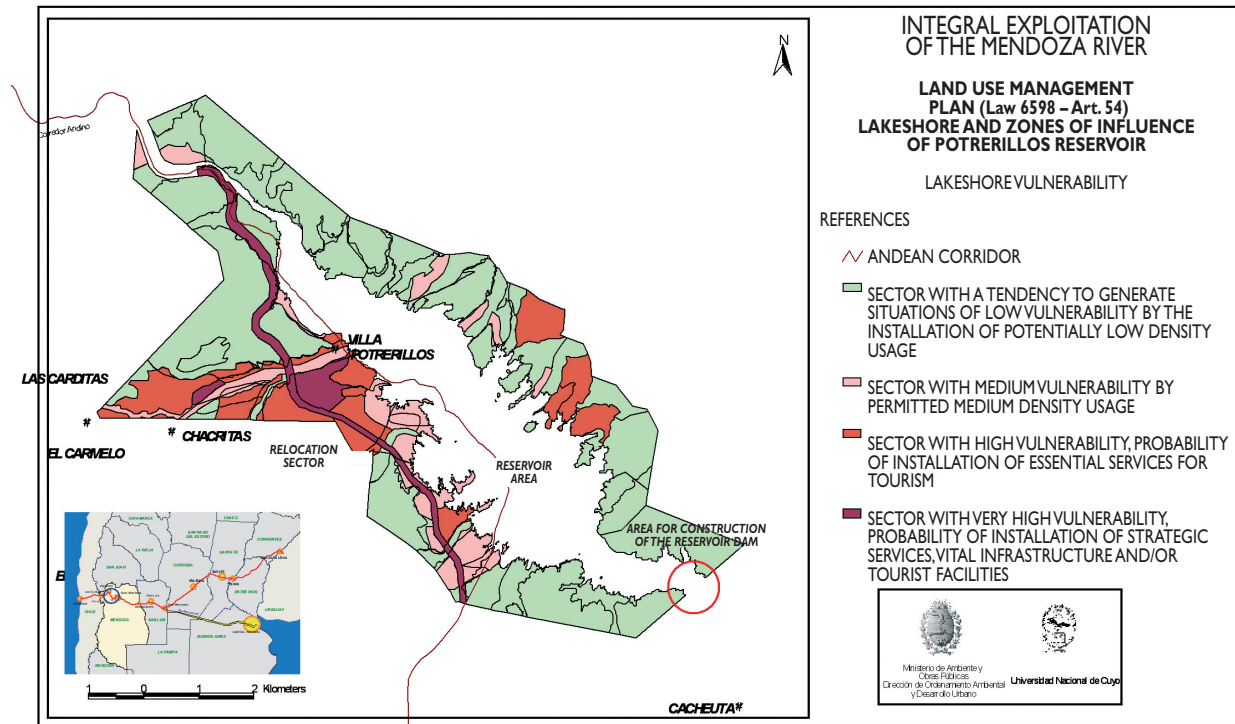
SEVERE EROSION OF SLOPES THREATENS THE ANDEAN CORRIDOR AND THE RIVER.

Below International Route No. 7 and the Mendoza River (prior to filling the lake) in the locality of Potrerillos. 1,500 to 2,000 trucks/day move through this area; 30% transport hazardous materials. The river supplies water for all uses, to 1.4 million people downstream.



CONSTRUCTION OF THE POTRERILLOS RESERVOIR DAM

Photo taken in 2001



LOCALITIES, ROADS, AND LOADS EXPOSED TO THE DANGER OF AVALANCHES IN THE WINTER, LANDSLIDES IN THE SUMMER AND HAZARDOUS MATERIALS TRAFFIC THROUGH THE INTER-ANDEAN CORRIDOR THROUGHOUT THE YEAR.



The analysis made it possible to understand that very clear directives must be given for development in this area due to its critical nature:

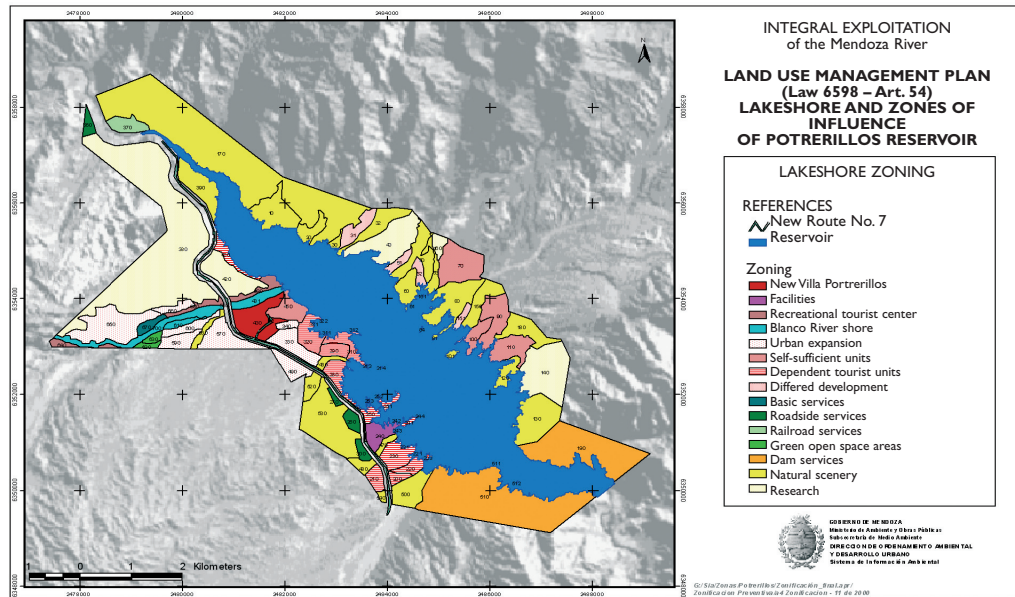
1. Good soil is a scarce commodity and its **conservation** is indispensable.
2. Much of the best soil aptitude areas should be assigned as **reserves and protected areas** (54%).
3. A high percentage of usable areas should be the object of **mitigation measures** (60%).
4. Where carrying capacity is low, contractual obligations with investors should prevent its use.
5. The NORTH SHORE implies a considerable effort for investment in **infrastructure and services**.
6. There is a good percentage of land suited to STU in the hands of the provincial government.
7. A margin of 100-200 m. should be set aside as a **shoreline exclusion zone for public use**.
8. A strict but flexible **MANAGEMENT PLAN** is needed.
9. Intelligent **ZONING** management is indispensable.
10. The **WATER, ENVIRONMENT AND RISK MANAGEMENT** plan is basic.
11. There is a concrete possibility of developing **ECOTOURISM**.
12. It is indispensable to start a campaign of **education and awareness** for the future users of the reservoir (direct and indirect) and its shorelines.

As a consequence, **the principal guidelines** for this plan were as follows:

1. Recommend mitigation measures and preventive actions directed at reducing the negative environmental impact to acceptable levels, that is, levels that can be managed thanks to their economic feasibility with the resources that can be obtained in the zone.
2. Complement the measures of reparation and/or compensation, when situations or environmental damages happen that, by their nature, cannot be mitigated.
3. Manage the risk within the zone, reducing the potential vulnerability through preventive measures and adequate land management, which is included in every development project, both public and private.
4. Clearly identify the actors responsible at each level (national, provincial, local, community, NGOs, and others) to precisely define the reach of each sector in the implementation of each of the actions put into motion.
5. Establish schedules favoring the coordination and articulation of these responsibilities.
6. Establish controls and monitoring devices based on relevant indicators, for follow-up of the forms of installation and the development of the tourist or other activities that are developed in the area.

The activities and actions recommended are organized in two documents:

- A - The Lakeshore Zoning Decree:** Defines the approaches to, and the manner in which, implementation should be taken into account when facilitating the assignment of zones approved in the norm.
- B - Definition of Sub-programs of Action:** The object of these sub-programs is to organize the thematic aspects and to define the types of projects that will be necessary and beneficial to initiate in each instance.



SUB PROGRAM	CENTRAL ISSUES	SPECIFIC ISSUES	PRODUCTS	OBSERVATIONS
1. LAND USE MANAGEMENT: URBAN CODE	Standards for designing infrastructure Basic and general services Norms for urban development Forms of access to land Development of dry lands	-Control and use of soil -Updating land use management -Control of the demographic development process -Control of the process of occupation for economic activities -Conservation of the historical cultural patrimony	CODES FOR URBANIZATION CONSTRUCTION LAND PARCELING ADVERTIZING	Updating the zoning and land usage norm
2. ENVIRONMENTAL MANAGEMENT	Environmental development Information generation Environmental monitoring and follow-up Legislation	-Information (organization) -Definition of environmental quality (laws, decrees, ordinances, etc.) -Environmental Monitoring and control, especially agrochemical use, and others -Inter-institutional coordination -Adopted legislation	MINIMUM LAYERS OF INFORMATION TO BE MAINTAINED -RESPONSIBLE AUTHORITY IN EACH CASE -CHARACTERISTICS OF DESIRED ENVIRONMENTAL DEVELOPMENT	List of codes and standards -List of responsible organizations -Forms of coordination
3. RISK MANAGEMENT	Risk prevention plans Contingency plans	-Control of massive erosion processes -Control early warning networks -Monitoring seismic risk -Monitoring alluvial risk -Fire prevention -Control of hazardous cargo circulation -Vigilance over water quality	PROPOSALS FOR PREVENTION PLANS PROPOSALS FOR CONTINGENCY PLANS	Norms for developing: -Structures -Services -Infrastructure -Circulation -Inter-institutional relationships
4. NATURAL RESOURCE MANAGEMENT	Flora and fauna management Weed management Vector management Biomass removal Biodiversity Recovery and maintenance of bio-systems	-Forestation control -Fishery management -Natural areas management -Fishery development management -Native animal species management -Management of reserves and protected areas	- NORMS FOR MANAGING EACH CASE - APPLICABLE AUTHORITIES	-Lists of codes and standards for each case. -List of responsible organizations -Forms of coordination
5. EDUCATION AND SOCIAL COMMUNICATIONS	Environmental education: formal and informal Systems for dissemination Information and consultation center Mechanisms for participation and consulting	-Mechanisms for environmental education -Mechanisms for tourism promotion: generation of ideas -Proposed plans -Workshops and seminars -Ecological brigades -Special schools: park rangers, others	-NORMS OF SOCIAL PARTICIPATION -FORMS OF PARTICIPATION IN EDUCATION -FORMS OF DISSEMINATION AND CONSULTATION	-Minimum list of programs to be developed -List of NGOs in the zone -List of consulting NGOs -Forms of connection with formal educational programs

An active effort was made with the risk management program, preparing the preventive plans and the contingency plans for the area as a whole, in the context of the land use management policy. Most importantly, detailed documentation was prepared for the individual management of each type of hazard found in the area.

These were the tools for establishing the coordination with each of the investors who would be responsible for overseeing the maintenance of security and the reduction of risk in the zone or parcel intended for occupation under the control and assessment of specialized DOADU personnel.

FLASH CARDS ELABORATED FOR RISK CONTROL IN EACH LOT

<p>HAZARD MUD AND WATER SLIDES</p>	<p>HAZARD WILD FIRES</p>
<p>DESCRIPTION Hydrological phenomenon originated by convective storms, usually in the summer season, in areas with important slopes and low vegetative coverage</p>	<p>DESCRIPTION: Socionatural phenomenon associated with low humidity and high temperatures, electric storms and/or caused by human acts</p>
<p>TYPES / DEGREES: -Landslides in permanent river beds: Mendoza River – Blanco River -Landslides in meandering river beds: Cacheuta River – Larga and del Toro Streams – others</p>	<p>TYPES / DEGREES -Natural -Man-made</p>
<p>ASSOCIATED HAZARDS -Erosion -Desertification -Outlet sedimentation</p>	<p>ASSOCIATED HAZARDS -Strong winds -Desertification -Electrical storms</p>
<p>EXPOSURE: Permanent inhabitants, people in transit, tourists, workers Critical installations: potable and waste water networks, electric power lines, roads, bridges, railroads, telecommunication installations, areas of human concentrations, safety installations, community facilities Buildings: private and rental residences, tourist facilities Others: archeological and paleontological patrimony</p>	<p>EXPOSURE: Permanent inhabitants, people in transit, tourists, workers Critical installations: potable and waste water networks, electric power lines, roads, bridges, railroads, telecommunication installations, areas of human concentrations, safety installations, community facilities Buildings: private and rental residences, tourist facilities Others: archeological and paleontological patrimony</p>
<p>AGGRAVATING FACTORS Occupation of natural riverbeds, Alteration of the topography, Destruction of native flora Processes of desertification, high impact sports</p>	<p>AGGRAVATING FACTORS -Destruction of native flora -Processes of desertification -Uncontrolled recreational activities -Arson</p>
<p>PREVENTIVE PROGRAM EDUCATION: Including prevention in the training programs of personnel at all levels. INFORMATION: Dissemination and problem awareness programs for the permanent and transitory populations</p>	<p>PREVENTIVE PROGRAM EDUCATION: Including prevention in the training programs of personnel at all levels. INFORMATION: Dissemination and problem awareness programs for the permanent and transitory populations</p>
<p>MITIGATION MEASURES</p> <p>Structural -Construction of defenses and dams -Stabilization of mountainsides</p> <p>Non-structural -Micro-zoning - Norms for the protection of native flora and soil - Infrastructure maintenance - Norms for preservation of the natural drainage network - Limitation of activities - Monitoring and early warning: measure precipitation, occurrence of storms.</p> <p>Augment the existing mountain base system.</p>	<p>MITIGATION MEASURES</p> <p>Structural -Fire lines -Fire lanes (minor roads for access)</p> <p>Non-structural -Plans identifying areas prone to being affected by this phenomenon -Permanent monitoring and early warning system</p>
<p>CONTINGENCY -Evacuation plan</p>	<p>CONTINGENCY -Evacuation plan</p>

A management plan was also drafted for the entire area with the necessary intersector and interinstitutional collaboration. A plan for tourist development was elaborated with the full participation of the tourism operators from the region and the area's resident population. This issue is temporarily under the responsibility of the Provincial Ministry of Tourism and Culture.

The first plan has already been approved by the Chamber of Legislators of the Mendoza Provincial Legislature;

it has been forwarded for review in the Chamber of Senators, and was expected to be passed into law at the beginning of 2007. This plan regulates all acts along the lakeshore. The reduction of potential vulnerability and especially all aspects of preventive risk management integrated into the land use management policy play an important role.

The project of a special management organization for the lakeshore area, whose creation was indispensable,

taking into account that the zone is under shared jurisdiction, is also in discussion in the Legislature:

- Under provincial law, the responsibility of land use management on the lakeshore falls on the provincial government;
- The lands are under the jurisdiction of two municipalities (Las Heras and Luján) who retain police powers;
- The management of bodies of water in the province falls under the auspices of the General Department of Irrigation, which has constitutional rank, independent of the provincial government.

These institutions form a part of the new organization, which will be able to carry out the project in its totality, without legal or institutional interference.

The new Villa of Potrerillos was built on its assigned parcel and delivered to its inhabitants in 2003. This allowed them to begin filling the reservoir in the summer of 2004, and it is now in full operation. The complementary civil works are still in the process of construction,

especially the lakeside roads and the topping out of the dam that are more expensive due to the topography of the zone.

The public bidding process for the international Trans-Andean Railway project that crosses the zone is now in process. The arrangement for locating the **transfer station just outside Potrerillos**, to the south of the locality of Cacheuta, came about precisely because of the vulnerability that it would generate in the tourist village that is being developed. We must consider that the traffic flows through the Andean Corridor, both by road and expected rail, have a component of 30 to 40% hazardous materials or dangerous substances.

For the same reason, the international highway was located at a prudent distance from the villa.

In synthesis, we can consider that this project took into overall consideration the approach of land use management and risk management as a basis for the construction of territorial policy. In spite of its complexity, both disciplines worked in a coordinated manner in support of the overall process, both in the analysis/diagnostic phase, as well as project formulation and execution.

The foundation for success was in achieving:

- Adequate training for the project team involved, both in matters of land use management and risk management;
- Timely insertion of the knowledge accumulated by the land use management and risk management professionals in every stage of the project;
- A permanent flow of information toward both the different institutions that participated in the process, and toward the community involved and the political establishments that were to make the decisions;
- Strong management that constantly leaned toward coordination between these two perspectives.

The clarity of the information and the permanent flow of communication allowed for decisions to be made more rapidly and, above all, for each of the participants (professionals, institutions, community groups, suppliers, legislators, investors, etc.) to adopt the project as their own, upon seeing their opinions and contributions reflected in the varying components of the plan.

It is necessary to point out the invaluable role of the communications media, which were always invited to the meetings. They broadcast information to the community, precisely and with a solid foundation, making the job of the territorial managers, and above all, that of the risk managers, much easier by giving a view of building security by all concerned, and not of a view of irreversible hazard in matters of risk.

5.4 Combined and Joint Formulation of Normative Instruments

Land use management is basically a **public policy** for the public sector to achieve through concerted and coordinated planning, a **process of collective building** that leads to improving the organization of the territory, the quality of life, competitiveness and sustainability, providing harmonic development for the different regions in the context of a framework of political governance and social equity.

Most importantly, it establishes the need to combine and complement through solidarity with authority and that of territorial entities in a context of globalization of the relationships.

The complexity of the framework for action makes it necessary to create a set of regulatory stipulations set up through a series of norms that focus the interventions to be made, and give permanence and continuity to the land use management process.

In general, we can point out the existence of two types of land use management:

- **General norms** oriented toward precipitating the land use management process. Section 4.4.2.1 gave us a preview of the definition of this type of norm, since it showed the characteristics and functions of the law governing land use management, a general framework law that obliges us to initiate a continuous process of land use management under special conditions.

It sets general objectives, the types of policies to formulate, the organizations to be involved, the coordinating elements, the participation, the types of documents that are produced and accepted at the intervention level, the obligations and responsibilities according to the levels of government, and the penalties, etc.

This norm is generally accompanied by a law or regulatory document that facilitates its implementation and the successive process of its modification or amplification.

- **Generic norms** cover the implementation of the land use management policy in order to reach the established objectives. In this second group of norms, we find three fundamental types:
 - **Administrative regulations** involved with the conditions under which the administration should make its decisions as to under what conditions fiscal incentives are to be applied, how development organizations are recognized, what impacts to land areas are produced, land expropriation and sale processes, and the administration of value-added situations among the many problems that emerge when one develops land use management plans and their implementation.
 - **Special regulations**, which in general include regulations regarding the conservation of natural resources, environmental management and risk management – conservation and ecosystem development, declarations of patrimonial interest, patrimonial reserves, emergency management, prevention systems, and alerts, etc. This scenario also includes the norms that regulate land use, the determination of areas as zones for extension of human activity and facilities (zones apt or not for urbanization, hazardous zones, etc.) that are related to the criteria adopted in previous regulations.
 - **Regulations for public works** constitute comprehensive norms that regulate the distribution and creation of facility networks (those of primary and secondary road connections, ports, airports, etc.), the regulations covering urban facilities for transportation, industrial and technological development, sanitation, and the provision of basic infrastructure, health and educational networks, etc.

Regarding these regulatory frameworks in Latin America, we can find two types of situations:

1. **Countries with general norms**, that have a law for land use management as is the case of Colombia and Venezuela. From this we get in a cascading form the other regulations that commit the institutions that are involved, and include a large number of generic norms that cover the details mentioned albeit in the context of a general norm that serves for control and as a permanent point of reference.
2. **Countries with no general norms but which have generic norms** that are in fact, used for organizing the territory.

It is evident that **linking risk management to land use management** – both for installing risk management and for carrying it out in the context of land use management – can be done with greater assurance of success in the context of the first type of countries because there is already a systematic legal framework in place that obliges them to practice land use management, define the form of implementation, and thereby generate an atmosphere propitious for the inclusion of the preventive actions and planning necessary for reducing vulnerability and managing risk in an integrated and clear manner.

Does this mean that in the rest of the countries it is impossible to link risk management to land use management?

In reality, it is possible, but this action will be subject to the level of development each of the countries has attained in the area. The answer to this question is not easy because the range of situations covering acceptance and use of land use management, as we have mentioned, is so broad that it will, no doubt, be a job with many random results.

In practice there is a third alternative, which is the tendency seen in most countries – land use management plans formulated on differing scales, and put into practice and executed on a regular basis in spite of the fact that the country has no land use management law. In these cases, **land use management plans generate a normative framework** that complements the plans, and that in themselves constitute a means for giving shape to an ordered process, and therefore are an organic set of

regulatory measures for land use management as in the case of the example of Potrerillos cited above.

In this context, we can identify a special norm that obliges us to formulate and adopt the land use management plan. It establishes general and subsidiary norms – the plans and proposals for land use management themselves contain a normative character that can be obtained through special norms.

Therefore, to be able to insert risk management into this type of land use management situation, it is necessary and advisable to:

- Take a detailed inventory of the available land use management and risk management norms;
- Identify the legal and normative voids in this context;
- Produce the necessary land use management norms and insert risk management norms into them;
- Take into consideration the fact that a minimal set of administrative norms is available, along with the necessary special regulations and public works, norms for monitoring the process and norms for defining police powers responsible for carrying out and controlling the plans.

One should be especially careful to generate norms that are characterized by their **clarity and ease of administrative management**. To do this one should adopt a sequential and articulated form – as with the general laws – to produce a referenced text where it is easier to find the regulations you are looking for, and to avoid their being added in a random fashion.

These norms will adopt the appropriate judicial forms, according to the level of committed decision-making: ordinances, decrees, etc., and should respect the Constitution and the general, higher-ranking norms of each territory.

In summary, to formulate and execute a land use management plan, you will find a body of norms connected to:

- a- Definition of the territorial environment,

- b- Specific criteria for regulating land usage,
- c- Conditions for building,
- d- General norms for regulating the use and expansion of useful lands, and
- e- Zoning and development norms for the formulation of plans, programs and projects.

This list does not contain all of the issues that should be regulated. It simply covers the most common issues and those that absolutely must be dealt with in a land use management plan.

Among them, one should include the norms and recommendations on risk management to guarantee a sustainable development of the territory. There is a table attached to the following page dealing with this subject.

The norms detailed in the table must be supported by a clear set of laws that permit the use of **four basic tools** that serve to formulate, implement and operate land use management policy with risk management:

- f- Norms that create flexibility in the relationship between society and the public sector to facilitate the responsible **participation** of the community in the processes of land use management and risk management;
- g- Norms that regulate the **training** of professionals, technicians, administrators and the community in general on matters of land use management and risk management in order to improve the knowledge and awareness of society on the advantages of jointly using these tools;
- h- Norms that regulate linkage to the available **dissemination and telecommunications** media to insure the insertion of the issues, and informal education of participating groups into the processes of land use management and risk management;
- i- Norms that clearly regulate production, integration, use and access to **information concerning territory, environment and risk** to reduce the levels of uncertainty in which the land use management and risk management processes currently operate.

CONTRIBUTIONS OF LEGISLATION TO THE PROCESS OF ARTICULATION BETWEEN LAND USE MANAGEMENT AND RISK MANAGEMENT (according to specific issues dealt with by territorial policy)				
Issues on which norms are based	Knowledge of the territory	Knowledge of the risk	Risk reduction/ management	Organization for joint management of land use and risk management
a- Definition of the territorial context	<p>- Defines:</p> <ul style="list-style-type: none"> • The involved territorial context and the jurisdictions that it comprises; • Scope of the LUM norm and its links to other norms; • Conditions for the modifications of the LUM plan; • Conditions for handling the situations prior to or outside of the norm: corrective plans, acts subject to licenses, permits, bids, etc. and procedures to regulate them; • Ways to finance the activities. 	<p>- Defines the possibility of identifying:</p> <ul style="list-style-type: none"> • The structure of the risk; characteristics, distribution, dynamics; • Trends for development of potential risk situations (initial synergy trends); • Population involved; • Activities affected; • Dimensions of the problem. 	<p>- Points out:</p> <ul style="list-style-type: none"> • Conditions of the norms connecting land use management and risk management; • Conditions for managing situations prior to or outside of this norm (corrective plans). <p>- Allows for designing:</p> <ul style="list-style-type: none"> • Risk management projects; • Participation of responsible groups; • Risk management plans (prevention plans). 	<p>- Defines:</p> <ul style="list-style-type: none"> • The responsible and/or functioning administration; • Authority of each; • Circumstantial surroundings in which the actions are applicable; • The synergy between land use management and risk management actions.

CONTRIBUTIONS OF LEGISLATION TO THE PROCESS OF ARTICULATION BETWEEN LAND USE MANAGEMENT AND RISK MANAGEMENT (according to specific issues dealt with by territorial policy)				
Issues on which norms are based	Knowledge of the territory	Knowledge of the risk	Risk reduction/management	Organization for joint management of land use and risk management
b. Specific criteria for regulating land use	<ul style="list-style-type: none"> - Defines concepts and modalities for typifying: • Land areas to be occupied apt for urbanization, extension, reserve, etc; • Land areas that are inappropriate for development (urban, rural, etc.); • Reserve land areas according to their dominant usage. 	<ul style="list-style-type: none"> - Defines the possible land use patterns: • Occupation with and without risk; • Land areas with acceptable risk that may be used; • Land areas that should not be occupied (inappropriate, dangerous, etc.). 	<ul style="list-style-type: none"> - Allows identification of: • Critical areas for application of corrective or preventive measures; • Characterization of environmental resilience; • Characterization of capacity for social adaptation and response. 	<ul style="list-style-type: none"> - Facilitates the definition of: • Special conditions for land use regulation: acquisition, cessions, expropriations, land value of land, etc.; • Structuring, classification and zoning of land use (adjustments and boundary definition, types of soil, etc.)
c. Conditions for building	<ul style="list-style-type: none"> - Establishes regulations for identifying: • Conditions of natural inhabitability; • Land use limits (carrying capacity); • Limits to building height; • Occupation density in the zones; • Occupation density in the parcels; • Minimum land areas and norms for the creation of parcels. 	<ul style="list-style-type: none"> - Enables the definition of: • Norms for accident prevention: fires, environmental security, etc. in the built environment; • Safety norms during construction; • Safety norms after construction; • Structural strength indicators for special buildings, etc. 	<ul style="list-style-type: none"> - Allows for calculating: • Critical loads for persons and activities; • Actual availability of an area for building construction in safe and low risk conditions; • Possibilities of reducing the vulnerability of buildings in risky environments (seismic zones, alluvial zones, etc.); 	<ul style="list-style-type: none"> - Allows for formulating: • Building codes; • Urbanization norms; • Urban safety codes; • Fire prevention codes for residential buildings and other uses (industrial, public services, etc.).
d. General norms for regulating the use and expansion of habitable lands	<ul style="list-style-type: none"> - Allows for making predictions on: • Reserve areas for urban expansion; • Areas for rural preservation; • Areas for natural resource preservation; • Areas of special management and/or differentiation. 	<ul style="list-style-type: none"> - Facilitates the effective occupation of: • Areas with acceptable risk; • Varying uses (residential, industrial, services, etc.). 	<ul style="list-style-type: none"> - Allows basing calculations on: • Land area needed for the expansion of the population, activities and infrastructure; • The demand for basic services (water, energy, etc.). 	<ul style="list-style-type: none"> - Allows establishment of schedules for: • Immediate secure zones for occupation; • Differed occupation of areas with acceptable risk.

CONTRIBUTIONS OF LEGISLATION TO THE PROCESS OF ARTICULATION BETWEEN LAND USE MANAGEMENT AND RISK MANAGEMENT (according to specific issues dealt with by territorial policy)				
Issues on which norms are based	Knowledge of the territory	Knowledge of the risk	Risk reduction/management	Organization for joint management of land use and risk management
e. Norms for zoning and development formulation of plans, projects, etc.	<ul style="list-style-type: none"> - Establishes the regulation necessary for: • Formulating land use management plans; • Defining model projects (desired scenarios); • Selecting alternatives for optimized territorial organization; • Defining territorial policies to be implemented; • Designing territorial plans and projects; • Identifying responsible public and private actors for land use management actions; • Defining financing models; • Establishing necessary legal frameworks; • Identifying levels of execution; • Identifying levels of inter-institutional coordination; • Identifying monitoring and control systems. 	<ul style="list-style-type: none"> - Establishes the necessary regulation for: • Formulating risk management plans; • Corrective, preventive and contingency; • Establishing programs and projects for vulnerability reduction; • Establishing adequate distribution of activities and population in land use approaches of acceptable risk; • Plans and programs for risk management; • Programs for risk monitoring and control; • Early warning systems. 	<ul style="list-style-type: none"> - Allows for establishing details on: • Critical areas due to exposure to multiple hazards; • Vulnerable population by level of exposure; • Risk scenarios in the territory to be planned. 	<ul style="list-style-type: none"> - Allows for incorporation of: • Land use management plans that include the risk variable in each of the stages of development planning; • Intervention actions focused on sustainability; • Investment plans that consider risk as part of the cost of the process (included and quantified).

5.5 Control Instruments, Evaluation and Follow-up

The monitoring and evaluation system is elaborated for the purpose of determining whether, on one hand, the land use management activities are being implemented according to the **objectives** being pursued, and on the other, the **level of administrative fulfillment** of the activities projected by the plan.

In order to control this process, which links directly to the action plans to be developed in each region, these documents are considered general guidelines for the overall jurisdiction, and should then flow to each of the lower jurisdictions and be adjusted to their realities. The activities of monitoring and evaluation should be carried out in a coordinated manner among the actors involved

in executing land use management and the organizations of civil society. They are directly associated with the definition of a **FRAMEWORK OF RESULTS** of the development, and the execution of land use management and risk management.

The design of the monitoring plan begins with the activities of the **operating plan** (general plans, specific plans, corrective, development, conservation policies, etc.) that are habitually expressed in concise and explicit form in the established **work schedule**.

It is necessary to define the manner in which the acts, actions and implementation of land use management and risk management can be clearly recorded in an adjusted, timely and continuous manner. To do this, one should identify, among other issues, not only **information**

sources and reliable systems for information collection, and elaborate specific **indicators**, but also identify the persons **responsible** for the control process, defining the type and frequency of reports, etc.

The availability of innovative information technologies and the formidable progress of the communications and information media currently allow us to include monitoring and evaluation in the implementation of territorial information systems linked to land use management and risk management. The information systems are thereby converted into instruments that are useful not only in collecting and accumulating data and producing information for the different elements of the land use management plan, but also vital **as an information system for management**, that is, as a tool for monitoring the process under a framework of consensus and mutual commitment among the institutions, which guarantees the viability of these initiatives.

It is easy to see that the processes of territorial planning in Latin American countries stagnate in their early stages. The diagnosis and formulation of the land use management plan, and in some cases, its implementation, are not always completed according to the proposed plans, which rarely include the tools for control and evaluation.

This is partially the fault of established land use management processes themselves, given that these plans frequently fail to identify responsible actors, define concrete goals and formulate **control indicators** that support the follow-up of activities. It is impossible to guarantee the impact of the actions, the correct execution of the implementation, the efficiency in assigning economic resources, and the evaluation of results.

Neither will it be possible, then, to make any type of claim as long as the parties responsible for the acts and the reasons why the interventions failed cannot be identified.

Another thing to consider is that the objective of the follow-up is not only control, but also the **learning that one gains by evaluating what worked and what didn't**. It is necessary to understand that the monitoring and evaluation plans in the process of land use management are directed at much more than the simple act of

administering control over what is being done. The following questions are often asked: Were the programmed actions carried out? Was the budget item executed? Was everything submitted in the proper form and on time?

It is more interesting to ask: Are the activities being carried out at their optimum level of quality? Were the budget items executed efficiently? What is the tendency of the demand for attention in land use management services at the provincial and municipal levels? Is the personnel well trained? Is there good response on the part of the users and the community? What is the level of social participation that has been attained? Has there been a reduction in vulnerability? Is there awareness of the need to recognize risk, etc.?

The first group of questions responds to the common use made of monitoring **administrative control**. This results in a partial and fragmented idea of management's fulfillment of the achievements, indicating only completion of this or that activity.

The second group of questions is oriented more toward **management's fulfillment of the objectives** in an integrating vision of the processes in function of the final products of land use management and risk management, and now aimed at analyzing the process, and therefore, **decision-making**. The idea is that this type of integrating vision of the processes in function of the final products of land use management and risk management activities allows the process, if necessary, to be reordered, re-orienting the actions that are off the mark of the objectives, and gradually conducting the process toward the foreseen goals in the land use management plan.

In this sense, for example, in Colombia and in Costa Rica they are using an experimental information system called "**follow-up**" for these tasks. It is a tool developed by Microsoft Access 2000, which allows for monitoring, evaluation and follow-up of partial and final management and execution results of the actions contemplated in the land use management and municipal development plans based on the policies, programs, projects, goals and indicators as formulated in those plans.

This tool is being tested in the process of evaluating and monitoring the Basic Plan for Land Use Management

and Municipal Development of Puerto López (goal); however it can be conveniently adapted to any other planning instrument, whether it be integral or sectoral. The single condition is that it be formulated completely, that is with its policies, programs, projects, strategies, goals, responsible persons and indicators. Each user can use the tool and introduce his or her own information through modules, sequential templates, and published final reports to make the respective analysis with which it is possible to hold technical workshops with the staff, the councils, and the communities, etc.⁶⁸

The monitoring program, conceived with this strategic focus, deals with improving on a passive and bureaucratic vision of this activity, and is characterized by:

- Being an information instrument for enabling the implementation of a strategic, continuous and permanent direction of the process of land use management and risk management and also being the generator of the information most useful to the administrator;
- Providing information for management evaluation of both land use management and risk management processes;
- Contributing to the creation of a combined unit of the two in the operation of the management process.

Each of the activities that make up an operational plan for land use management generally has its own evaluation entity for each activity, which facilitates the identification of its **partial achievements**.

The criteria detailed above, however, will allow an evaluation of how the **process** has been carried out, and whether or not it has worked according to the objectives and goals established in the operation plan. Here participants will see the fulfillment of the **planned goals** in the operation plan, where the forms of control used to evaluate the efficiency of the land use management policy combined with risk management should be foreseen.

6. TERRITORIAL DYNAMICS AND ACCUMULATION OF RISK IN TERRITORIES UNDERGOING CHANGE

6.1 Accumulation of Vulnerability in the Territory

The process of reflection developed up to this point shows new approaches to facing the problems that Latin America is facing today as it undergoes profound changes in its territories accompanied by certain opportunities of growth in competitiveness that result in **accumulating vulnerability and risk**.

Why do emerging regions become more vulnerable with territorial transformation? In the case of Latin America, we can see a clear functional territorial relationship between market zones-networks-urban services-mountain passes that combine to define a competitive unit. Therefore, the opening of new regions and their incorporation into the markets substantially modifies their structure. That is where we need to start our research, establish land use management projects, make environmental predictions and most importantly, reduce their

68 What are the steps in the “Follow-up” tool? The tool has the following modules:

- Main menu: Allows you to select the type of plan to evaluate: Land use management plans or development plans.
- Definition of policies: Select each of the policies or dimensions of the development with its respective objective.
- Definition of programs: Define the programs or packages of actions for each of the policies.
- Detail of programs: Identify the projects and/or concrete actions within each program.
- Definition of goals: Define the goals for each project, establishing for each, when and how much you expect to achieve.
- Definition of indicators: Define the indicators and the responsible persons to facilitate future evaluation and monitoring of the plan.
- Reports: Allows you to print the reports by module and make the corresponding analysis.

Publication:

Jiménez, M.F., Jaramillo, J., Pineda, R., Beaulieu, N. (2004) User manual for “Follow-up” tool for following up on the plans for municipal development.

vulnerability to disasters, because many of these projects are fragile, prone to rapid deterioration and produce critical combinations that can unleash disasters.

These regions are **tropical areas** with great wealth in **forests, mountain passes**, dynamic **urban areas** well placed in the new networks, **zones with accumulated strategic resources** that can help regions and countries compete in their national or international markets. This is only to mention a few, since **coastal areas** and **river basins** and many other zones also can become critical areas.

When one starts to work with these issues of combining land use management and risk management, a whole set of difficulties limiting the response of the countries and their respective public and private organizations comes to light. The most important of these difficulties can be seen in the projects that have been set in motion in different countries with contributions from governments and international organizations, and are concentrated around the following observations:⁶⁹

- **Territorial information is poor and sometimes non-existent.**

Even when some countries have hosted important regional studies, with the backing of international organizations (OAS, UN, WB, IADB, etc.), to launch infrastructure projects for integration and production, most of the territorial and environmental information is dispersed, fragmented, incomplete, and almost always prepared with selective criteria and inconsistent organization. In practically no case are territorial and environmental matters treated in an integrated form and even more rarely is mention made of natural, technological or human organizational hazards that would allow for evaluating the vulnerability and calculating the risk of new investment projects.

This is the situation that led us to foresee and designate a line item in each project, especially in **highway**

projects (the class of project that commits the greatest number of regions and countries) specifically aimed at evaluating the environmental impact through the preparation of an environmental impact analysis (EIA), since many countries lack updated and reliable databases to consult when designing these projects. As a consequence, the EIA is frequently the only document available for developing territorial projects. However, this is no solution to the problem, since for economic reasons EIA studies are usually elaborated considering only the area of **direct impact** of each intervention or project.

For example, in the case of highway corridors, a strip of land between 200 and 500 meters on either side of the future roadway is included in the study, giving an imperfect and incomplete view of the environmental and social responses that one can expect from the **area indirectly impacted** by the roadway in the medium and long term. This is important to point out because in most cases these highway corridors transverse new areas that are being incorporated for the first time into production. Consequently, their ecosystem structure and function and risk levels are not well known.

With this approach, we find the risks created by the projects in their own context, but it makes it very difficult to calculate the **foreseeable risks** that accompany the project once it goes into operation. We can expect these risks to appear as **unforeseen costs** that are incorporated into the companies' cost of transportation (highway closures due to heavy snow, torrential rainfall, damaged bridges, etc.), the insurance companies (loss of cargo, lives, etc.), and at times, these costs are distributed throughout society when they are very high (losses from floods, earthquakes, etc.). Some costs can never be recuperated (loss of potable water supplies, fertile lands, indigenous communities, opportunities for development, etc.).

- **Environmental studies apply a method of evaluation and generalized standard procedures, in spite of the diversity of the territory.**

69 These concepts were also defined as a phenomenon associated with the subject of environmental management. In Gray de Cerdán, Nelly: Hemispheric Plan: Guide for Sustainable Management of Transportation Corridors. Department of Sustainable Development of the Organization of American States (DSD/OAS): Chap. 2 and 3. Washington, D.C. 1998.

We can see that in major investment projects, as well as in many small and medium undertakings, there is a structure of homogeneous organization in the environmental studies, which use the same concepts to deal with different environments: urban zones, deserts, rural or mountainous areas, etc. This would indicate that the **objectives** of territorial projects are **prevalently macroeconomic**, and linked to the availability or existence of certain resources, a flow of benefits, an assignment of land use, incentives for investing in determined activities, etc., all of which at times have direct negative effects on the environment or at least diminish the effect of environmental policies in the medium term.⁷⁰

There is very little or no interest in learning about the impact of territorial processes and the situations of risk to be unleashed by each investment or the levels of vulnerability that will be added to the existing environmental deficits. Environmental studies often are mere copies or scraps of previous studies.

As an example, we can recall the recent problem caused by the construction of the **Potrerillos dam**, whose development was analyzed in Section 5. It was constructed between 1999 and 2003, generating a surface area measuring 12 km in length and 3 km in width in an extremely complex and vulnerable Andean mountain range zone, due to tectonic (very high seismic activity), climatic and geomorphological phenomena, as detailed previously.

This civil works project was constructed on the Mendoza River, which supplies a rich productive oasis for more than 1.4 million inhabitants downstream, who depend on this water collected from the mountainous zone. For the construction project, the usual studies were carried out (geological, soil, climatic, sedimentation, etc.). The declaration of environmental impact⁷¹ was approved, and the work began. After reaching almost the midpoint in the dam construction, however, a layer of very fine material

that was the base of the dam itself was detected. This situation created doubts about the safety of the wall under construction, and introduced an issue as to the safety of the population at the center of the problem. They should have turned to international consultants and specialized companies to evaluate the **level of vulnerability and risk that could be foreseen**, both for the civil works project and for the affected population.

Once defined – after a year of comings and goings – they decided to construct a complementary protective wall to reinforce what was already built. This delayed the filling of the reservoir by three years and meant a very high marginal investment for both the construction company and the provincial government ... But enormous levels of doubt remain in the community – will the dam really be safe? The safety and subsistence of more than 80% of the population of the Province of Mendoza, concentrated along this river, depends on it. On the other hand, the safety of the only working mountain pass from MERCOSUR to the Chilean ports of the Pacific also depends on it.

Generally speaking, the detailed environmental and territorial studies in Latin America clearly show the specificity and special configuration of certain ecosystems and territories, their different levels of assimilation of impacts and as a consequence, the impossibility of handling them with tools that fail to respect this diversity. It is not the same to organize a desert territory, a jungle zone, a mountainous area or a dense urban setting, especially when designing the study, when assembling the professional team, in the aspects to be retained and above all, in the policies to be developed and their operational costs. The situation is accentuated in Latin America, when we consider the **magnitude** of some projects, for example, the length of some corridors generally greater than 500 km, and the heterogeneity and dimensions of the different natural and human environments that a

70 "Macroeconomic policies are not neutral, from the spatial developmental point of view. To the contrary, the trend to generate important spatial modifications, as occurs, for example, with policies that modify employment and migratory patterns, or the location and degree of urban or rural concentration of industries. Considering this spatial dimension of sustainable development is fundamental for the management and improvement of the environment. It is enough to remember the enormous impact of constructing highways in the advance of agricultural frontiers and of the improvement of urban transport systems in the growth of cities. CEPAL: Sustainable Development. Productive Transformation, Equity and the Environment. UN, Santiago de Chile, 1991. p. 40.

71 The declaration of environmental impact demonstrated the need for managing the use of the land and evaluating the territorial impact. However, this was done along with the construction of the works and lost its capacity for foreseeing the consequences that those works could cause.

single commercial corridor connect both at the level of ecosystems and of policies for dealing with them.

If we take the example of the **Arica Corridor** (Chile) - **Santa Cruz** (Bolivia) - **Sao Paulo** (Brazil), we can see that over its more than 2,000 km distance, it connects the environments of three countries with very different legal structures and with extremely distinct natural and human habitats: coastal deserts, high mountains, tropical forests, deforested plateaus, very dense urban areas, mining, agricultural and industrial zones, indigenous reserves, etc. Each of these, because of their size, constitutes a heterogeneous set of impacts and responses (environment-corridor, corridor-environment), varying levels of potential vulnerability and risk, and, as a result, a set of heterogeneous and local policies for managing them requiring special studies to foresee their impact with any semblance of accuracy once the corridor is built.

This calls for a very dynamic dialectic between the introduction of the territorial/environmental dimensions and those of risk in the investment projects at the macroeconomic level, and the need to formulate and complement them with land use and risk management strategies at the local levels, which are not currently taken into account.

6.2 Public and Private Action in the Territory as a Generator of Vulnerability and Risk

6.2.1 Public Intervention Generates Situations of Risk

Environmental and vulnerability reduction policies are generally outside of the general plans of the public sector at an operational level, **isolated administratively and functionally from the policies of land use management and general planning**. For example, environmental guidelines appear at the level of each investment project, but in many cases include only

compliance with the minimum requirements needed to access national and international loans.

In public organizations we are also warned of the **paucity of multidisciplinary teams** capable of elaborating a context of reference for land use, environmental and risk management in the new as well as the older regions. Professionals have emigrated to the private sector thanks to the lack of stimulation from the public sector to retain them. This is another of the reasons that the EIA cannot be written by public agencies, and therefore are not available for the land use planning and management projects of many countries.

On the other hand, although plans are indeed formulated for land use management and risk management that address these issues, **territorial investment moves along other paths**. Underlying this is a combination of political and business interests intervening in these public works.

In particular, the distribution of tasks within the public administration apparatus conspires against the combination of land use management and risk management as proposed in this document, given that if indeed the major portion of the Latin American countries have national and regional offices that could carry out territorial policies (planning and programming offices, etc.), the institutions that are able to evaluate risk (offices of civil defense and civil protection, etc.), are designed to **attend to emergencies and function totally separate from those planning and programming offices**.

These offices are where contingency plans are drafted, where mechanisms of early warning, as well as mechanisms of vigilance and educational campaigns, etc., are established to provide aid and to improve the response of the population. But very few of them are able to carry out systematic studies to define the types of hazards, the vulnerable areas, and risk maps that could serve as a base for the design and evaluation⁷² of the projects for

72 Allusion is made here to three types of evaluation: evaluation of natural hazards (provides information on the location and probable severity of natural, technological or social phenomena, and the probability of its occurrence within a determined area and a specific timeframe); evaluation of vulnerability (estimates the degree of loss or damage caused by the exposure to a given hazard); and risk evaluation (estimation of the total or partial losses expected due to a dangerous event). (World Bank: Manual for Environmental Evaluation. USA, 1991.)

territorial intervention, although this approach tends to develop very slowly in some countries.

This situation demonstrates that in spite of the great effort made in this field, in Latin America there is still in many situations a **lack of awareness among public institutions as to the need to incorporate these issues into government programs and for clearly seeing their limitations**. This is described in detail by the World Bank and the IADB – the monopoly of the public sector, inefficiency of public agencies, lack of control and monitoring, mismanagement of funds, etc., and the need to overcome these faults through reforms in both public and private management processes.

6.2.2 Weak Community Participation in the Definition of Territorial Projects

In the newly formed regions, as well as in the older traditional regions, community participation is weak in everything having to do with decision-making. This area is unstructured and lacks motivation. It functions in an irregular and sporadic manner, according to each of the countries and regions. It has only been as of this decade that there has been a generalized awareness of the need for active community participation in the organization of its territory. This can be seen in the educational programs and in the recent aperture of certain national and local governments to work with organized social establishments, as a result of the public sector's inability to assume the costs of territorial development (providing basic and productive infrastructure).

Although we can verify a strong social movement in Latin America, stimulated by international organizations, we can see that the greatest efforts have been and continue to be oriented predominantly toward overcoming poverty and activating the underutilized human resources in each system. Agricultural activities, identification of areas with special needs, attention to health care, and access to education and housing are priority motives for social organization in most of Latin America.⁷³

Territorial issues seem to be **linked** to them, but only occasionally are there instances of participation in drafting investment projects. These projects are reserved as singular subjects by the public agencies and private companies that participate in public bidding processes. In these cases, the community is seen as a simple receptacle for the projects and their benefits over the medium term, and participating only weakly in the design of their programming. It can be verified that in some cases there are instances of public consultation, but it never goes beyond that.

The process of globalization, however, requires business groups, local governments, and NGOs to participate actively in the construction of the new scenarios, applying their knowledge and creativity to give form to the socioeconomic relationships and action with a strong dose of pragmatism and with shared advantages and responsibilities.

Regionalization emerges in this context as a **self-constructed reality** to respond to motivations, traditions, projects of social integration, but above all, the challenge to maintain respect for the culture, the historic heritage and the local projects.

It therefore becomes indispensable to **identify social behavior**. This issue is usually a pending task since it is very difficult to find social diagnoses oriented toward action. In general, the diagnoses available are sectoral and are oriented toward attending to certain problem groups (youth, the elderly, etc.).

In the case of land use and risk management, it is important to be able to identify critical segments of society involved in the process as well as the capacity for change, the capacity for adaptation, the capacity for re-learning, the acceptance of innovations, the social profile, the leaders, the power groups, etc. These characteristics of populations in the new regions make it possible to know what the expected **response level** is for each group or community, and to define which global **education**

73 - I.A.F.: Summary. October 1, 1995 to September 30, 1996. Inter-American Foundation, Virginia, USA, 1996.

programs are necessary to adapt this response to the new territorial situations and their levels of vulnerability and risk.

In almost all Latin American countries, there is a very strong movement for **revising education** as an ideally suited instrument for bringing about the social change needed in the new model of national and international relations. This is present as much in formal education (new laws on education, renovated educational programs, enriched and innovative curricula) as it is in informal education (recycling labor of the productive sector, graduate management, administration, marketing and managerial programs, etc.).

There is strong competition for improving the quality of human resources and increasing the opportunities for community participation in the workplace. But in only a few of these educational centers and curricula can we see the introduction of the knowledge for understanding land use management, vulnerability reduction, risk management, and incorporating the concept of “**safe region as a base for development.**”

There can be no doubt that the public sector should

stimulate the positive efforts. But it should also generate entities for learning to control the process and warn about possible **undesirable impacts** in intra-regional or international spaces, and to limit losses or the appearance of new situations of insecurity, worry, marginality, and vulnerability to the risk of disaster.

The difficulties described up to this point are some of those most common in countries committed to the process of territorial transformation, but others of equal gravity can easily appear – **legal voids, institutional disorganization**, etc. – that can result in very significant problems, not only in the design of territorial organization projects, but more importantly, in the operation and dynamics of the impacts that those projects will provoke over the medium and long run. It is indispensable, as we have analyzed, to review and evaluate the level of efficiency of the **norms and institutions** in order to be able to complement the process of territorial construction with a level of acceptable risk; constructions, laws, decrees, ordinances, applicable codes, should be reviewed, improved upon and adapted. It is also vital to modify, or at least optimize, the **administrative operation** in such a way as to enable it to truly serve as support to new projects, and to the new dimensions of decision.

LESSONS LEARNED?

1. **EMERGENCE OF REGIONS WITH EXCESSIVE ENVIRONMENTAL FRAGILITY:** A permanent challenge given the advance of commercial flows and the installation of new activities.
2. **REGIONAL WEAKNESS FOR EXPANDING, MAINTAINING AND MANAGING THE INFRASTRUCTURE:** Huge investment needed to integrate the new regions into development.
3. **NEED FOR A VISION OF AN INTEGRATED ORGANIZATION:** Land use management, risk management and environmental management as the principal tools for territorial intervention.

PRINCIPAL WEAKNESSES: Opportunities for growth?

Risk management and land use management are not sufficiently broadcast. There is a lack of diagnosis and plans: technical and communicational vulnerability.

There is no established dialog between land use, risk and environmental management staff: political vulnerability for lack of preparation and coordination.

Local governments are key to interventions, but they are who have the greatest budgetary, legal, professional and technical difficulties: institutional and legal vulnerability.

Little community or group participation in the projects of territorial intervention: social vulnerability.

6.2.3 Attitude of Countries Facing the Need to Introduce Issues of Land Use Management and Risk Management

It is important to recognize that governments, despite the problems described, are working to overcome these difficulties and to introduce the subjects of sustainable territorial organization, vulnerability and risk reduction into their land use policies.

In the first instance, it is necessary to recognize that the processes of integration have brought about the growing awareness of the need to promote **reforms in a framework of stability, participation and progress**. The point of equilibrium for these reforms depends on the way each country resolves aspects such as participation, association, harmonization and consensus for development.⁷⁴ However, these are not easy processes to manage, considering that they require a reasonable period of time to be carried out.

Many countries are gaining awareness of the fact that although every area that becomes integrated into the market has its limits and its borders, **this all changes** the dimensions of interaction and the economic, social and political actors in the process of integration. It is indispensable, therefore, to **redefine the territory** of the emerging regions, since new **levels of power** appear and new **managerial spaces** are generated by globalization and integration.

As these new elements must be inserted over the previous mosaic, it is also essential to analyze:

- The new territorial dimensions and the steps of interaction for the group: importance of the redefinition of the administrative limits and the type of linkage with other administrative and regional units;
- The possibilities for making the different political projects compatible; and

- The possibilities of harmonizing different levels of management and decision-making for the territory.

We can give the example of the northern **region of the San Juan Province in Argentina**, which was recently evaluated by the government of that province as the only alternative for generating a significant change in the provincial land use organization for seeking to insert itself into the competitive circle of the new territorial globalization and integration model. The idea is to achieve the development of the area in order to respond to the operational needs of the AGUA NEGRA BI-OCEAN PASS in the Departments of Jáchal and Iglesias.⁷⁵

The plan is to re-establish the operability of the zone and give a high priority role of providing **services and becoming a cargo transfer area for the BI-OCEAN PASS** that will link the west of Argentina to Region III of Chile (localities of La Serena and Puerto Coquimbo) in the MERCOSUR. The intention is to generate a policy for the rapid development of the road network and heavy cargo system, to consolidate the principal urban nuclei, and to provide energetic growth for industrial development.

It is estimated that this ambitious program of land use management should be taken on in two stages:

- 1- Integration of the zone into the markets of the eastern and central regions of the country in the short and medium term;
- 2- Opening and equipping the Agua Negra International Pass to Chile in the medium and long term;

This will be complimented with activities of:

- **Mining services:** In part, this activity is being developed, although with difficulty, since the mining centers have behaved as isolated enclaves having little or no socioeconomic impact on the zone.⁷⁶

74 CEPAL: Institutions and Sustainable Development. In Sustainable Development. Transformation.... Op.Cit. p.100.

75 Government of the Province of San Juan: Plan for Urban – Rural Land Use Management. 2006-1016. Consultant: Nelly G. De Cerdán. UNPRE-IDB. Bs.As.2006.

76 There are huge international investments in gold mining by Canadian and U.S. companies.

- **Agro-industry:** Especially oriented toward the production of high quality, certified seeds (potato and vegetables).
- **Expanding the agricultural boundary** into the Bermejo Valley, which is currently a desert.

The two latter activities will require substantial work on the irrigation network, which will need to be restored and expanded, and on the expansion of the local road networks.

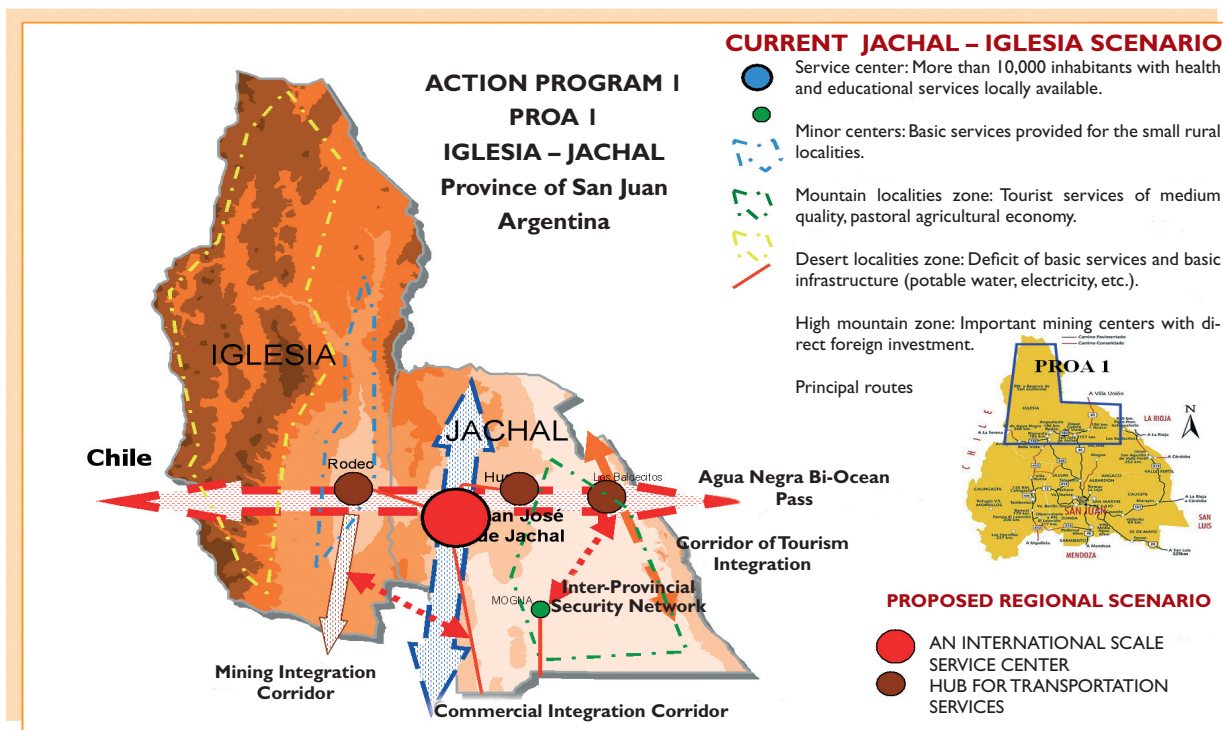
Both stages will require **coordination of actions** with:

- Other provinces: La Rioja and especially Córdoba in order to attain access to certain provincial corridors that transect complex mountainous zones. The objective is to obtain a route to the east and to the port of Buenos Aires.
- The authorities of Chile's Region III, to coordinate civil works in the high mountains, the productive plans and the flows of commercialization.

This process is a real challenge to management, since it takes place in an extremely difficult region to start with: very poor access to the more developed lowland plains (Pampas) in the province of Córdoba with tiny villages (ranging from 3,000 to 6,000 inhabitants), and with a traditional economic structure of negligible productivity. Furthermore, there is strong social resistance to change, demographic and trained human resource deficits, institutional and legal weakness, and a lack of information and of the possibility of setting up training plans using local human resources.

What is the **power space or base** that is generated in this context? What can be defined, out of all of this, by the provincial and local governments themselves? What aspects will have to be coordinated with the development of the rest of the regions? To what levels will it be possible to generate their coordination, and what will be their levels of functional and temporal dependence?

What is certain is that the success of this territorial project will depend on the establishment of a new power space or base and definition of the type of actors that will conduct the process toward a goal of sustainable development and security in the face of risk.



In synthesis, in these Latin American contexts, it is vital to point out that the administration of the territory and its efficient management depends on different factors and on a process that covers stages connected to:

- A substantial increase in the information needed for making decisions,
- An improvement in the capacity of design and evaluation of development programs of each region and of each country,
- A substantial strengthening of education, training and research,
- Revision and improvement of the legal and institutional system,
- The acquisition of awareness as to the validity and need for using, in a joint and integrated manner, land use, risk and environmental management, as basic tools for territorial policy.

Considering that the processes of economic transformation are at a very unstable level of development in the various countries of Latin America,⁷⁷ and that there are still many subjects pending and problems as yet unsolved,

the systematic and integrated treatment of the territory, the environment and the reduction of vulnerability will depend to a great extent on the **progress and evolution** that the countries experience toward these issues.

It will also depend on the quality of the **tools** that each country designs from the legal, institutional, environmental, and social point of view to make development decisions for their respective territories.

The truth is that the effort to create safe territories requires **permanent** action, so that these issues that are not currently included in their agendas can begin to “filter” **horizontally** into all of government actions and private decisions that have territorial impact.

It is probable that, within the context of the **mega-blocs** (MERCOSUR, Pacto Andino, etc.), progress can be made more rapidly as long as the competitive advantages offered in the context of the grand infrastructure projects – in which business, state, local and international interests converge – demand efforts of coordination of all of the member countries and their respective sub-regions in order to overcome their limitations and manage to function efficiently in the new economic and territorial model while taking advantage of the competitive advantages that they offer.

77 Gray de Cerdán, N: Integration in Latin America. Towards ... Op. cit. p. 10.

ANNEX I LAND USE MANAGEMENT POLICY AS AN EXPRESSION OF REGIONAL POLICY

I. Changes in Economic Policy and Land Use Management

*"In both conceptual and political contexts, it is generally agreed that the regional level is the most adequate scenario for putting a territorial policy into practice."*⁷⁸ This concept remains pertinent in the context of the globalized economy, even though the concept of region has gone through a significant evolution over the course of Latin America's economic history. Massiris Cabeza⁷⁹ recognizes different types of regions: geographic, homogeneous or uniform, formal, functional, plan or program, administrative, international and competitive – and he correctly points out that the polysemic and pluri-paradigmatic character of the region:

"...is what makes interdisciplinary communication difficult. However, each of the different approaches is valuable in the context in which it is used. So the natural regions are very important, for example, to protect the cultural patrimony or the right of the ethnic communities to their territory and their administrative autonomy, or to construct spaces for much more solid or economically competitive political and/or administrative actions. Therefore, the functional regions gain great importance when one desires to carry out a more effective land use planning and management task. It is also possible to construct regional spaces based on a combination of different criteria, including historical, administrative and functional. There are no recipes for building regions. The criteria to use will depend on the objectives being sought, on the determining factors of the spatial organization, whether they are physical or cultural, and on the spatial scale in which we move."

Chile, for its part, recognizes the **role of the region in its spatial context** and defines it as having:⁸⁰

- **A political function:** The region should support the processes of decentralization of the state, regionalization and de-concentration of public services, in order to empower its decision-making ability and management regarding the destiny of the region;
- **An economic function:** The region tends toward the maximization of its basic economic growth, in the sustainable use of its natural resources, in bolstering its productive capacities and in integrally improving its human and institutional resources, generating a diversified and competitive supply with clean production, aimed mainly at the globalized world market, favoring the development of regional potentialities and opportunities and access, for the regional population, to employment and the satisfaction of its consumer needs;
- **A social function:** The region should promote the fortification of its social organizations for integrating its inhabitants into the benefits of development in a context of equity and equality of opportunities to achieve a greater contribution to equity in the distribution of resources. It is assumed that economic growth does not resolve the problems of inequity and poverty on its own, and therefore, overcoming these scourges and creating greater equity are objectives that should be adopted simultaneously and in a complementary manner, through programs of assistance in the short run, and training oriented toward socio-cultural change in the medium term;
- **A cultural function:** The region should promote the socialization of its culture. Participation

78 Gomez Orea, Domingo: Land Use Management. An Approach from a Physical Medium. Edit. Agrícola Española SA. ITG de España. 1998.

79 Massiris Cabeza Angel. Land Use Management and Regional Construction Processes. Luis Angel Arango Digital Library. Bank of the Republic of Colombia, 2006.

80 Government of Chile. Regional Development Strategy. Region of Valparaíso. Regional Government of the V Region of Valparaíso. Final document presented to the Regional Council in 2003. Santiago de Chile. 2003. p. 7.

and integration of the different sub-cultures into regional life in a framework of respect, tolerance and harmonious coexistence. This is important for achieving the strategic objectives of development. Cultural diversity is a cultural asset that must be preserved.

- **A territorial function:** The region should develop policies for land use management that allow it to generate an integrated and harmonious territory, and overcome the current imbalances it suffers. The objective of land use management is to orient and regulate the location and conditions of land usage, urbanization, building and management of human settlements, and of productive activities, equipment and infrastructure in order to move toward economic development, social welfare and protection of the environment.

In this context, the concept of **regional policy** has two interpretations that are not mutually exclusive: the set of measures destined to **reduce imbalances** or inter-regional inequalities and the efforts destined toward the interior regions (provinces, cities), considered individually, to overcome **problems of economic retardation or decline**. The first approach, which is the classic one, seeks – for reasons of efficiency and equity – to guarantee the cohesive growth of the government economy and carries implicitly with it an emphasis in support for the most backward territories. The second, which is the Anglo-Saxon model, is known as “regional planning,” and seeks the potential unique to each territory in particular independent of its relative position in the government ranking.

The new emerging trends of **Latin American regional policy** are being generated in response to a set of new challenges for land use management and other public policies in the decade of the 1990s: economic globalization, the creation of single markets, rapid technological change, transition toward an information society, the insertion of territorial policy in the European Union, the aperture of countries in the East and the differentiated demographic evolution, all challenges that also have territorial impact, which the policy of land use management must bear in mind.

The dynamic and permanent connection between **development, regional policy and land use management** is currently a central theme for the more developed countries. However, the regional policy significantly changed its position on a world level when the crisis of 1973 happened. Until that time, important and sustained economic growth, especially benefiting the more developed countries (classic regional policy), was recognized; but from that time to the present, several different factors have come together to result in a different regional policy in which we now recognize changes in the way we view problems, criteria, objectives and agents involved in the process.

The progressive economic diversification sustained by a productive apparatus now oriented toward forms of territorial competitiveness mark a strong **differentiation in the central issues** – the territorial strategies adopted, the organization of production and the behavior of economic agents, the innovative productive sectors (tourism, technological services, business services, etc.), technological policy, the nature and function of infrastructure, quality of life, the quality of the environment and the capacity for endogenous development.

Regional policy has gradually moved from a focus whose highest priority was **correcting regional imbalances** toward an idea of **regional development**, based on equity, competitiveness, and sustainability.

On the other hand, it is also necessary to point out that the first stage of regional policy was almost the exclusive domain of the central administration of each state, while today it is moving toward more participatory and democratic forms, where the actors participating in its design are multiplied.

2. Technological Policies at the Service of Territorial Development

Among the regional policies that have taken on the most importance during the past decades is technological policy, which has developed as a result of the fact that capital is a scarce commodity. From the formulation of innovative ideas and scientific discoveries and their application to the area of production and social devel-

opment, technological development is by far the motor for multiplying the social and economic benefit of the different communities in a world characterized by rapid changes and uncertainty. One of the documents that best expresses the need to stimulate the technological policy for regional development is “The Andean Community” (*Comunidad Andina*), published by the General Secretariat on its Web page and found in Document 84, “Bases for Regional Technological Policy,” where the Commission on the Cartagena Accords says:

”SEEN IN: The Bogotá Declaration, Articles 25, 27, 38, 70 and 106 of the Cartagena Accords and Decisions 24, 46 and 49 of the Accords Commission;

CONSIDERING

- That the modern world is characterized by the determining influence that the possession of knowledge, and the ability to use it, has, in the orientation of economic and social development, and the possibility for countries to act autonomously within the international community;
- That the efforts in scientific/technological matters made in the sub-region have had an orientation that has lacked a connection to the region’s real problems of development;
- That the type of process for importing technology in the past generated an accumulation of serious negative effects; that there has persisted in the sub-region a lack of relationship between the technological infrastructure and the sectors of economic activity; and,
- That the characteristics of the consumer goods and patterns of imported preferences from Third World countries have had a determining impact on technological requirements;

DECLARES:

- I. The formulation and adoption of a sub-regional policy on technological development is indispensable for reaching the objectives of the integration process and satisfying the needs of economic and social development of the Member States. Said policy should have defined objectives, concrete instruments for reaching said objectives and an order of priorities regarding the areas that should be exercised. For this reason, the Member States shall establish in a gradual and progressive form the scientific, technological infrastructure made up of the assortment of knowledge that the sub-region should utilize to satisfy its needs, the persons trained to master said knowledge, and to use them in productive activities and the institutional organization that is indispensable for connecting the centers of generation or assimilation of knowledge with the businesses or persons that use them. Such policy is only a part of the global effort that the countries should undertake in the field of knowledge and should be closely coordinated with the actions that are carried out in education at every level, and in scientific research.”

The first stage is designed especially to reward the management of information that supports the process of creation or adoption of new technologies and their subsequent dissemination. The effort is oriented not only toward inserting adequate foreign technologies,⁸¹ but also toward recovering their own technologies... “to promote the creation and use of their own knowledge and the adaptation of external technologies to local needs and the unique characteristics of the sub-region. Given that a very high percentage of the innovations are generated in industrialized countries with very different needs and characteristics from those of the sub-region, these acts of adaptation and creation of technology are

81 In this sense it is pointed out that, “we must correct the traditional practice of buying technology in “packages” of combos that contain elements of very diverse value, many of which can be generated locally or provided by local suppliers. This would have the object of correcting the negative effects of this practice that should investigate the contents of the technological “packages” in detail, eliminating the superfluous parts in order to acquire more adequate technological input, in the most convenient of conditions and to divert to local suppliers the demand for inputs that they are able to provide.”

essential, especially if we consider that there are very important areas of the economies of the Member States that should develop their own capabilities, in order to avoid the perpetuation of an extremely inconvenient dependency.”

In the context of these definitions we must point out that technological innovation – like the upgrading of human resources and the construction of markets, of strategic factors and services for entrepreneurial development – can be done efficiently only in the **territorial context where the activities are located**. The process of technological innovation is always a territorial act. It should refer to the concrete problems and needs of the territorial environment in the process of land use management.

3. Social Policies as an Element of Territorial Equity

Social policy is focused on human development, based on the person, the family and the territory in the context of rights, obligations and equity, seeking cohesion of the social fabric. It works from an integral perspective, centered on the person, not as an isolated individual, but forming part of a social context.

Even though we respect the individual's singularities that are transected by the social matrix in which he or she is immersed, we try to construct an “inclusive space” that strengthens the citizen's political, economic, social, cultural rights and territorial equity.

We start with the family, where the first social links are established. However, social policy also takes the particularities of each region and its possibilities of development into account as a **guarantee of access** for the person into a society that includes them in the context of an adequate quality of life. For this reason, we

also consider the productive profile that of services and infrastructure of the specific territory, since all of this influences the development of persons.

Therefore, in this sense, it is indispensable that land use management support social policy to **prioritize the promotion of opportunities oriented toward creating patrimonial, familiar and community assets that bolster social capital**.

In this context, for example, the Government of Argentina has suggested:

“a) Promoting human development within a social ideology associated with equity, and rights. b) Installing skills and tools for overcoming not only the material shortcomings, but the lack of opportunities as well. c) Exercising the commitment ethic of a government that accompanies and articulates the consolidation of social policy with strong social investment. d) Favoring an associative management scheme between the state, civil society, and the private sector. Through this management, the state assumes commitments and obligations regarding the principles that it stands for, oriented toward achieving social inclusion and integration. It does so working through participatory democracy that is not limited to electing government officials, but that also works with citizens to help them form a part of a network of pro-solidarity actions and movements, adding value to the social investment, from the commitment ethic standpoint in all of the geographical areas of the country.”⁸²

Today, the social question has to do with work, with the citizenry's access to better levels of life (housing, health, education, salaries etc.) and with participation, which should translate into well-articulated **TERRITORIAL POLICIES OF SOCIAL INTEGRATION**. The strategy of land use management, therefore, points to a triple approach:

82 Ministry of Social Development, Argentina 2007, institutional Web page. It must be pointed out that poverty began to grow spontaneously in Argentina after 1995 (36.7%) reaching 52% in 2002.

- **Designing integrated intervention**, trying to avoid the dispersion of resources, the duplication of structures, the extemporaneousness of objectives; one should seek the articulation of resources, administrative circuits and shared management at the socioterritorial level;
- **Produce territorial responses with identity:** social policy should be conceived from the unique territorial dynamic of each locality, province or region, acting in coordination from the geographical landscape, with all of its advantages and limitations;
- **Interjurisdictional and interinstitutional coordination:** it is necessary to consider the articulation between various scales of intervention (local, national, regional, international) and a direct horizontal link of the social establishments with production, the distribution of goods, services, training, and technical assistance.

This suggested format is necessary considering the diversity of social scenarios that predominate in Latin America and the different levels of social vulnerability that exist, as Eduardo Amadeo⁸³ tries so well to typify.

*“As a tentative proposal, we have organized a classification for the Latin American countries and the Caribbean based on three dimensions: the productive dimension (growth, income, employment, physical capacity and external debt); distributive equity (social expense, concentration of income, the poverty line, coverage of health care and education, urbanization/housing) and degrees of **institutional reform and international insertion** (index of institutional changes, surveys and recent indicators). From the combination of these dimensions we propose taxonomy, where the different countries form **four groups**:*

A. FIRST GROUP: Countries with relatively good indicators in the three dimensions, including

Chile and Costa Rica, have indicators above the average of the region in the three dimensions although with some differences.

B. SECOND GROUP: Countries with high to medium incomes with medium satisfaction of the indicators in the three dimensions, but with **trends for improvement** in some of them; here we find **Brazil and Mexico** who also show some differences.

C. THIRD GROUP: Countries with **medium satisfaction of the indicators in all three dimensions but with trends toward worsening in some or the majority of them**, where we have two groups: the countries that have medium-high income, such as **Uruguay, Venezuela, and Argentina**, and countries with medium-low income such as **Colombia, Peru, and Panama**. These are countries, with the exception of Uruguay, where institutional weakness has become most evident.

D. FOURTH GROUP: Countries that are in an **unsatisfactory situation in all or most of the dimensions studied** in which we also find two different situations – those in which the economic indicators have been favorable and have reached low/medium levels in the other dimensions – **Dominican Republic, Guatemala, El Salvador, and Nicaragua** – and those that have had null or negative performance in all of the dimensions – **Ecuador, Bolivia, Paraguay, Honduras, Jamaica, and Haiti**.

4. Environmental Policies in the Context of Territorial Sustainability

Currently environmental quality plays an important role as a **factor of attraction** for productive investments. In Latin America there has been a rapid and strong process in the awareness of the importance of environmental sustainability in the development of the countries. In spite of that, the environmental problems have increased

83 Amadeo, E. Balance and Evaluation of Social Policy in Latin America and the Caribbean during the 1990s and Future Perspectives. Working Document. Social Observatory. Bs.As. 2003. Internet.

in the process of territorial transformation, as analyzed in Sections 2.1 and 4.1. The subject of environment is explained in the territorial strategies of each of the countries, although in practice there is still much to be done since “to reach environmental sustainability of the territory, in such a way as to guarantee the current and future availability of its resources, we rely on values like environmental conscience, active responsibility and respect for biodiversity. The policies that must necessarily accompany these values are:

- Training and sensitizing society to generate proactive and responsible environmental behaviors;
- Improving knowledge regarding natural and environmental resources;
- Incorporating the environmental dimension and the variables of vulnerability and risk as transversal issues into the territorial policies at the federal, provincial and local levels;
- Organizing and protecting the environment and landscape through an integrated management of natural resources, human settlements and zones with economic and social frailty. As a product of these policies, each person and his or her community could enjoy the resources without putting the biodiversity at risk, notwithstanding the rapid increases in productivity.⁸⁴

ANNEX 2

COMMENTS ON THE BIBLIOGRAPHY⁸⁵

The elaboration of this document required research of a great deal of background material, both in the context of conceptualization of land use management and of the most recent projects using these concepts. The chal-

lenge has been to find indicators, testimonies, ways to act, methods, suggestions, and instruments that demonstrate to what extent and how the process of approximation between these two disciplines of organizing the territory of Latin America is taking place.

In order that the wealth of the literature and documentary analysis not be lost, and to orient the efforts of other researchers, professionals, students, or persons interested in the subject, we have tried to present the contents of the most important documents in the form of synthesized tables, to enable making a series of comparisons.

This has revealed that, in spite of the great interest shown on the theme, **very few documents exist containing explicit interest in combining land use management and risk management** in joint undertakings, which demonstrates the novelty and youth of this focus.

On the other hand, this reading has also revealed the need to **redefine the meaning of land use management** in Latin America, where uneven – though complementary – concepts are confused among similar ideas, such as development, planning, strategies, ordering, management, etc. The current approach, throughout the territory, constitutes a challenge to creativity for reconstructing the concepts, along with the ideologies, economic, social, and political transformations and the restoration of values.

It also gives testimony to the depth and progress of risk management in Latin America, in spite of its recent evolution. Pressure to include the complete set of these concepts in the territorial policy has found a variety of “niches” for insertion, such as investment policies, development projects, environmental policies, and many more. On this subject it is necessary to recognize the invaluable contribution of the international organizations that have given their help, through cooperation, in finding these niches.

⁸⁴ Federal Ministry of Planning, Public Investment and Services: Argentina 2016, Policy... Op.cit., p. 23.

⁸⁵ The tables were prepared especially by María Cad, student of the final course of the Professional Geographer Major of the Geography Department of the Faculty of Philosophy and Letters of the National University of Cuyo, Mendoza, Argentina.

It also shows the **growing tendency toward inserting these issues into local contexts**, where the decisions and behaviors are fairly easily identifiable, and where the information is connected to the reality of the problems, although those decisions and conducts are notable for their diversity, weakness and uncertainty. In this setting, the municipalities – backed by the growing tendency toward the decentralization of power and politics – are enjoying a growing participation in the form of potential, active, and efficient cells for territorial control and risk management; these are the surroundings where

the problems multiply and as a result, so multiply the needs of territorial proposals.

Perhaps this table can continue to be enriched, expanded, improved and also contradicted in its observations, at the levels of university or professional studies. The intention is to find a path that will orient us toward the adequate integration of the tools for territorial policies – with the inclusion of risk management – and in our search for the scenarios in which this combination can most efficiently be carried out.

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Argentina 2016. National Policy and Strategy on Development and Land Use Management.	Federal Ministry of Planning, Public Investment and Services. Buenos Aires, Argentina. 2004	http://www.minplan.gov.r/rminplan/pet/pet	<p>Presents the National Policy on Territorial Development, Argentina 2016.</p> <p>This policy is based on creating a country model characterized, among other things, by environmental sustainability, social equity and governance. It also expects to achieve the organization and protection of the natural environment and the landscape.</p> <p>These objectives, country model and instruments should be applied by the provinces, in the elaboration and management of their LUM plan in a federal decision framework.</p>	<p>The variables of vulnerability and risk are incorporated into public and private policies and actions. The instruments for this are training, legislation and institutional strengthening.</p> <p>Some instruments proposed are monitoring plans and programs, prevention and control of natural catastrophic phenomena.</p>	Leaves a direct connection open between LUM and RM for the formulation of territorial policies and for public and private intervention, at both the central and provincial levels.
Inter-regional Articulation NOA-Cuyo.	Institute of Urban Planning and Development. Tucumán, Argentina. 1998	CD IPDU	Highlighted among the sub-programs is the System for Settlements, LUM and Population from which we obtain the project on the inventory of resources and services for the management and planning of the Argentine Andean region.	Does not consider RM, although its sections outline risk provoking natural problems.	No direct relationship apparent between the two.

(a) <http://www.minplan.gov.r/rminplan/pet/pet>

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Human Settlements in Latin America and the Caribbean.	XIV Reunion of the Forum of Ministers of the Environment for Latin America and the Caribbean. Panamá, 2003. UNEP Regional Office for Latin America and the Caribbean.	www.pnuma.org/foroalc/esp/reuniones/pan06nfe-Asentamientos Humanos.pdf		Presents the background of the treatment of this issue in international commitments assumed by the region. Describes the environmental, social and economic challenges for the region and the recommendations for action. Emphasizes poverty and vulnerability of the settlements, actions for their reduction seeking to make them safer, actions that are integrated with measures related to sanitation, contamination, transportation and basic services.	
Conceptual Base and Methodology for Scenarios of Land Use Management.	Oscar Lücke Sánchez. 1998	Ministry of the Presidency of the Republic of Costa Rica.	Defines and differentiates a series of concepts to consider in the process of LUM and then the methodology for generating the scenario without intervention, and of the desired scenario.	Among the concepts to consider in the process of LUM the concepts of natural phenomena, disasters and vulnerability are defined and differentiated.	Natural hazards and vulnerability are elements to consider when generating scenarios, although the methodology does not explain how to do this.
How to Analyze Risk in Infrastructure Projects of Limited Risk. (Module 4)	Regional Government of Piura. 2006	CD, obtained through USAID/OFDA.	Assimilates the concept of LUM into that of development and planning, but does not consider it in a special manner. It handles the modern concept of territory and recognizes the dynamics of its elements: environment, economy, and society, legal and institutional aspects.	Explains the need to understand risk, to incorporate preventive measures into the profiles of a project and the technical records of projects to avoid the vulnerability and insecurity of investments and exposure to hazards. Describes four steps for doing this in a participatory manner.	No direct relationship apparent between the two.

(a) www.pnuma.org/foroalc/esp/reuniones/pan06nfe-Asentamientos Humanos.pdf

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Concepts Associated with Risk Management in Development Planning and Investment (Guidel)	National Systems of Public Investment (SNIP), Government of the Republic of Peru. 2006	www.crid.or.cr/digitalizacion/pdf/spa/doc16603/doc16603.htm CD	Does not address the concept of LUM but does deal with the process of Development as a necessary context.	Explains the concepts of hazard, vulnerability, risk, disaster, and the types of RM (pre-emptive and corrective). Describes the levels of RM, the use of risk analysis as a method of management to design and evaluate alternatives for investment. Also explains its incorporation into the elaboration of investment projects, through the application of tools such as the logical framework and the checklist. Finally, it presents the proposal to incorporate risk analysis into the project implementation plan (PIP) and SNIP, to improve the public expenditure. The proposed steps are: analysis of hazardous scenarios in the surroundings of the project, analysis vulnerability of the elements connected to the elements of the project, and risk analysis of the alternatives.	No direct relationship apparent between the two.
Considerations on the Variable Hazards and Risks within the Category of Land Use Management. Local LUM Councils. An Alternative to LUM in Areas under Threat and Natural Risks in Costa Rica.	Malavassi, R. and Salgado, Douglas. 1994	http://www.crid.or.cr/crid/CD_CNE/pdf/spa/doc120/doc120.htm	Proposes the Local LUM Council (CLOT) as a decentralized, inter-institutional and participatory entity for carrying out the practice of LUM.	The activities of the CLOT allow for mitigating disasters, freeing development of the negative effects of the same. This is necessary in Costa Rica due to characteristics of the terrain and the natural hazards, as well as its spatial location, and this is framed in greater attention given to the disasters of the last decade in this country.	Suggests the necessity of linking risk management with territorial management in the context of land use management.

(a) www.crid.or.cr/digitalizacion/pdf/spa/doc16603/doc16603.htm(b) http://www.crid.or.cr/crid/CD_CNE/pdf/spa/doc120/doc120.htm

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Environmental Sustainable Criteria for Land Use Management for the Region.	Regional Government, Metropolitan Region Division of Analysis and Control of Operations. Department of Land Use Management and the Environment, University of Chile. Institute of Public Affairs.2002	www.gobiernosantiago.cl/medios/Ordenamiento_Territorial/anexo2.doc	Contextualizes the land use management of the metropolitan region of the city of Santiago, into the 2001 National Policy for Regional Development. Then it presents the results of the diagnosis, in which the environmental, social and economic aspects of the territory are considered. It also explains the strategic view, strategic and specific guidelines, and operational criteria organized by area, corresponding to the dimensions of the territory.	Does not deal with the concept of risk. Risk is included in the diagnosis of the environmental and social aspects, as well as the guidelines for environmental actions.	No direct explicit relationship apparent between the two; however it does incorporate risk into territorial intervention.
Diagnosis of the Inter-regional Area of Bio-maritime Development. Second Phase. Executive Report.	D&L Architects Valparaíso, Chile.1999	CD	Considers land use management in the diagnosis it summarizes the instances of planning in Chile and the central macro region since the 1950s. Then it describes present-day territorial planning instruments. It explains the analytical sectors, taken in the diagnosis: the urban system, infrastructure, transportation, tourism, industry, and environment. The work ends with a territorial synthesis in which "homogeneous areas" are defined.	Risks were analyzed in some of the communities diagnosed, however, it was not a variable incorporated into the final synthesis.	No direct relationship apparent between the two.
Directives for Land Use Management in the Province of Tucumán.	Institute of Urban Planning and Development. Tucumán, Argentina. 1994	CD IPDU	In the first place they designed the bases for defining the territorial model, describing the current and future scenarios. Then they described the proposed territorial model and the L.U.M. directives.	The document makes no mention of risk management.	No direct relationship apparent between the two.
The Participatory Budget. (Module 3)	Regional Government of Piura. 2006	CD, obtained through USAID/OFDA.	Assimilates the concept of LUM into that of development and planning, but does not consider it in a special manner. It handles the modern concept of territory and recognizes the dynamics of its elements: environment, economy, and society, legal and institutional aspects.	Explains that the modality of participation budget insures that the public investment is sustainable, by orienting it toward local Development and the reduction of vulnerability, since it allows for prioritizing viable and secure investments.	No direct relationship apparent however, the criteria for prioritization of investments comes from the economic, social, environmental and institutional dimensions of development, and from the need to reduce vulnerability in the territory.

(a) www.gobiernosantiago.cl/medios/Ordenamiento_Territorial/anexo2.doc

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
The Process of Risk Management.	National Customs Service, Government of Chile. 2005	www.aduana.cl/p4_principal/site/artic/20050916/pags/20050916161822.html	Does not deal with the issue of land use management.	Describes the steps of the risk management process, starting with the definition of the context, identification of risks, risk analysis, evaluation and prioritization of risks, treatment of risks (presenting options for avoiding, reducing or transferring them) and continuous review and monitoring.	No direct relationship apparent between the two.
Elements Concerning the Population related to Land Use Management (Series on Population, LUM and Development). (Guide 2)	Vice-Ministry of Housing and Territorial Development. Directorate of Territorial Development, Colombia. 2005	www.minambiente.gov.co/prensa/publicaciones/docum_especializada/desarrollo_territorial.htm CD	Starts from the bases for land use management, applicable in Colombia. Describes the decisions of the organizer for making the needs of the population compatible with a model of the territorial organization that can empower development with minimal risk.	Inserts the issue of risk management into the entire text as an indispensable instrument for sustainable land use management.	Integrates risk into land use management in its definition, since they are taken as an integrated planning process that permits directing the action of the population to present development opportunities and to mitigate or prevent risks. Then it explains the definition of the territorial attributes based on its population and how to insert risk into them: in the classification of lands, in the relocation, reconstruction or improvement of housing, and in providing public space.
Strategy of Regionalization and Urban Development.	SEGEPLAN. Republic of Guatemala. 2005	www.segeplan.gob.gt/html/prd/prd001.htm	Does not address land use management as such, rather as a strategy for urban planning and development (urban land use management). The strategy suggested responds to the particular problem of population distribution and socio-cultural problems of Guatemala. Among the guidelines for action are: regionalization, the national urbanization system, the national sustainable urban development policy and decentralization.	It does not address the subject of risk management.	No direct relationship apparent between the two.
Evaluation of the Potential Demand of the Agua Negra Pass, San Juan.	HYTSA Studies and Projects S.A. — R & Q Engineering, Ltd. 2005	CD	It does not address the subject of land use management.	In the pre-project stage, it looks at four criteria to compare alternatives that include: geological conditions and natural risks.	No direct relationship apparent between the two.

(a) www.aduana.cl/p4_principal/site/artic/20050916/pags/20050916161822.html(b) www.minambiente.gov.co/prensa/publicaciones/docum_especializada/desarrollo_territorial.htm(c) www.segeplan.gob.gt/html/prd/prd001.htm

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Formulation of Land Use Management Plans and Environmental Management of River Basins in the Cauca Valley. (Methodology)	Cauca Valley Regional Autonomous Corporation, Sub-direction for Planning, Environmental Planning Group. 2003	http://www.ut.edu.co/fif/0906/pgsch/docs/cvc.doc	Presents the methodology to use in the formulation of land use management. Also contextualizes the experiences and approaches for planning of basins and the principal characteristics of the environmental situation.	Among the environmental situations contextualized by this work, is the location of human settlements in high-risk zones.	No direct relationship apparent between the two.
Disaster Risk Management.	Department of Sustainable Development, IADB. 2006	http://www.iadb.org/sds/ENV/site_2493_s.htm	Refers to public interventions, however makes no mention of policies of land use management.	Explains the need to approach the causes of vulnerability to stop the vicious circle of destruction-reconstruction in Latin America. For this it suggests the application — in policies and institutional measures — of an integral approach to achieve it and for the subsequent recovery, using as tools: risk analysis, measures of mitigation and prevention, risk transfer, preparation and intervention in emergencies, rehabilitation and subsequent reconstruction. IADB offers assistance for countries to integrate risk reduction into their plans and investments, since they are creating technical and operational capacity.	No direct relationship apparent between the two.
Land Use Management - Risk Management in the Local Atmosphere, in the Context of the Local Development Program. FISDL. Final Report.	Joan MacDonald M. Francisco Otava R. IADB. Swedish Cooperation Agency for International Development. 2001	www.crid.or.cr/crid/CD_Asentamientos_Humanos/pdf/spa/doc14300/doc14300.htm	Analyzes the problem of human settlements in El Salvador on the national, regional and local scale, as well as the general institutional framework of land use management, as well as current and contemplated norms.	Details the general institutional framework of risk management, the current and proposed norm. Presents the social investment fund projects for local development that affect the reduction of the population's vulnerability.	Describes the proposals for improving the policies of disaster prevention, land use management, local development, investment projects and risk management, how and why they should be articulated.

- (a) <http://www.ut.edu.co/fif/0906/pgsch/docs/cvc.doc>
- (b) http://www.iadb.org/sds/ENV/site_2493_s.htm
- (c) www.crid.or.cr/crid/CD_Asentamientos_Humanos/pdf/spa/doc14300/doc14300.htm

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Risk Management and Strategic Territorial Planning (STP).	Rosa Sánchez del Valle. 2006	XI International Congress of the Latin American Center for Administration for Development (CLAD) on State and Public Administration Reform, Guatemala City, November 7-10, 2006. < http://portal.cnd.gob.pe/archivos/clad/documentos/sanchdel.pdf >	Presents the definitions of LUM, STP and the organizations that apply them, and the evolution of their work. In the exposition, suggests the need for generating instruments to improve citizen perception and the technical work in the municipality. Makes comments on lessons learned from the STP processes in the country.	Describes the situation of risk in Central America and Guatemala and the focus with which risk management has been approached in that country: Prevention, mitigation, forms and links to the causes of territorial occupation.	Describes aspects of the relationship between the concepts — actions in STP, LUM and RM. Highlights the need for creating local capacities. Makes certain considerations on STP, as the inclusion of the analysis of vulnerability, participatory work, the identification of municipal expansion zones and the relationship of perception—acceptance of risk in the priority of territorial policies.
Risk Management in Urban Environments.	Allan Lavell. Latin American Faculty for Social Sciences (FLACSO) and the Network of Social Studies in Disaster Prevention in Latin America (LARED). 1999	www.desenredando.org/public/articulos/1999/grau/index.html	Does not consider the concept of land use management, although it cites problems of not exercising LUM as causes for risk.	Describes the importance of the problem of disasters in the urban environment of Latin American countries, which leads to enumeration the factors that especially explain the greater vulnerability in the cities, such as the concentration and density of the population, the aging and adolescence of the infrastructure, as well as the lack of policies, norms, instruments of control and the existence of corruption in the institutional political environment.	No direct relationship apparent between the two.
Guide for Incorporating the Criteria of Environmentally Sustainable Land Use Management in the Technical-Economical Revision of the Projects Presented to the National Investment System (SNI).	Regional Government, Metropolitan Region. Division of Management Analysis and Control. Department of Land Use Management and the Environment, University of Chile. Institute of Public Affairs. 2003	www.gobiernosantiago.cl/medios/produotas/gui_OT_prySNI.pdf	Incorporation of land use management criteria into the procedures of Chile's Regional Secretariats for Planning and Coordination (SERPLAC) carried out through a matrix of evaluation; similar to a checklist, since the matrix is organized according to the criteria of land use management and questions to evaluate whether the project helps the fulfillment of these guidelines of action.	Considers some aspects of risk location but not the concept of risk management	Advises guidelines for environmental action: condition the use of lands in high-risk zones, locate the activities according to the principles of sustainability and environmental security, and minimize the risks associated with the deposits of residues. Questions are asked about these that help to evaluate the projects.

(a) www.desenredando.org/public/articulos/1999/grau/index.html(b) www.gobiernosantiago.cl/medios/produotas/gui_OT_prySNI.pdf

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Guide for Orienting the Actions of Investment in Local Risk Management in the Municipal Context.	Colombia's National Planning Department (DNP) and Directorate of Urban Development and Environmental Policy (DDUPA).	http://www.dnp.gov.co/paginas_detalle.aspx?idp=881	Explains the relationship between local risk management and the National System of Environmental Planning and Disaster Prevention and Assistance, which is implemented through plans at the national, departmental and municipal levels.	<p>Defines risk, hazard and vulnerability.</p> <p>Explains the importance of local risk management, the characteristics that permit it to be efficient and the responsibility of the state and civil society in this task.</p> <p>Advises considering existing risk through corrective policies, and the risks to be created through pre-emptive policies.</p> <p>Specifically for Colombia, the risk management plan covers the acquirement of knowledge and monitoring, corrective and pre-emptive management of risks, strengthening the institutions, the emergency and contingency plan, the insurance market and follow-up and control of risks.</p>	The local risk management plan is considered part of the local development plan, and details the specific projects defined in the land use management plan.
Incorporation of Risk Prevention and Reduction in the Processes of Land Use Management. Environment and Land Use Management Series. Guide I)	Ministry of the Environment, Housing and Territorial Development. Vice-ministry of Housing and Territorial Development. Office of Territorial Development. Colombia. 2005	http://www.minambiente.gov.co/prensa/publicaciones/docum_especializada/desarrollo_territorial.htm CD	Starts from the basis of current land use management in Colombia. Details the legislative and planning background in Colombia up to the ratification of the Land Use Management Law of 1997.	Explains the concepts of risk, hazard and vulnerability, risk generation, risk prevention and reduction. The difference in actions for prevention and reduction of risk carried out ex-ante and ex-post.	Explains the cost of NOT incorporating risk into the plans for land use management, the relationship between LUM and natural risks. Details four steps for incorporating risk into the plans for land use management, corresponding to the administration of the environment, vulnerability and risk in the diagnosis, formulation, implementation and evaluation of land use management.

(a) http://www.dnp.gov.co/paginas_detalle.aspx?idp=881
 (b) http://www.minambiente.gov.co/prensa/publicaciones/docum_especializada/desarrollo_territorial.htm

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Incorporation of Risk Analysis into the Formulation of Infrastructure Projects of SNIP (SNIP and RM, Guide 2)	National Systems of Public Investment (SNIP), Government of the Republic of Peru. 2006	CD	Does not mention the concept of land use management.	Explains the concepts of hazard, vulnerability and risk. Describes the incorporation of risk analysis into the projects of Peru's General Directorate of Public Sector Multiannual Programming (DGPMS). Also describes the principal natural hazards affecting the country. Explains the factors of vulnerability (exposure, fragility and resilience) to be incorporated into the PIP and the decisions and instrumentation that should be generated, as well as the identification of structural and non-structural measures for risk reduction. Explains the proposal to incorporate risk analysis into the PIP, in aspects such as location, technical specifications and indicators in the pre-investment stage, as well as the prioritization of the alternatives in the formulation process. Describes the methodologies of the IDB list of questions and the Disaster and Risk Analysis Study of Colombia, comparing them. Points out how they are combined in the SNIP Methodological Guide. Finally, it suggests a proposal for norms on the aspects that should be included in risk analysis in documents, procedures and formats of SNIP.	No direct relationship apparent between the two.
Disaster Risk and Risk Management Indicators, Principal Technical Report	National University of Colombia - Manizales. Institute for Environmental Studies. IADB. 2005	www.iadb.org/sds/publication/publication_4161_s.htm	Does not mention the concept of land use management.	Explains the calculation of the theoretical bases of four indicators and seeks to describe elements of vulnerability and effort. The elaboration of these indicators is in response to the need for offering decision-makers tools for defining dimensions, representing and managing risk, and enabling them to compare with other priorities.	No direct relationship apparent between the two.

(a) www.iadb.org/sds/publication/publication_4161_s.htm

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Project Progress Reports.	Municipality of Córdoba. 2005	www.pecba.gov.ar	Does not mention the concept of land use management.	Although the projects do not respond directly to the mitigation of hazards, some are related (not explicitly) to the modification of certain elements of vulnerability of the population (such as the improvement of slums and villas, sewer systems, traffic, infrastructure), with the planning of land usage.	No direct relationship apparent between the two.
Risk Management in Land Use Management: Floods in Cali, the Autonomous Regional Corporation of the Cauca Valley (CVC) and the El Niño Southern Oscillation (ENSO) phenomenon.	Andrés Velásquez. 2004	www.cambioglobal.org/enso/public/downloads/lgtrotic_enso_2004.pdf	Considers the issues of land use management. Comments on the activities of the CVC, such as the protective works and the improvement in the east of Cali since 1952. This coincided with the demographic and real estate pressure in the city that caused accelerated urbanization with implications in the cost of service infrastructure, and in the occurrence and effects of the floods, which presented a new situation and challenge for CVC planning.	Describes the interaction of the ENSO phenomenon with the historic Cauca floods.	Explains that the relationship of land use management with risk management and environmental management depends on sociocultural, economic, political, and territorial occupation factors.
Conceptual Framework. (Module I)	Regional Government of Piura. 2006	CD, obtained through USAID/OFDA.	Considers the integrated territorial policies, as a framework for insertion of Risk analysis and diagnosis.	Explains the concepts of hazard, vulnerability, risk and disaster, and the types of Risk Management (prospective, corrective and preparation for emergency). Proposes a model for Risk Management.	Explains the need to introduce risk analysis into the plans for Land Use Management and into the projects of public investment.
Methodology for Land Use Management Studies. 1998	Nicaraguan Institute for Territorial Studies. 1998	http://www.ineter.gob.ni/atencion_al_publico/ordenamiento.html	Defines land use management as a planning instrument. The methodology is divided into four stages: methodology and coordination, territorial diagnosis, land use management proposal and organization and management. A diagnosis is made for each element of the territory as well as land use management proposals.	In order to elaborate the diagnosis, information must be compiled on the components of the territory, such as the physical environment. Natural hazards are included among these elements.	Incorporates natural hazard analysis as a variable of the physical aspect of the territory in the diagnostic stage and that of formulation of proposals for land use management. Does not consider social or other vulnerabilities.

(a) www.pecba.gov.ar

(b) www.cambioglobal.org/enso/public/downloads/lgtrotic_enso_2004.pdf

(c) http://www.ineter.gob.ni/atencion_al_publico/ordenamiento.html

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Land Use Management International Experiences and Conceptual and Legal Treatments Carried out in Colombia.	Angel Massiris Cabeza. 2004	Bank of the Republic of Colombia. L.A. Arango Library	Presents the approach, concept, characteristics, instruments, requirements and situation of land use management in Europe, Latin America and in Colombia, in a way that allows their comparison. Links land use management in Colombia to the country's new political/administrative order, based on regionalization, and to the new style of development planning, the latter in its economic, ecological, social, and spatial dimensions.	Does not consider the subject of risk.	No direct relationship apparent between the two.
Another Look at Land Use Management.	Bernal Arteaga, Carlos Humberto. 2004	Bank of the Republic of Colombia. L.A. Arango Library	Explains the need to consider land use management to resolve conflicts, interests and power relations within the territory. Land use management is therefore conceived as a process of power distribution.	Although it reviews concepts, it does not address the concept of risk.	No direct relationship apparent between the two.
Methodological Guidance for Incorporating Disaster Risk Analysis into Projects of Public Investment.	Ministry of Economy and Finance of the Republic of Peru. National Systems of Public Investment. 2006	www.mef.gob.pe/DGPM/docs/manuales/PautasRiesgos.pdf	Does not address integrated land use management	Explains the importance of risk analysis in the projects of public investment. Proposes schedules for incorporating risk analysis into the different stages of the life cycle of public investment projects (identification, formulation and evaluation).	The incorporation of risk analysis is done in the realm of public investment projects, not that of territorial policy.
Basic Land Use Management Plan for the Municipality of Chinchiná. Technical Document.	Municipality of Chinchiná, Province of Caldas, Colombia. 2005	www.chinchina.comunidad.com.co/NR/rdonlyres/D799E142-4BE8-4A73-99CD-DCC6155EF02A/6167/DocumentoT%C3%A9cnicoSoportePBOT.doc	Includes the basic plan for land use management in the current legislation, in the context of the country's and the central southern region of Caldas' Development. Shows the results of the diagnosis, vision, policies and action programs, as well as the urban norms to be implemented.	The risk variable is included from the diagnostic stage, by considering the situations of human settlements in high risk zones as a territorial weakness. Defining areas of high risk, in turn, is used in the classification of land usage in the normative proposal.	Risk is the motive of a specific objective of land use management, referring to the mitigation of the factors that produce it and of the policy of its identification, for designing and carrying out measures of mitigation and prevention integrated into land use management.

(a) www.mef.gob.pe/DGPM/docs/manuales/PautasRiesgos.pdf(b) www.chinchina.comunidad.com.co/NR/rdonlyres/D799E142-4BE8-4A73-99CD-DCC6155EF02A/6167/DocumentoT%C3%A9cnicoSoportePBOT.doc

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
2004-2007 Development Plan: "Medellin, Commitment of the Entire Citizenry"	Medellin City Hall, Colombia. 2004	www.medellin.gov.co	Presents the Municipal Development Plan. The diagnosis shows the principal problems faced by the city (governance, social and economic crises, poverty and inequity, insufficient integration within the world and the country). Presents a model of the city that is translated into five line items, referring to: governance and participation, social inclusion, housing, production and competitiveness, and integration. Each of these line items point out the problems of origin, diagnosis of the sector, objectives and strategies, programs and components. Also presents the investment plan and sources of financing.	Vulnerability factors are covered in the areas of health care, old age, family and minors, housing, programs of disaster prevention, education for the prevention and integral management of river basins.	Although there is no specific line item for risk management, programs are seen to include the issue.
Communal Development Plan for Klarindan, Nicaragua.	Atlantic Biological Corridor Project. Component of Planning and Monitoring. 2003	www.marena.gob.ni/documentacion/metadato/PLANDCKLARINDAN.htm	This is the development plan for the Klaridan Community. Presents the phases of land use management elaboration: Communal diagnosis, suggested objectives and the projects formulated.	In the diagnostic phase it takes environmental and biodiversity problems into consideration and in the SWOT matrix (strengths, weaknesses, opportunities and threats), it deals with the dangers and hazards of other types and origins.	Natural hazards are included as variables in the analysis-diagnosis stage. The objectives and projects are not directly oriented toward risk reduction, but toward environmental protective measures and to providing better living conditions for the population.
2005-2007 Development Plan for Manizales: "For the City We All Love."	Manizales City Hall, Colombia. 2005	http://www.alcaldiamanizales.gov.co/Manizales_Alcaldia/Informacion/PlanDesarrollo/	Details the structure of the development plan and the multiannual investment plan. The structure is given for a vision. The mission, general objective, and orienting principles are in human development, the Millennium Development Goals, and regional integration, among others. The four areas of development are: social, territorial, economic and institutional. Each area has a general policy, programs and sub-programs for each public sector.	No specific objective is addressed.	No direct relationship apparent between the two.

- (a) www.medellin.gov.co
- (b) www.marena.gob.ni/documentacion/metadato/PLANDCKLARINDAN.htm
- (c) http://www.alcaldiamanizales.gov.co/Manizales_Alcaldia/Informacion/PlanDesarrollo/

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Development Plan for the Province of Mendoza, Argentina.	Institute for Rural Development (IDR), Ministry of Economy, Government of Mendoza, Argentina. 2003	idr@org.ar	Designs a strategic plan aimed at promotion and competitiveness of the rural activity, in a framework of social equity and environmental preservation. Proposes 11 working strategies distributed between institutional responsibilities (provincial and local). One of them proposes the realization of rural land use management plans.	Among its objectives, it suggests the need to protect the natural resources and prevent accidents, especially of a climatic and landslide nature, which are the type that bring most problems to the rural environment.	Does not explain how to insert the concepts of risk management in practice; but the strategic proposals are included, so that can be taken and developed in the context of integration with land use and environmental management.
Land Use Management Plan for Bolívar, Cauca Valley, Colombia.	Millán Orozco, David and Varela Varón, Martha Rocío. 2006	http://www.fundicot.org/grupo%209/014.pdf	Based on the current Land Use Management Law in Colombia. The elaboration of the plan comprised six stages: evaluation of political willingness and feasibility of realization, definition of objectives and thematic axes, pre-diagnostic, diagnostic (based on the multiple dimensions of development), formulation of the model of desired development, of the policies and action strategies and implementation.	Considers risk as necessary data: applies risk analysis as a basic element, but within the diagnosis of environmental management. Formulates projects of mitigation and prevention.	Risk management is incorporated into the objectives (identify risk factors) for adopting measures of prevention and mitigation. The development model incorporated prevention and mitigation, that is translated into policies and strategies of the same subject.
Municipal Land Use Management Plan in Function of the Natural Hazards. Department of Chinandega, Municipality of Corinto.	SINAPRED, Executive Secretary. 2005	http://www.sinapred.gob.ni/Archivos/Planes/POT0409.pdf	Based on the current Land Use Management Law in Colombia. Describes the objective of the land use management plan in the legal framework, the current and probable scenario, the hazards that affect the municipality, proposed zoning and the phases of land use management plan implementation.	All the tools of risk management are put to use.	This is a case where a complete proposal for land use has been carried out, in function of the natural hazards and the project of vulnerability reduction for natural disasters in the framework of the Land Use Management Law in Colombia. Risk analysis has been used in the preventive management of the municipalities of the SINAPRED, and in the vision of the municipality (risk reduction together with taking advantage of the potential for port development).

(a) idr@org.ar

(b) <http://www.fundicot.org/grupo%209/014.pdf>(c) <http://www.sinapred.gob.ni/Archivos/Planes/POT0409.pdf>

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Plan for Managing the Systematization of Streams on the Eastern Flank of the San Javier Mountain Range and for Upgrading the Drainage System.	Institute for Planning and Urban Development, Tucumán, Argentina. 1994	CD IPDU	Stages are detailed for analysis of information, diagnosis and proposals. The analysis collects and analyzes the information and creates maps and index cards on the problems. Diagnosis takes the judicial and environmental systems into account, among others, and analyzes the interrelationship between the problems. In the proposals, the guidelines are listed first and then the proposals by sector; environmental proposals are among them.	Includes risk as a variable in the analysis as a limiting factor of the physical environment in the diagnosis and as a criterion in the definition of the planning units in the proposals.	There is a dialectic link between the concepts and an operative linkage at the proposal level.
Plan for Managing the Mendoza River.	General Directorate of Irrigation, Government of the Province of Mendoza, Argentina. 2001	CD presentation of the Hydrological Information System.	Does not address the theme of land use management. Deals with a sectoral plan of a territorial nature. Makes an agronomic characterization of the Mendoza River basin. For the elaboration of this plan, environmental characteristics were analyzed, including those that analyzed the available hydrological surface.	Considers issues related to the risk produced by the industrial, mining, agricultural, transportation and urban activities in contaminating water, all along the river basin. This includes the mudslide risk in Gran Mendoza and the risk of unavailability of water.	No explicit relationship.
Strategic Plan for the City of Córdoba. PECba.	Municipality of Córdoba. 2003	www.pecba.gov.ar	Addresses the subject of land use management. Presents the statement or vision of the inhabitants of Córdoba for their city, the stages of diagnosis, proposal for development, identification of priority projects, means of execution and follow-up. The objectives have been outlined in the social, economic, urban, and environmental aspects. To this global plan are added specific projects for zones of the city and the formulation of the proposal for the neighborhood participation. Great emphasis is placed on the identity, education and awareness, and revaluation of the city center and urban consolidation.	Not treated as a specific objective, in spite of the fact that it is considered a critical theme in the diagnosis of sustainable environment and the status of the city's resources. In the urban aspect it considers the physical limitations to development due to the growth pattern of the city: vulnerability to flooding. The measure proposed is to achieve awareness of this situation: but there are no preventive, mitigation, response or recovery projects at this time.	No explicit relationship between land use management and risk management. The general objective of the plan is for Córdoba to be a city that respects its environmental surroundings.

(a) www.pecba.gov.ar

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
SENPLADES Strategic Plan, Ecuador.	National Secretariat for Planning of Economic Development (SENPLADES). 2005	http://www.senplades.gov.ec	Does not address land use management. Considers planning and public policies. This is a SENPLADES plan for institutional strengthening. Presents components of the plan: diagnosis, vision, mission, objectives, policies and strategies, as well as specific planning by executive unit.	SENPLADES seeks to incorporate a risk management culture into the processes of planning and the formulation of public policies. Although there is a unit for risk management that will carry out these policies and strategies, the risk management is incorporated into the unit for investment and projects, where the incorporation of the risk focus into the project studies will be promoted.	There is a relationship between risk management and territorial public investment, but not between risk management and land use management, as instruments of integrated territorial policy.
Regional Plan for Disaster Prevention and Attention for the Region of Piura. 2005-2010.	Regional Government of Piura. 2005	www.regionpiura.gov.pe/recnat/defensacivil/Planes/PREPAD.pdf	Does not address land use management, only the processes of regional development.	Explains the role of Peru's Regional Civil Defense System (SIREDECL). Explains the hazards and disasters that affect the country and the result of a strengths, weaknesses, opportunities and threats (SWOT) analysis. Consigns the principles of Civil Defense and the objective for the year 2010. Then it describes the normative framework and the guidelines of policies to implement, as well as the strategies and programs of actions. Emphasizes the articulation of these with other national and regional management and development instruments.	There is no relationship between risk management and land use management, but among the weaknesses and hazards of the SWOT analysis, it consigns factors of institutional vulnerability, such as the failure to incorporate risk management into the processes of regional development, and the limitations regarding a culture of prevention and budgets, as well as the slowness of the decentralization process. Among the strategies proposed are risk estimation, its reduction and the incorporation of risk management into the plans for development, investment projects and in the prevention of emergencies and disasters.
Planning for Development with a Focus of Risk Management. (Module 2)	Regional Government of Piura. 2006	CD, obtained through USAID/OFDA.	Considers the concept of territory as an environment where development happens. Emphasizes the investments necessary to make it happen. Assimilates the concept of land use management with that of development and planning, but gives it no special consideration.	Exposes the need to incorporate measures for reducing vulnerability in the investment programs to avoid having the projects create new risk scenarios.	There is no direct relationship between land use management and risk management, but it considers risk management as a strategy for development, explaining the relationship between risk and development. Describes aspects to be considered in the formulation of development plans, such as vulnerability connected to poverty and risk analysis, among others.

(a) <http://www.senplades.gov.ec>(b) www.regionpiura.gov.pe/recnat/defensacivil/Planes/PREPAD.pdf

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Planning and Financial Protection for Surviving Disasters.	Kari Keipi Justin Tyson- Inter-American Development Bank. Series of technical reports from the Department of Sustainable Development. 2002	http://www.iadb.org/sds/publication/publication_3108_s.htm	Does not address land use management.	Makes a differentiation between risk management and emergency response. Explains the importance of reducing vulnerability due to the impossibility of totally eliminating disasters, for which it is necessary to create mechanisms of financial protection. Given that it is a financial entity, emphasis is placed on these forms of protection: disaster bonds, insurance, sources of finance, funds for prevention and mitigation, and risk transfer.	No explicit relationship.
Policy on Territorial Development.	Ministry of the Environment, Housing and Territorial Development. Directorate of Territorial Development. Republic of Colombia. 2006	http://www.minambiente.gov.co/viceministerios/vivienda_desarrollo_territorial/desa_territ/politicas.htm	Presents the Ministry's policy on territorial development. Gives a brief diagnosis of the new reality since the 1990s, the objectives of the policy and the three strategic areas of action: formulation of policies and guidelines, promotion of technical assistance to municipalities and regions and support for special development projects that are outlined in turn into actions. Among the foreseen actions in the area of policy formulation are the development of urban processes that guarantee sustainable housing, and orderly, balanced, and high-quality urban growth.	No risk management guidelines.	No explicit relationship.
Guiding Principles for Hydrological Policy of the Republic of Argentina. Fundamentals of the Federal Agreements on Water.	Federal Hydrological Council. Sub-secretariat of Hydrological Resources. Ministry of Federal Planning. 2003	Special Bulletin of the Federal Hydrological Council. Argentina	Does not address the subject of land use management. Deals with a sectoral plan of a territorial nature. Most of the document talks about the need for integrated management of hydrological resources, with a focus on environmental management.	Aspects such as prevention and mitigation are included by dealing with the relationship between water and society, using water as a risk factor, and proposing norms, contingency plans, and infrastructure. The incorporation of the environmental dimension into hydrological risk management is carried out by evaluating the risk and the impact on specific projects.	No direct relationship apparent between the two.

(a) http://www.iadb.org/sds/publication/publication_3108_s.htm

(b) http://www.minambiente.gov.co/viceministerios/vivienda_desarrollo_territorial/desa_territ/politicas.htm

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
2001-2006 National Program on Urban Development and Land Use Management.	Secretariat for Social Development, Mexico. 2001	http://www.sedesol.gob.mx/subsecretarias/desarrollourbano/subsecretaria/documentos/01%20INTRODUCCI%EEEN.PDF	The urban system and national development are placed in the diagnosis, in the international and national context, and there is a description of the challenges for the country regarding land use management, urban and regional development and the use of urban land. Then it presents the objectives, vision and mission, policies for carrying them out and the way to evaluate the accomplishment of the objectives.	It takes vulnerability of the urban settlements into account. Among the policies of land use management, it deals with housing development, the use of land area reserves, and recommends policies of disaster prevention assistance.	In the description of the vulnerability of human settlements, it stresses the conditions of hazard, the generation of vulnerability and its connection to the processes of urbanization and development of the territory. It deals with the progress in disaster assistance and prevention.
Proposal for Guidelines for the Land Use Management Policy of Peru.	Sub-committee on Land Use Management, Peru. 2005	www.conam.gob.pe/documentos/denamientoambiental/OrdTerrit/Lineamientosde_OTaprobado%20Subcomite.pdf	Presents the problems requiring the application of land use management and its guiding principles, as well as the normative background and national plans. Then it presents the objectives, guidelines and instruments.	Works with the hazards, the location of critical areas and social awareness of risk.	Among the principles of land use management, prevention and correction of the placement of human settlements and infrastructure in areas of risk are included as an objective. From here we derive the guidelines for identifying danger zones, zones for resettlement of the population, zones for developing a culture of prevention and the inclusion of prevention in the investment projects.
Proposal for Land Use Management in Junín, 2004-2014.	Municipality of Junín, Mendoza, Argentina, Institute for Rural Development (IDR) Mendoza, Argentina. 2004	CD presentation of the Land Use Management Plan.	The plan is organized into four programs for territorial action corresponding to four sectors of the municipality whose boundaries are described in the diagnosis in which the five programs of intervention will be implemented in function of the particularities of each sector. These programs are subdivided into sub-programs and projects.	Includes the concepts of risk management. The program is subdivided into evaluation of potential natural and technological risks, and in the creation of programs to manage emergencies and plans for prevention to keep settlements safe.	One of the five intervention programs is that of environmental preservation and risk management; it responds to the specific objective of protecting the environment, resources, the population and the country, in a context of competitive development and a framework of permanent land use management.
Proposal for Land Use Management in the Province of San Juan, Argentina.	Government of the Province of San Juan, Ministry of Federal Planning, Public Investment and Services of the Republic of Argentina. 2006	Office of Planning and Urban Development, Ministry of Technology and Public Works, Government of San Juan, Argentina.	Diagnosis addresses environmental, social, economic, legal, and institutional systems. Describes the current territorial situation, evaluates alternatives of potential development and presents a desired scenario, together with the programs of actions, the installation of the project and monitoring of its execution. The concrete intervention projects are outlined as well as the pre-feasibility studies for each of the provinces.	Risk that affects the provincial territory is analyzed among the environmental characteristics. Social attitude toward risk, affecting the conformation of the current system, is taken into account.	Measures are recommended for risk prevention in the context of land use management and especially oriented toward the action of training professionals, administrators and responsible territorial persons, on LUM, RM and environmental management in an integrated manner, together with the process of territorial decentralization. It also proposes integrated information systems.

(a) <http://www.sedesol.gob.mx/subsecretarias/desarrollourbano/subsecretaria/documentos/01%20INTRODUCCI%EEEN.PDF>(b) www.conam.gob.pe/documentos/ordenamientoambiental/OrdTerrit/Lineamientosde_OTaprobado%20Subcomite.pdf

Title of Document	Author and Other Data on the Document	Location	Concept of Land Use Management (LUM)	Concept of Risk Management (RM)	Dialectical or Operative Relationship between LUM and RM
Regional Rural Land Use Sustainable Management Project.	Food and Agriculture Organization (FAO). 2006	Bank of the Republic of Colombia. L.A. Arango Library.	Explains the methodology of land use management proposed by FAO for application in the counterpart countries. Since it is rural land use management, it is mainly based on the agro-ecological characteristics of the territory, which are defined by the use given to each site, and therefore is an incomplete definition.	Does not address the concept of risk.	No direct relationship apparent between the two.
Risks and Sustainability Challenges for Municipal Administration.	Néstor Eugenio Ramírez Cardona, Mayor of Manizales, Colombia. 2004	www.sgc-grcosude.com/boletines/documentoramirez.pdf	Based on current land use management in Colombia.	Presents the conditions of coexistence of the municipality's population, with factors of risk. Introduces a conceptualization on the relation between vulnerability, risk and disaster reduction, and its general absence from municipal policies. Specifies that for risk prevention, it is necessary to add work in science and technique, political willingness and community acceptance. It also clarifies that risk management should add risk identification to the evaluation of economic and social losses, and to the balance between economic growth and the environment, to avoid its increase.	There is an operational relationship between land use management and risk management in that it describes the aspects in which Manizales has been working, such as risk reduction, resettlement of families located in high-risk zones and risk transfer, defining each element and the objective of pertinent policies and completed tasks.
A Subject of Development: Vulnerability Reduction in the Face of Disasters.	U.N. Economic Commission for Latin America and the Caribbean (CEPAL), IADB. 2000	www.iadb.org/sds/publication/publication_2168_s.htm	Does not address the concept of land use management, but deals with sustainable development. However, it does recognize LUM as a tool for sustainable development.	Presents the definitions of hazard, vulnerability and danger, differentiating them, as well as the hazards that affect Latin America. Points out the damage caused and its variation over the last decades.	Explains the need to invest in the reduction of vulnerability, to achieve sustainable development, emphasizing the attention to political/institutional vulnerability. Presents some elements for incorporating vulnerability reduction into the strategies of sustainable development, into integral risk management and into the most ample elements that fall under land use management.

- (a) www.sgc-grcosude.com/boletines/documentoramirez.pdf
 (b) www.iadb.org/sds/publication/publication_2168_s.htm

*CONTRIBUTION TO RISK REDUCTION
FROM THE PERSPECTIVE
OF FINANCE AND PUBLIC INVESTMENT*

Prepared by:

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*Contribution to Risk Reduction from the Perspective
of Finance and Public Investment*

PRESENTATION

This document is a compilation and revision of several articles, documents and consulting jobs carried out by Omar Darío Cardona A. related to risk retention and transfer, the impact of extreme disasters on the growth rate and the sustainability of public finances, the financial protection of the state, insurance and reinsurance for natural disasters, and other related matters.

The actual work to compile, adjust and adapt the contents of this publication was carried out by Juan Pablo Sarmiento P. The concept of conducting this task was a document directed at the decision-making levels of public administration and those in the private sector involved in these issues: recipients who are not necessarily specialists in financial aspects or in risk management.

The author of the texts selected herein has produced an extensive amount of specialized information in which these issues are carefully analyzed and documented, and should a reader desire to obtain greater details he or she is invited to establish direct contact with him at: odcardona@hotmail.com.

I. INTRODUCTION

One of the most outstanding facts of the past 15 years is the proof of a long-term tendency toward an increase in the number of natural or social disasters in developing countries. Add to this a factor of greater vulnerability of societies to events of great magnitude, such as earthquakes and floods, and a notable increase in expected losses in both human lives and material goods is observed. The accelerated process of urbanization and the growth of poverty have overwhelmed the conventional schemes of traditional social assistance and protection, leaving wide sectors of the population with no possibility of reacting to these emergencies.

Even though institutional changes have been implemented, introducing modern schemes for facing disasters, persistent problems continue to plague the areas of organization and assignation of resources for risk prevention and mitigating activities. At the same time, financial markets have globalized, giving local nationals access to external financial resources and derivatives that can help to reduce the population's exposure to natural phenomena as well as that of their family patrimony. Based on this, it is necessary to defend the basic principle that it is more human to prevent a tragedy than to cure its effects.

Therefore, it is necessary for countries to promote and use the coverage mechanisms that have been developed in the capital markets for risk transfer, thereby minimizing private losses and the physical exposure of the state. Humanitarian assistance is insufficient and cannot solve the problems; governments cannot sustain their policies in what has come to be called the "first lady syndrome" (Wilches, 2000). The truth is, "worldwide experience has demonstrated that insuring against natural disasters provides two great advantages: it stimulates prevention, oriented by insurance companies, and it guarantees financing and efficiency in the activities of post-disaster reconstruction" (Vargas, 2002).

This chapter presents a summary of the principal financial instruments available to cover economic losses. It provides a general description of the transfer mecha-

nisms, risk retention from the financial perspective, and its possibilities in the future. It also reflects on the role of the different sectors involved and gives special emphasis to opportunity and to the complementary approach that exists among these sectors to stimulate the execution of risk reduction and mitigating measures. The chapter concludes with an analysis of the effect of extreme disasters on the growth rate and the sustainability of public finances.

2. RISK TRANSFER

Generally speaking, integral risk management is the term used to identify the planning and application of measures meant to hinder or reduce the adverse effects of dangerous phenomena on the population, goods and services and the environment. The process involves five basic steps: 1) Identify and analyze the danger and the vulnerability (also known as risk estimation); 2) Examine the feasibility of the alternatives or techniques for risk reduction; 3) Select the best available, while feasible, techniques; 4) Implement the chosen techniques; and 5) Give the program the follow-up it requires. Now, from a financial point of view, risk management follows this same plan, but from an economic perspective, it involves identifying and analyzing the exposure to loss, examining the possibilities of transfer and retention, carrying out transactions and paying attention to the changes or adjustments that should be made. The following is a review of the role the insurance and reinsurance industry plays, title registration and other financial tools used or that might be explored for their integration into collective risk management of the causes of natural or man-made phenomena, from a multisector, interinstitutional and multidisciplinary perspective.

2.1 The Insurance and Reinsurance Industry

This financial figure allows a property owner to transfer the risk (in this case, the potential for economic loss) to an insurance company. Insurance policies are usually based on the law of large numbers (insured events are

seen as independent from each other; the probability of the simultaneous occurrence of many events is very low). However, in the case of insurance for catastrophe, such as those caused by earthquakes or hurricanes, the situation can be very different; the losses may occur simultaneously to many properties over a large area. In these cases, the losses are referred to as correlated. The less correlation, the fewer losses or risk to a particular insurance company.

Insurance is a business. It involves accountants, actuaries, salesmen, adjusters, managers, executives, etc. Insurance is also a product oriented toward a particular market; it has a value for the client and a price (premium). However, the business of insurance has one characteristic that distinguishes it from most other consumer products: the cost of the product for the insurer is determined only after the product is sold. Its cost depends on the claims paid during the life of the policy, therefore the expected losses and other costs should be estimated in advance. These estimates are the work of the actuaries who project, for example, losses due to car accidents, based on the history of past accidents, inflation in the costs of medical attention and changes in legislation. In the same manner, actuaries project the payment of insurance policies, for example in the case of life insurance, based on morbidity and mortality tables that are derived from historical experience that they have had with health and life insurance in the past. Disaster insurance, on the other hand, represents a greater challenge for the actuaries because the past cannot necessarily be used to project the future in these cases. Actuaries have to deposit a great deal of confidence in scientific knowledge and in engineering, when they try to quantify the probability of events of low frequency and high severity and their effects on the exposed elements.

Most insurance policies include some form of deductible, which means that the insured party must cover the first part of the loss. This signifies that the insurance company is only responsible for damage to the property when the amount exceeds the percentage of loss established in the deductible and up to an also previously specified maximum amount of limited coverage. In order to reduce the magnitude of the losses, the

company resorts to high deductibles or co-payment instruments, where the insurer pays a fraction of any loss that comes up, which produces an effect similar to the deductible. Insurers use the reinsurance industry to transfer, and at the same time, manage, their own risks. Therefore, in order to cover the excess of loss, insurers usually resort to reinsurers under coverage contracts, starting with an agreed upon amount that may, additionally, also have a limit; or the loss may be shared proportionally starting with a certain amount, as previously determined. Reinsurance companies underwrite policies from different parts of the world and thereby distribute the risk geographically.

When the risk is highly ambiguous, that is to say, there is a high degree of uncertainty in relation to the probability of a specific loss and its magnitude, the value of the premium will be higher. The actuaries and underwriters express their aversion to ambiguity by placing a higher value on premiums when they perceive that the risk is not well specified. When it is impossible to distinguish between the probability of loss for categories of good and bad risks, they are said to present an adverse selection. This happens when an insurer assigns the same premium to the entire population of properties, which may lead to only owners of bad risks buying the policy. So, if coverage is bought only for bad risks, the insurer may suffer important losses in every policy it sells, which is the reason it is recommendable to differentiate the premium between good and bad risks. This should be done to avoid having owners of good risks express their aversion and refuse to pay for coverage that they consider too expensive. Although there are several approaches for confronting this type of situation, the most adequate, according to current knowledge, is to undergo a suitable audit or professional examination of the situation, to more precisely determine the nature of the risk. However, the cost of this study might mean an increase in the premium, unless the buyer of the policy pays for the audit.

This problem of adverse selection obviously occurs only when people are better informed of the probabilities of loss than is the seller of the coverage. If neither side has an advantage in information, then both sides will base their positions on the same data, and

a blanket premium can be established, based on the average risk. In this case, both the owners of good and bad risks will tend to be equally interested in buying policies. In recent years, greater public understanding of the vulnerability of buildings and the role of building codes has frequently resulted in owners questioning the insurance companies who fail to establish the difference between buildings constructed with standards or reinforced and others that do not comply with these characteristics.

Another aspect that should be considered is moral risk. This refers to an increase in probability of a loss due to the behavior of the policyholder. This is difficult to monitor and to control. One of the ways to confront this situation is to introduce deductibles and co-payments that stimulate or reward careful behavior after acquiring the coverage. These aspects, in addition to the correlation or simultaneity of the losses caused by a single event, usually translate into an increase in the value of the premiums, which has, in turn, affected many cases where there has been little demand for coverage. Insurance companies, therefore, have found it unfeasible to offer coverage in many cases, and have come to the conclusion that the risks being considered are un-insurable, since they do not lend themselves to a normal development of the product.

In the United States of America, although the income earned by many insurance companies before the 1990s had been considered fair, events such as Hurricane Andrew in Florida and the Northridge Earthquake in California, in many cases diluted those earnings and several insurance companies became insolvent or were forced to refinance. Before 1988 the insurance industry had never suffered losses greater than \$1 billion for any single event. Hurricane Andrew represented a loss of \$15.5 billion while the Northridge Earthquake cost \$12.5 billion. This last event exceeded the value of all insurance premiums collected during the entire century, that is to say, it was clearly subsidized, given that premiums had been collected only amounting to \$1 billion. At that time, new estimates indicated that natural disasters could cause losses between \$50 billion and \$100 billion and that the total capital of the insur-

ance industry could be in the order of \$200 billion (it is currently in the order of \$300 billion). This situation led certain insurers to decide against insuring against hurricanes and earthquakes or to attempt to retire or renegotiate their policies. The industry had previously arrived at similar conclusions in the case of insurability for floods, which prompted the U.S. Government to create the National Flood Insurance Program in 1968. The events of the 1990s in the United States caused a restructuring of insurance and reinsurance contracts; new private and governmental insurance instruments as well as new markets and initiatives for confronting this type of situations were created, such as the one that was strengthened in Bermuda. It is important to mention that a new disaster of high magnitude is of great concern to the industry, since it could affect its financial stability.

Insurance companies need answers to questions such as the following:

- What is the expected annual loss? Based on that estimate, they can define how much the value of the policy's premium should be; that is, they can identify what makes the difference in determining the premium to charge.
- How can the company adjust its premiums for different on-site conditions, the type of building and the quality of the construction? Each building is different in its structure and particular conditions; some are built on rock foundations and others on soft soils. Due to these circumstances, expected annual loss for each can differ.

To create the portfolio for each company, it is necessary to determine the probability of a maximum loss within a defined number of years. This estimate, known as Probable Maximum Loss (PML), for which there is no single standard (200, 500, 1,000 or more years) is fundamental information for companies and regulating agencies, in order to guarantee solvency and, thereby, know if additional funds beyond those available will be required to attend to the excess losses that occur.

To control the over-concentration of exposure, the companies should program and limit the underwriting of certain high-risk regions. For this reason, special models are needed. The information of averages and statistics based only on historical data is insufficient because these events are sporadic and the window of opportunity for obtaining useful information for precise estimates is very small. For example, forgetting to consider an extreme loss in statistical history can lead to a low estimate of the average yearly loss and, by the same token, including a major event within a short timeframe can overestimate the yearly loss. For example, between 1970 and 1993, according to historical data, the rate of average loss in the United States was 0.26, but if you include the year 1994, the rate soars to 2.07. The Northridge Earthquake, a moderate event, occurred that year; the loss could, therefore, be far greater if a severe earthquake should occur as a result of the movement of other geological faults in the zone. Furthermore, for this information to be useful, it should be adjusted appropriately, taking factors into account such as inflation, the increase in exposure, changes in vulnerability (updating to consider building codes), greater penetration of the insurance market, eventual changes in the structure of the policy, etc. Due to the fragmented nature of these data it is difficult, if not impossible, to reconstruct earlier socioeconomic and demographic scenarios. For these and many other reasons, the use of only historical information and an empirical approach to prognosticate catastrophic losses is unsatisfactory. The estimates that result from these uncertainties can be controlled only using more rigorous, independent estimating techniques, such as models based on engineering studies and better developed scientific approaches. For this reason it is estimated that the insurance industry has been increasing its expenses in risk modeling, from investments on the order of \$111 million in 1995 to a projected figure of \$432 million in 2005.

In the case of highly regulated residential insurance in the United States, in the past, the industry provided a basically uniform coverage and deductible (for example, 100% for the building, 50% for the contents, 20% for damages resulting as a consequence of the event,

10% for additional subsistence expenses and a deductible of 5% or 10%). Similar instruments have been used in most countries. However, after the Northridge Earthquake, many companies started using more purified models, based on engineering studies, to adjust insurance rates and deductibles. Principal private and public entities offering coverage for earthquake loss in California have adopted this type of model. In Mexico, for several decades the insurance industry has backed research for developing technical instruments for estimating pure premiums, PMLs, fees and reserves for ongoing risks.

A computer system that uses the latest estimation technologies for seismic hazard includes the microzoning of the city and the vulnerability of the buildings; it is the system used in Mexico by all of the insurance companies to evaluate their risk portfolios on an individual and accumulated basis. One special version of this system, used for monitoring and follow-up, is also used by the National Commission on Insurance and Finance; this version has made it possible to use a standard that allows each company to specify the amount of reserves it requires, according to the structure of its portfolio. This system also allows for an agreement between each company and the regulating entity on the percentage of reserves necessary. In Colombia, a strategic alliance between local and Mexican specialists developed a computer tool similar to the one described above. Its use has allowed the insurance industry to carry out massive evaluations in the field of earthquakes for all of the companies and has already initiated the acquisition and individual usage of this technology to carry out periodic estimates. Generally speaking, automatic models are beginning to be used to orient risk management decisions, in order to determine how much capital each company needs, how much reinsurance it should buy and how to achieve maximum diversification.

Governments in general have exercised important pressure on the industry to maintain the availability of catastrophe insurance at a price within reach of homeowners, while the insurers seek to increase their prices for this type of coverage in order to reduce their risk and

remain profitable and solvent in case of a major event. In the United States, this conflict has created significant tension between the industry's regulators and insurers in places where there is high seismic risk. This has been one of the factors in establishing complementary insurance and re-insurance mechanisms.

It is often said that the purchase of earthquake insurance should be mandatory, in order to distribute the risk and make major earthquakes insurable. This suggestion has been included in several government programs in countries such as the United States. However, there is no scientific or legal basis for making the purchase of earthquake insurance mandatory. From the legal point of view, any gains sought to be obtained by geographical distribution has long since been realized. If the objective of the policy is to make owners of low-risk buildings subsidize the owners of high-risk buildings (such as the non-reinforced shantytowns in areas of high propensity), then it would be preferable to impose a mandatory tax. Furthermore, it is not clear why they should sell an earthquake insurance policy to cover many old buildings, since these policies usually have coverage for replacement of the destroyed building, which would have to be new and whose value in these cases would be far greater than that of the destroyed old building. The final argument against mandatory earthquake insurance is that the strategies for increasing insurability would be impossible, since the insurer would have no opportunity to choose the risks and control the PML. Therefore, the insurability of earthquake losses could be reduced by private insurers who provide coverage.

Because of this, one of the proposals that have been suggested in some countries is that the national or federal governments offer earthquake insurance, as is done for floods in the United States. This proposal was suggested because the insurance industry is unwilling to offer coverage due to the high possibility of suffering losses. It has also been suggested that government pro-

grams could accumulate premiums and tax-free investment earnings, and thereby accumulate funds at a much more favorable rate than can the insurers. It has also been argued that a program of this type could reduce the onerous situation that post-disaster assistance represents for the government in loans and subsidies. One of the most important points is the possibility of promoting mitigation for reducing seismic damage and the ability of associating it with a program of government insurance. However, although these seem to be very reasonable arguments, these suggestions also enter into conflict with certain sociological, economic and actuarial principles: the "veracity" of these government programs (the opportunity cost of the funds), the expected benefits of a competitive insurance market (i.e. efficiency and competitiveness of interest rates) and the impossibility for choosing the consumer (the ability to decide on the purchase of the coverage). Simply put, this type of controversy leads one to ask, in political terms, "what can the government do best and what can the private insurers do best?" without also failing to ask, "what is the most adequate orientation of expenditure of scarce government resources among the myriad of social demands and commitments that compete for the public budget?"

Insurance, in and of itself, is not considered a mitigating measure because its effect is to redistribute the loss rather than to reduce it. A carefully designed insurance program can, however, stimulate the adoption of mitigating measures, assigning a price to the risk and creating financial incentives through applicable discounts to premium rates, lower deductibles or higher coverage limits, conditioned to the implementation of those risk-reducing measures. Figure 1 illustrates how the risk increases as the level of hazard or danger increases, vulnerability increases or both factors increase simultaneously. Figure 2 represents the reduction of the risk and the hypothetical threshold of the risk's insurability to the degree that mitigating or risk reducing measures can be implemented.

Figure 1. Risk Factors: The Greater the Hazard and the Vulnerability, the Greater the Risk

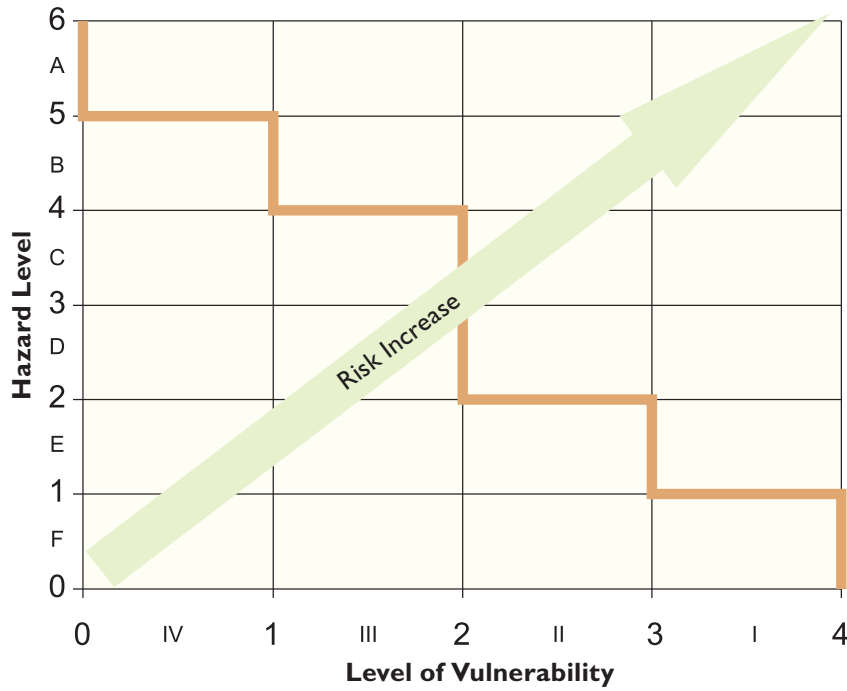
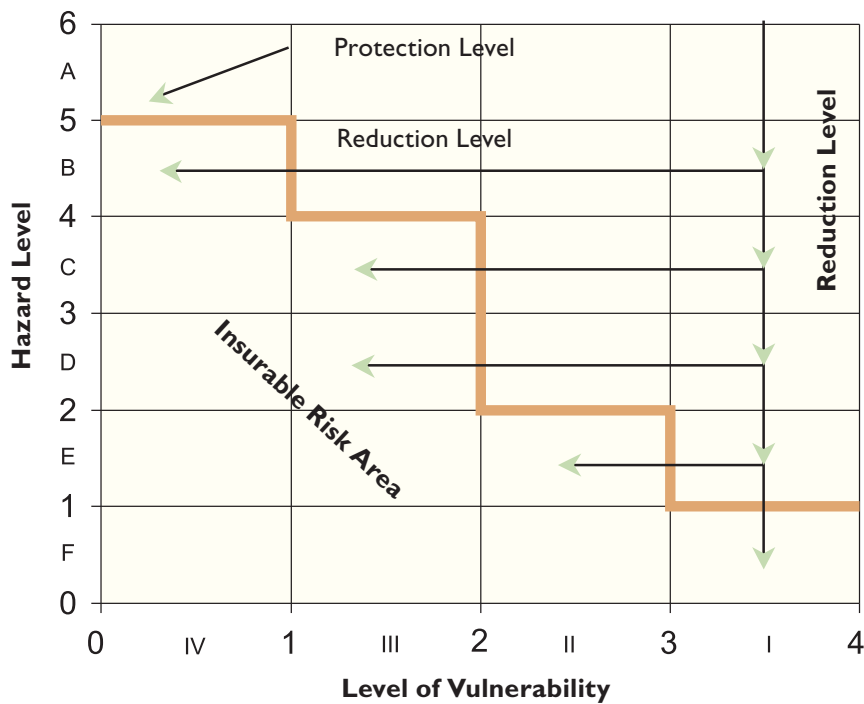


Figure 2. Insurable Risk because of the Application of Reduction and Mitigation Measures



The mutuality pool is a tool that, similar to insurance companies, obtains an insurance policy or operation through which a number of interested parties, threatened by analogous risks, organize themselves to be able to compensate members who suffer damages, thanks to the premiums they have collected, but the insured, in this case, by becoming an affiliate and signing the policy, acquires the double quality of insured and member of the mutual association, with the duties and rights of all associates. This type of figure has been used by corporations and recently by municipalities or government level districts in certain countries. From these examples one can conclude that, although they are, by no means, a panacea, insurers and reinsurers play an essential role in sharing (pooling) the risk of individual properties in case of disasters, through the principles of portfolio diversification.

It is important to mention that there are different reasons for which the insurance markets in some emerging economies are not yet well developed. In some cases it is because large segments of the economy are informal, individuals have few assets to insure or insurance has never been a traditional part of their culture. Frequently, the lack of development in the insurance market is due to the lack of familiarity with insurance or the fact that the market functions poorly and therefore is not competitive. In many cases the level of training and professionalism is deficient, which hinders the formation of robust markets. Hyperinflation is another factor that has had an extremely negative effect because it has resulted in multiplying the replacement values. In some countries there have also been problems with insurers or with their agents because they have failed to make due payment on insured losses or have not done so on time. There have also been many cases of questionable solvency and the risk of defaulting on payments has created doubts among potential purchasers of insurance policies. Finally, it is also important to point out that in several countries, legislation and regulation is in bad need of modernization and strengthening. Therefore, the insurance industry in many developing countries is in its incipient stages or is plagued with major deficiencies.

2.2 Reinsurance

Insurers use reinsurance to limit the temporal fluctuations in damages to the policyholders to whom they are responsible, and to protect themselves against insolvency

in case of a disaster. There are different types of reinsurance that are important for purposes of finding the best scheme for transferring risk through this mechanism.

Proportional Reinsurance

In this type of reinsurance, the premiums and damages are distributed between the direct insurer and the reinsurer at a fixed ratio. These reinsurance instruments may either be a fixed quota or for amounts exceeding a given limit.

Fixed Quota Reinsurance

In this type of contract, the reinsurer assumes a fixed quota on all of the policies that the insurer has underwritten in a given field. This quota determines the way the direct insurer and the reinsurer divide the premiums and the payment of damages. Because of its simplicity, this form of reinsurance is easy to manage and tends to save costs. However, it has the drawback that it does not allow for sufficient collection against larger losses, so it generates a portfolio of highly varied risks.

Reinsurance of Excess Amounts

In this type of reinsurance, the insurer retains the totality of the risk, up to a maximum limit of the amount insured. Beyond that limit, the reinsurer assumes the rest of the amount insured. The obligations of the reinsurer are limited to losses no greater than a defined multiplier of the maximum limit. A proportion of the insured risk that determines the way the premiums and losses are divided is derived from the distribution between retention and cession to the reinsurer.

Nonproportional Reinsurance

In this type of insurance, the damages are distributed according to the losses effectively suffered. The direct insurer defines a specific quantity up to which it will respond for the totality of losses. This amount is known as priority or deductible. When losses surpass that priority, the reinsurer should respond for the payment of the rest of the losses up to a limit of contracted coverage. Contrary to the case of proportional reinsurance, the reinsurer should calculate the price of the reinsurance based on statistical information and

the distribution of the probabilities of the hazards. Reinsurance for excess losses is among the non-proportional reinsurance options.

Reinsurance for Excess Losses (XL)

This is the most frequently employed type of reinsurance for disasters. In this type of reinsurance, the amount of the losses determines the proportion of risk cession. In this modality of reinsurance, the direct insurer takes complete responsibility for the losses up to the amount determined by the priority of all of the policies of a predetermined class in the contract, independently of the amount insured in these policies. Only the losses that surpass the amount established by the priority should be paid by the reinsurer. It participates only in the payment of losses that surpass the priority.

2.3 Capital Markets

The capital market has a new emerging role in catastrophic risk transfer. A basic characteristic of more solid economies is a well-developed capital market system. These systems place savings and investment capital into various economic sectors with the localization of rules based on risk and yield. In practice, financial risk is packaged and transferred to investors through financial instruments, also through proprietary funds (such as common shares) stocks or derivatives (equity options, future interest rates, foreign trade, future commodities contracts). Therefore, it is possible to transfer the risks from the sectors that support them (owners, to use the broadest definition) to the capital markets.

As mentioned in an earlier section, the lack of a sufficient level of capital (in the insurance and reinsurance sector, at both the international and local levels) to back the financing required for a disaster, generates a scarcity in supply of reinsurers in countries prone to this type of risk, as well as disproportionate increases in insurance premiums and a generalized distortion in the adequate functioning of the markets. In some cases, depending on the magnitude of the disaster, the local capital markets are unable to absorb the demand for resources and

liquidity that this type of disaster requires. On occasion even the global insurance markets have had times in which a slight increase in the frequency of disasters has taken them to dangerously low levels of capital and solvency. Finally, local governments frequently lack the capacity to finance losses caused by this type of disaster, due to their limited fiscal capacity.

Even in cases where most private properties are insured, the vast majority of government assets, as well as infrastructure, are completely unprotected; this is without even considering the responsibility that falls on the government regarding that part of the population that, due to its conditions of poverty and lack of resources, is unable to acquire insurance even though it is available in the market, and is therefore also completely unprotected.

Traditionally, the option for disaster risk coverage by local governments has been to seek resources for reconstruction after the disaster has occurred; resources that, for the most part, have come from lines of credit with banks and other sources of capital available in the market. However, the financial load that this type of mechanism generates for the agencies involved in the insurance contract, and the inability of this type of financing mechanism to finance great disasters, has led to the search for sources of risk coverage and financing that are better prepared to cover this type of losses.

In this context, global capital markets have emerged as an alternative for financing and transferring risk. It is estimated that this market is currently valued at close to \$30 quintillion, of which the United States of America represents approximately one third, and that the losses generated by a disaster amount to closely approximating the price shifts that occur in one day in this market. Therefore, the capital market has the capacity, in terms of resources, to finance and absorb the financial risks that a disaster is likely to generate (Andersen, 2002, p. 10). Although some developing countries do not have a great deal of access to this type of market, multilateral institutions can facilitate this income by creating contingent credits and promoting regional agreements that permit regional diversification of the risk, among other benefits.

Recently, certain financial innovations have emerged in the world's principal capital markets (United States, Europe and Japan, and others) that provide an alternative way of managing the financial risk of disasters. These alternatives are not a substitute for the insurance and reinsurance markets; quite to the contrary, they are a complement, in that they may be used to transfer part of the risk of insurance and reinsurance companies to the global market, since that market has sufficient capital available to absorb the risks and make the payments demanded by this type of catastrophic event. Furthermore, these alternatives allow the local and global insurance sectors to capitalize, so that over the medium and long term, this sector becomes self-sustaining.

The objective of this section is to present the financial instruments that are currently available in the principal capital markets that can act as financing alternatives for facing a country's disasters. As we present each of these instruments, we will give a basic definition of its structure and a general explanation of its value in the market. In general, there are two types of instruments that are important to describe in detail: instruments for financing and instruments for transferring risk. In the case of the instruments for financing, the issuer of the title or

instrument must, at some time, return the capital to the investor who made it available, in exchange for the deed or title, while in the case of risk transfer, the investor runs the risk of losing his or her capital, in exchange for a higher rate of return.

There is no theoretical reason for which the risk run by the investors in case of a disaster cannot be titled. The forces of today's market have accelerated the convergence between the insurance and the capital markets, allowing issuers who have ambitious plans for growth or excessive exposure to disasters to obtain direct access to other sources of capital. On the other hand, the investors have the opportunity to invest in new classes of assets that are not correlated to other debts or risk funds while earning an attractive return. The risk of the conventional portfolio of titles decreases with the addition of non-correlated titles; and significant improvements in the latest methodologies of risk management and modeling techniques can enable investors, unfamiliar with the risk of insured disaster, to understand and accept the quantification of the risk.

Table I summarizes some of the benefits for both the issuers (sellers) and the investors (buyers) of disaster risk.

Table I. Benefits to Sellers (Issuers) and Buyers (Investors) of Catastrophe Risk

Issuers	Investors
New sources of risk capital	Attractive value
New capacity of risk capital	Non-correlated diversification
Innovative financial structures	Sophisticated risk estimation
No credit risk	Competitive behavior
Stable prices	

There are costs involved in legalizing titles: commissions, risk analysis, placement in external companies for tax-reduction purposes, accounting and/or aspects of regulation, legal fees and printing costs. These costs increase the discounts of legalizing titles and the time and learning period for a new product. Legalizing titles is currently a promising alternative but it does not have the feasibility of becoming a low-cost alternative for catastrophic risk that can be obtained in the traditional reinsurance market. With time, it is reasonable to believe that there will be some very competitive sources for selling catastrophic risk insurance, especially after certain regulatory, accounting and tax aspects have been resolved. On the other hand, going back to the conceptual elements of capital markets, one way to classify these markets is by determining whether the titles are “new,” that is, whether the investor is acquiring them directly from the issuer, or if they are being traded among different investors. In the first case, the market for new titles is denominated “primary market,” while in the second case the market for already issued titles (those traded among investors) is the “secondary market.” The secondary market, in addition to giving liquidity to the market, allows the issuers of the title or financial asset to determine the degree of receptivity that investors will have to new title issues. So this secondary market will allow, in later sections, for an analysis of the demand for financial instruments. Beginning with these basic concepts, this chapter will continue by presenting the financial instruments available in the principal capital markets that can be used for financing and transferring risk in disaster situations.

2.3.1 Bonds

Bonds are fixed-income financial assets. The two agents involved in a bond issue are the issuer and the investor. In its simplest form, the investor buys a title of certain value (principal) that will be returned at the end of a certain period of time (date of the bond’s maturity). During this interval, the investor receives coupons (cash

flows from the interest offered by the bond) with certain periodicity.

In the case of disaster risk, there is a special type of bond called a catastrophe bond (cat bond). These bonds are different from other bonds in their simplest form, in that they are subject to credit risk (the risk of nonpayment or default on the part of the issuer) in all or part of the principal and/or of the coupons in the event of a previously specified disaster, whereby they convert to an instrument of risk transfer. The funds obtained by the sale of a bond are invested at a risk-free rate, and the yield of this last investment is then used to pay the interest or bond coupon. In compensation for the credit risk that these bonds present, they offer higher interest rates and yields than other bonds offered in the market.

Generally speaking, in the process of issuing a catastrophe bond, both parties (issuer and investor) use a special purpose vehicle (SPV) as an intermediary in the process of titling the risk through the bond.¹ This SPV is a legal and independent entity that issues the catastrophe bond in exchange for a payment by the investor that buys the title. In turn, the SPV establishes an insurance contract with the insurance company that obliges that company to cover the risks established in the bond. This purchase is in exchange for the periodic premiums that are used by the SPV to pay the coupons to the investor. The amount that the SPV receives for the sale of the bond is deposited into an investment company or depository bank (trust) that collaterally issues treasury titles that are free of credit risk (Andersen, 2002). The insurance companies that seek to cover their risk through the use of these bonds are given incentives to use an SPV. They receive tax benefits as well as the accounting requirements that these offer, since they are generally located in zones that have fewer restrictions of this type. Similarly, investors use SPVs to avoid the risk of insolvency that an insurance firm might occasionally face (Lewis and Davis, 1998).

¹ Titling assets is defined as issuing titles (in the case of catastrophe bonds) using one or several assets as collateral to the issue (Fabozzi and Modigliani, 2003). In this case, the assets that back the issue are the insurance premiums received from the insurers.

Table 2. Catastrophe Indices

Property Claim Services (PCS)	This entity publishes nine indices based on losses in California, Florida, Texas, and six other regions. The losses are compiled from studies of the industry and visits of PCS to areas affected by disasters. Unlike the Guy Carpenter Index, the PCS method for calculating losses is not totally transparent.
Guy Carpenter Index	This index measures only damages to properties and real estate and is based on payments made by a specified group of insurers from each geographical region. The index is based on non-weighted averages of the loss/value proportions as reported by the insurers.
Risk Management Solutions (RMS)	Unlike the PCS and Guy Carpenter indices, this index is based on losses estimated through models. Developed through technologies for modeling catastrophes, this index focuses on a combination of factors, including: the type of exposure, geography and danger.

The mechanisms used in these bond contracts to determine the circumstances under which all or part of the principal and/or coupons for financing a disaster should be utilized, are denominated “triggers.” These may be one of two types: compensation for damages or losses and payment based on the indices. In the first case, the compensation is determined by the amounts insured by the insurance company² issuing the bonds. Although this alternative gives good coverage for the issuer’s losses, it may generate problems of moral risk and adverse selection.³ In the second case, the basic idea is to use indices that cannot be influenced by the insured, and that have a direct relationship to the disaster risk coverage that the bond or title provides.

In addition to the indices mentioned above, some contracts are established from indices that provide information on

geological or climatic conditions, i.e., the Richter scale in the case of earthquakes in a predefined area. Unlike the first case, in this second case a basic risk may result, that is the risk that the index might not adequately reflect the real losses that the disastrous event has generated. In this case, the insurers may become issuers of this type of bond and transfer part of the risk that they insure to the market. Furthermore, investors see this type of financial instrument as an attractive investment alternative, because it offers not only a higher yield, but also other factors, such as the relatively low probability that the disaster will occur, the absence of any correlation between the credit risk of these bonds and market movements, and the possibility of reducing the risk of loss through the diversification of titles from different geographical zones (a low probability that two natural disasters will occur at the same time in two different zones).⁴

2 Although this has been mentioned earlier, in most cases the issuer is the SPV, which is only an intermediary, and the entity that actually requests the resources in this type of transaction is the insurance company. For this reason, it is often assumed to be the issuing entity.

3 Moral risk, in this context, happens when the insuring party neglects the preventive measures after having established the insurance contract, and therefore may end up reporting excessive losses. Adverse selection occurs when any of the parties in the contract has additional information, from which it obtains more favorable terms in said contract (Andersen, 2002, Lewis and Davis, 1998).

4 In some cases, the impossibility of two mutually excluding events occurring in a single zone is also an attractive factor for this type of title (for example, drought and flooding).

Another type of financial instrument has been developed for the capital market. These instruments, although having had different market placements, have had the problem of low transaction volumes, which has led them to suspend their disaster options transactions traded on the Chicago Board of Trade (CBOT) (GAO, 2002). For this reason, these instruments will be mentioned, but it is very possible that these difficulties in tradability will cause them to be ignored as possible instruments of financing and risk transfer for disasters in certain countries.

2.3.2 Contingent Surplus Notes

Contingent surplus notes belong to a class of financial instruments denominated options. Options are derived financial instruments, in other words, their value is obtained from the price of an underlying financial asset or base. In contrast to futures contracts, an options contract is defined as a contract that grants the right (and not the obligation) of buying (call option) or selling (put option) an underlying asset on a future date at a price established today. Two parties participate in the options contract: the issuer or seller of the option and the buyer. The issuer sells the option to the buyer in exchange for a premium or option price, and furthermore, is the party of the contract that carries the responsibility of fulfilling the option. On the other hand, the buyer by definition acquires only the *right* (and not the obligation); so his or her maximum loss will be the premium or price paid to acquire the option. The price of an option on the market depends basically on six factors: the current price of the underlying asset or base, the price at which the base is valued in the option contract (*strike price*), the time remaining for the option contract to expire, the expected volatility of the price of the underlying asset over the lifetime of the option, the risk-free, short-term

interest rate and finally the anticipated cash payments on the base asset. The effect that each of these factors has on the price of an option depends on the type of option (buy or sell) that is being analyzed.

The models for evaluating or determining the price of an option stem from arbitration arguments. Among the simplest of these are models constructed from binomial formulations, while more complex models, which seek to determine the price of an option more precisely for the purpose of building portfolios from them, start with the Black-Scholes option evaluation model. Finally, it is important to mention that the benefits of one of the two parties may be obtained through changes in the prices quoted on the underlying asset, depending as much on the type of option (right to buy or to sell) as on the magnitude of the price differential (the price established in the option contract compared to the market price). In the case of disaster risk, the contingent surplus notes are sales options; the underlying asset or base are debtor bonds; the sellers of this option are the investors, while the buyers are the insurers who wish to hold future financial instruments in case of a disaster. So these notes give the primary insurer the right to issue debtor bonds in the case of a disastrous event,⁵ and the investors have the obligation of acquiring these debtor bonds the moment the insurer exercises the option. Thus, contingent surplus notes are a financing instrument rather than one of risk transfer, and may be useful at the moment of needing immediate liquidity in the face of a disaster.

2.3.3 Market-Traded Catastrophe Puts

As the name implies, market-traded catastrophe puts are derived financial instruments (options) where the underlying or base asset is an index⁶ of the insurance industry

⁵ Although they may also be unconditional.

⁶ Using an index instead of another underlying asset can generate an additional risk, called a base risk, in this type of financial asset. This risk is basically that the index does not adequately reflect the losses in assets generated by the disaster, which creates the possibility of failure to generate sufficient coverage in risk for certain types of catastrophe.

(PCS, RMS and Carpenter Index, among others) which reflects the amount of resources that insurance companies have had to disburse as a consequence of covering their policies (damage payments). These options are sold by investors and may be acquired or purchased by insurance or reinsurance companies. These options then give insurance or reinsurance companies the right to require cash payments from the investor or seller of the option at the moment that the index (underlying asset) exceeds a certain level. In these terms, these catastrophe options are disaster risk transfer (as opposed to *financial*) instruments. Setting the value of these options also uses arbitrage arguments from which the binomial and Black-Scholes type models are derived. Finally, it should be mentioned that these options are currently traded on the CBOT and the Bermuda Commodities Exchange.

2.3.4 Catastrophe Equity Puts

Catastrophe equity puts are sell options. In this case, the buyers of the options are the insurance or reinsurance companies, while the seller of the option is the investor. These options give the buyer the right to sell participation in his patrimony to the investors, at pre-negotiable prices. Therefore, in the case that losses for a disaster exceed a certain level, the insurer exercises the option and sells participation in his patrimony to the investors, thereby obtaining immediate liquidity. By its nature, this type of financial instrument serves to finance, not transfer, risk. These instruments are also being traded on the CBOT and the Bermuda Commodities Exchange.

2.3.5 Catastrophe Swaps

Swaps are derived financial instruments (options), and are defined as an agreement in which the two parties commit to exchange payments with certain periodicity. The amount of each payment corresponds to a proportion or rate of an imaginary principal (*notional principal*).

In the case of catastrophe swaps, the insurer promises to make certain periodic payments to the investor,⁷ and in exchange for these payments, the investor makes payments to the insurer in the event of a disaster. The insurer may also make all of the payments generated by a portfolio of insurance policies when the disaster occurs. The indices mentioned above (PCS, RMS, etc.) are used to determine when the investor should make the payments to the insurer. This financial instrument, because of its characteristics, may be classified as an instrument that allows for risk transfer.

2.3.6 Climatic Derivations

Climatic derivations are financial instruments that derive their value from the base assets that, in this case, are the indices that reveal information on climatic and geographic conditions, for example, indices of temperature, seismic activity, drought, flooding, and hurricanes, to mention a few. Basically, this instrument is a contract under which the buying party receives payments at the moment said indices surpass a certain limit. So this instrument serves to transfer risk. Losses generated by natural disasters may take on very elevated values. These values may surpass the levels of risk coverage that can be reached using a single financial instrument. However, these losses may be segmented into different ranges or layers. In each of these layers, a determined financial instrument may be utilized. Therefore, in most cases, the best option for the primary insurer, who might be the government, to cover the risk is to combine reinsurance with other financial instruments to cover the losses generated by a disaster.

3. RISK RETENTION

Retention of the risk may be unconscious or passive when the possible victim is unaware of the fact that he or she is at risk because of ignorance or due to a flawed

7 In a way, because of the nature of the financial asset, these payments, like those made with other financial instruments, are similar to the payments that an insurer makes to a reinsurer.

or superficial examination of reality; this situation may be extremely dangerous. Retention may also be forced, due to the fact that there is no other alternative for its elimination, reduction or transfer, so the risk must be assumed as an obligation.

The absence of insurance is a type of retention, when coverage cannot be justified, owing, for example, to the obsolescence of the asset, or because the possibility of loss is extremely low and can be ignored, or because the loss is so high that transferring the risk would cost as much as the losses a disaster would generate. Also, given the conditions of economic health, it could be that only the gravest of risks are covered and the rest go without. However, this situation indicates that an important event could cause the total economic collapse of its victims.

3.1 Self-insurance

This is also considered a type of risk retention. This strategy consists in taking measures to control the risk and assuming the potential losses. Self-insurance is meant to improve the ratio between premiums and guarantees provided by insurance companies and therefore to lower the cost of the risks. Some consider that self-insurance cannot be defined as a class of insurance for the following reasons:

- No risk is transferred to others.
- It is not usually based on the law of large numbers.
- Many times there is no accumulation of reserves for the eventual payment of losses.
- It may require the utilization of resources or reserves that were intended for other uses in the case of unforeseen, exceptional losses.

The tax factor influences this type of policy, depending on whether the insurance premiums and payments made for disasters or for retained risks may be considered as expenses, deductible from income or whether or not they have special tax applications. Usually, the creation of funds and reserves for total or partial

retention do not carry incentives, so it has frequently been said that it is necessary to review this situation. At the corporative level, for example, it is normally unacceptable to establish reserve accounts, in the financial statements, for the prevision of losses from retained risks in future accounting exercises, since tax laws do not allow them as expenses deductible from income. At the government level, it is common practice at the end of the annual fiscal year for entities to be required to return unused resources to the national treasury. It would be necessary to make exceptions to budgetary laws, to accommodate these types of national or institutional reserves, and to find figures that would solve this type of problem. One alternative is to create fiduciary accounts. This has been one of the reasons that many developing countries have been unable to create efficient reserves for risk reduction or post-disaster reconstruction that would include funds for attending to emergencies. It is also important to note that at times, these funds are improperly estimated, based on the evaluation of the risks, so it is not unusual for them to be left short of needed funds during the normal process of budget disbursement. This figure is of special importance, since well-designed reserves based on solid techniques of engineering as well as financial analysis, allow for retaining certain risks and negotiating with insurance or reinsurance companies to cover residual risks. Developing countries can also negotiate to become part of a pool or to participate in capital markets. It is very necessary for developing countries, or those with emerging economies, to configure funds that allow for a balance between investment and risk reduction (prevention-mitigation) and the transfer of risks. Under this figure, the first part of the loss is retained in exchange for a reduction in the cost of the premium. In principle, if controlled by a strict prevention policy, this system allows for lowering the cost of risk by paying lower premiums, assuming the damages and rapidly proceeding with recuperation, in the case of minor events. As in the case of an insurance company, the “excess loss” can be handled with partial self-insurance, “at first risk” or “partial value.” Finally, these funds can also operate like “captive” insurance companies that are created by large corporations or by local, provincial or national governments, to cover their own risks and other items. This figure enables the “reserves” that are usually not deductible from income,

as mentioned above, to conform to paid “premiums” and thereby obtain the benefit of the deductible.

In addition to insuring specific assets, a country that has an adequate system or integral risk management program will possibly be in a better position to negotiate contingent coverage in case of extreme events. Developing countries can achieve this through pooling, or forming groups of retainers and/or taking on reinsurance with more favorable premiums and higher deductibles, given their achievements in prevention. The insurance instruments available may help countries to manage their risks in a more efficient and effective manner. That is to say, that in case a country does not buy insurance, it may in any case obtain the availability of a contingent fund, from the same industry, to cover unexpectedly high losses, as long as it has a good plan for risk management that promotes prevention and mitigation.

3.2 Contingency Loans

Another instrument, which has not yet been mentioned, enters into this scenario: the line of credit. Contingency loans are used in the highest layer or range (the highest levels of loss). In other words, if the losses due to a disaster surpass the levels covered by both reinsurance and other financial instruments, the excess is covered by a line of credit from a multilateral institution. In these lines of credit, the insurer should pay a commission for the agreement, which generally oscillates between 0.25% and 0.375% annually, and which guarantees that the institution will lend the resources in the event that losses through disaster reach the highest layer. This is usually the last option used by insurers for financing, since it implies an increase in the insurance premiums as backing for the credit granted. However, it is important to clarify that the entities that grant lines of credit are generally multilateral organisms whose efforts are directed at causing the regions to diversify their risk in an autonomous manner, and to generate incentive systems that promote risk

diversification by private agencies. Contingency loans have a great disadvantage in that, if the decision is made to use them, the government will increase its debt level with the multilateral banking system.

3.3 Fund for Recurring Disasters

There can be no doubt that small and large disasters have a significant effect on the well-being of city populations. Their accumulated negative consequences may reflect a high cost, in terms of the destruction of assets, public properties and physical capital, which has the immediate effect of reducing the population’s living standards as well as the possibility of causing the rate of economic growth to stall or decrease drastically as a consequence of these phenomena recurring over time. Although, from a theoretical point of view, a contingency market and a financial options market could be designed in an attempt to deal with natural and social risks through price mechanisms; in the real world, for a variety of circumstances, these alternatives are rarely developed and, in fact, in many countries, are practically non-existent.

In reality, protection and insurance against “large and small disasters” can be considered a “social asset” – that is, goods that cannot be divided into units that can be converted into the unique possession of individuals, but are an integral part of the general context of citizens’ everyday life. “As a consequence, these goods cannot easily be sold to individual consumers, and the funds available for different individuals cannot be adjusted according to their respective expenditures. The amount of an asset should be determined by a single decision, applicable in conjunction, to the entire population. Therefore, social assets are subject to a collective or political, not *individual* demand.”⁸ This gives rise to the problem of defining the mechanism to be used for determining the optimal amount of social assets and of allocating the monetary burden to be financed. However, the difficul-

8 Bowen, Howard. (1943). “The Interpretation of the Vote in Assigning Economic Resources,” Arroz and Scitovsky, *The Economy of Well-Being*, Volume I, The Economic Culture Fund, 1974.

ties do not end there. It is obvious that natural disaster risk management demands the conjunction and coordination of the actions of several agents: the government, families and operators of financial and insurance markets. Given the fact that the interests of the agents hardly ever coincide, the “prisoner dilemma” can arise, leaving society unprotected with the only possibility of improvement being to introduce institutional mechanisms that favor the cooperation and reinforcement of the city’s central government, which has the resources and the instruments for developing actions in a direct and effective manner.

In the absence of compensatory mechanisms, the losses in citizen well-being are considerable. The government should take action to reduce or eliminate social losses. This can be done through the assignation of public resources to the affected localities. Of course, if the impact is very strong and the productive structure is seriously affected, and if the systems of communication and transportation are damaged, public resources are reduced, so the authorities will be faced with the need to recur to credit markets and charity. However, if the city has a disaster fund, it can efficiently confront the situation. One way to approach the problem of establishing the optimum amount of resources for a disaster fund for attending to recurring events is through the use of cost-benefit criteria. The authorities require a stock of liquidity for precautionary purposes. In other words, a fund to be used at the moment when a contingency affecting citizens occurs, if there are no other mechanisms available to alleviate and attend to the victims of the event. To create this “stock,” they may use models adapted from optimal international reserves indicators.⁹ It is easy to establish an equivalency between the two problems. A country may accumulate international reserves as a medium of protection from events such as a crisis in the balance of payments or financial collapse, which can be as devastating as any earthquake.

The indicator is simply intended to establish ranges of security that allow authorities to evaluate the risks they are assuming when the resources stored in the fund fall below the optimal level.

A locality that invests more resources in the community to reduce the physical risk, such as the relocation of persons from vulnerable zones, reinforcing constructions, emergency preparations and creating infrastructure, generally speaking will suffer fewer social losses in the event of a disaster. The authorities may compensate for or eliminate this reduction of social well-being if they have the liquid resources that would allow them to confront the problems of disaster response and subsequent reconstruction in the zone. Of course, the convenience of the fund should be evaluated from a cost-benefit perspective. In fact, the demand for financial resources, motivated by the principle of precaution, has a cost for society. Keeping a significant balance of money in a liquid account implies assuming a cost of opportunity for those resources. This may be associated with the social rate of return of the capital, net of the financial yields that the fund’s resources earn. To determine the optimal value of the reserves of this fund, it is necessary to analyze three variables: (i) the social losses caused by a natural disaster; (ii) the cost of opportunity of maintaining liquid reserves in the fund; and (iii) the probability of the disaster’s occurrence. The optimum rule establishes: *the marginal cost of maintaining reserves should be equal to the marginal losses expected from the disaster.*

It is especially important to establish methodologies that allow for improving information on recurring disasters, carefully recording the damages and attaching a monetary value to those damages. When possible, information should be included on some parameter of intensity of the events that caused those losses. Without this information, it will be difficult to apply a reli-

9 Heinz Robert Sélér. (1966). “Optimal International Reserves,” *The Economic Journal*, Vol. 76, No. 302.

able model for estimating the needs required to assign economic resources earmarked for handling emergency and disaster situations. On the other hand, it is necessary to conduct studies that suggest a better definition of the costs of opportunity and the need to spend on disaster response at the local or territorial level.

Once the types of instruments have been determined, the analysis proceeds to the stage of formulating optimal capital structures, or the financial structures through which the losses that a disaster can generate on the different agencies can be transferred and financed most effectively, according to the particular needs of the country under analysis.

To summarize, this section concludes that the options may vary between complete retention and transferring risk to another sector, and that each option is based on information that is gathered by the risk specialist.

4. THE ROLE OF THE GOVERNMENT SECTOR

The government plays an important role in establishing public policies and regulations affecting the transfer and support of risk. Some government regulations (construction codes, standards, regulations on land use, etc.) and incentive policies (taxes, low-cost loans, low-cost insurance, etc.) may reduce the potential for disaster. In addition to its role as decision-maker and regulator, the government sector at all levels (national, provincial and local) is also an important proprietor of assets. Damages to public buildings and infrastructure can cause different types of losses for the sector: loss of lives, economic losses, losses of functions and of cultural patrimony. This sector manages its risks through the application of mitigation measures, through risk transfer (typically by means of insurance) and through the retention of risk or self-insurance. Selecting which technique to adopt is a complex decision, because it depends not only on the cost and the goals they are attempting to reach, but also on public opinion.

The public sector also shoulders some of the financial risks associated with damage to private property, such as residences, through the role it assumes in financing post-event recuperation. The cost of government-provided goods and services, such as health care, the activities of operational response, temporary shelter, reparation and rehabilitation after a disaster, has increased to an alarming degree over time. These costs should also be considered risks for the sector, because even though they do not fall under what is typically known as “assumed risk,” they somehow influence the decisions of governmental institutions or agencies concerning the financing of these risks. The protection of historic buildings is another aspect to be considered, for their intrinsic value, given that these buildings are cultural patrimony, which means that they are irreplaceable should they be severely damaged or destroyed. In these circumstances, the policy of risk management is said to be more appropriately a function of social values than of cost-benefit analysis.

Events that have potentially extreme consequences with a low probability of occurrence, such as earthquakes, tend to be of little concern to the average community, especially when it has been many years since the last disaster. This situation frequently causes governments to give little relevance to the matter of risk management. Public opinion is the force that drives many government decisions concerning risk management, and therefore these decisions are loaded with political implications. In some cases, they are clearly in response to the public perception of the risk rather than to cost-benefit or the safety of society. One interesting situation for analysis is when the public sector is not only responsible for risk management concerning public buildings and infrastructure, but also for providing incentives and loans for the benefit of the private sector (reinforcing private buildings). This situation may become a serious problem when the funds for reinforcing public buildings run out and are unavailable because they have been used to intervene in private structures.

Measures for risk reduction or mitigation are somehow related or connected to the availability of post-disaster humanitarian assistance. Local and provincial governments usually have national aid that functions like cost-free insurance. This has the effect of giving local authorities an excuse for not generating funds for mitigation and preparation. The U.S. Federal Emergency Management Agency (FEMA) has considered the possibility of requiring local governments to insure their public buildings in order to be eligible for federal disaster assistance, which, up to the present time has been automatic, with a simple declaration of disaster by the president. This is a necessity that is ever more palpable, and will require local governments to attract resources from every level. It is the case with health-care installations such as hospitals and educational establishments (schools). These buildings, because of their importance to the persons they shelter and their use in case of disaster (both as centers for response and for refuge), have been the first to receive attempts at reinforcement against earthquakes, for example. Therefore, given the fact that it is a priority, there is concern as to how to stimulate local investment for the evaluation of, and intervention in, the vulnerability of these buildings.

Different strategies of risk management provide different benefits. A mechanism for risk transfer such as insurance could pay part of the cost of reparation and then reduce the economic loss caused by damage to the buildings, however, this mechanism can do little to protect lives, the loss of functionality, the protection of patrimony or to mitigate the derived social costs.

For this reason, from the seismic engineering perspective, structural reinforcement is the most effective strategy that can be chosen to reduce the risk, because this mechanism has a favorable influence on the reduction of all types of losses to which the government is exposed. However, the cost and feasibility of implementation have always been the limiting factors of adopting this option. Although reinforcement should be carried out before a dangerous event happens, it is much more frequent for these repairs to be made on damaged structures after an earthquake or hurricane has happened, because that is when more funds are available.

When it comes to funds for pre-event mitigation, the sources of these funds vary notably in each level of jurisdiction, and, in fact, at the local level there is usually the possibility of accessing resources at the provincial or national levels; while at the provincial level there is the possibility of receiving national assistance. Unfortunately, this subsidiary and complementary scheme does not always work like that in many developing countries. In fact, in many of them the only assistance schemes that exist are centralized, where resources are provided and administered from the national level.

In the United States, the typical source for raising the resources needed to reinforce public buildings, essential at the state and local levels, are bonds, taxes and public and private alliances. One of the most commented examples is the case of Los Angeles, California. Some of the federal tax incentives have also been made available for rehabilitating historical buildings, although intervention in this type of structure is typically financed with local funds. At present, portions of federal funds, made available after a disaster, may be applied to projects intended for mitigation of future disasters. It is now acceptable to intervene preventively in public buildings or in certain types of profit-based organizations using part of the federal assistance funds for the reparations. Mitigation measures may be the object of an investment of up to 15% of the total eligible cost. However, this availability is conditioned to the applicant having insurance coverage on all of its installations.

There is also the possibility of setting up institutional funds or reserves for reinforcing buildings, such as schools, hospitals, and other essential buildings, by issuing local bonds. After the Loma Prieta Earthquake in 1989, the city of Berkley issued bonds to reinforce its vulnerable school buildings.

The government has several options for transferring risk through insurance, including private insurance, risk pooling and mutuality among government agencies. One option that can be considered is to transfer the risk to the capital markets through financial instruments. Usually, the decision to find insurance comes from the absence of government (state or federal)

support programs or systems. As mentioned, national or federal government essentially acts as a cost-free insurer, frequently covering a portion of the costs of repairing affected public infrastructure. Earthquake insurance is not easily available or might be very expensive for the government (high premiums and deductibles). One of the main reasons for which it is not viable to obtain insurance for the installations of the public sector at acceptable rates, is the lack of detailed data on the real estate property inventories. This makes it difficult for insurance companies to estimate the price of the policies. Generally, public entities purchase a global, commercial policy for earthquake coverage that means there is no differentiation or separation of limits per building. Insurance for schools and hospitals is usually obtained through commercial policies. Many public buildings are insured because there has been a requirement connected to the constitution of financial bonds or contracts that have been executed. Sometimes they have been associated with an insurance pool due to workers' obligations and compensations.

Very few cities in the United States have earthquake insurance from private companies. This is due in part to the high cost and limited availability of such policies. Cities sometimes have multiple hazard insurance. Some combine commercial insurance with self-insurance or retention. Others have insurance up to a limit and assume the rest directly. There are also cities that have taken out insurance for the entire city; for example, Anaheim, California, pays between \$1 million and \$1.3 million in yearly coverage to protect its properties, with a limit of \$200 million of insurance in a policy that covers all of the risks. Each public building is insured. In some cases where purchasing private insurance has not been feasible, local governments have set up an insurance pool that, within certain limits, covers the costs of emergencies, repairs and some additional obligations. These self-insurance risk funds are sometimes oriented toward specific sectors, such as schools and hospitals. Although earthquake insurance is not a common part of this figure, these funds can be obtained at very favorable interest rates when purchasing property insurance, because commonly they are offered over a wide geographical diversity and in large portfolios. Risk

retention or self-insurance is also an option that some cities consider feasible. New York, Texas, and the city of Los Angeles are examples of these cases. Nevertheless, some insurance plans have been taken out for a smaller number of installations, where required for financing bonds. The most recent concept to be discussed within the public sector is the subscription of a minimal amount of insurance coverage for buildings as a criterion for being considered as eligible for public assistance funding at the federal level.

Regarding mitigation measures for floods, there is a consensus that these measures are effective only if they are taken at the local community level, since jurisdiction on land use and urban development falls on local governments. In the case of the United States, outstanding results have been achieved by conditioning FEMA support and the possibility of procuring insurance on the implementation of mitigation measures by the local communities.

For decision-makers, there can be no doubt that it is very important to have good information about economic costs and benefits associated with a particular risk reduction strategy. They also need recommendations on how easy or difficult it is to implement that strategy, what the social and community benefits will be, and its indirect effects, such as the community's participation in the development of the project. It is important to mention that government agencies frequently need to be treated like private corporations in matters of evaluating risk management decisions. Many times the city's administration is the best landowner; for example, a university may be the most important entity in a city; therefore information regarding the suspension of functions of the university can have special importance. In conclusion, the complexities associated with this process make setting up strategies of reduction, transfer and risk retention a major challenge for today's governments.

In developing as well as developed countries, the role of government is definitive in light of the question of insurance being the best mechanism for providing financial protection for low-income populations.

In the United States it can be stated that, in the case of floods, only by achieving mandatory measures of risk reduction is it possible to think of the option of privatizing flood insurance. That is the responsibility of the federal government and furthermore, those measures are the only guarantee that the insurance will truly be feasible in financial terms. Reinforcement may be the best technical option to save lives and reduce damage, but it may prove to be prohibitively costly. In this case, some compromise between risk transfer and reinforcement might be a more feasible solution. The exchange ratios between costs of prevention and those of post-event recuperation may influence the decisions for financial risk management. In order to advance in this direction it is fundamental to better understand the role of the different sectors and their possible problems and limitations, to improve communications on the information concerning risk/cost/benefit, and to think about the development of innovative technologies that facilitate global risk management among the sectors involved, from an “external” perspective.

The cost of damage to the public sector resulting from natural phenomena is one that may be too high for taxpayers to absorb. The functionaries of public institutions should promote the purchase of insurance to cover public structures and invest in measures of effective risk reduction from a cost point of view. One way to achieve this objective is to change the laws in such a way that only a small percentage of the damage to these structures is covered by government funds for recuperation.

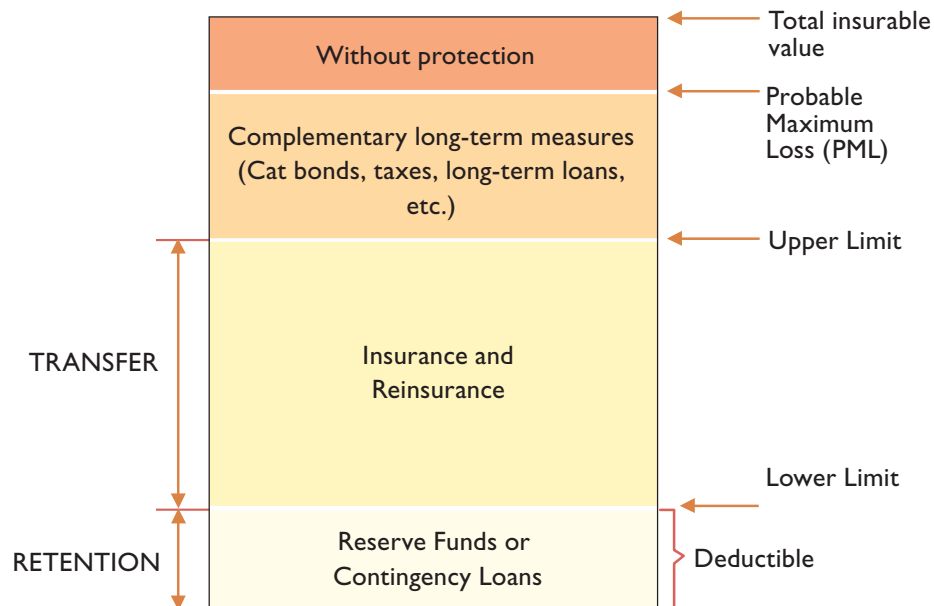
Those funds, as far as possible, should be conditioned as available only if the municipalities implement efficient measures for the reduction or mitigation of the risks.

Another alternative is to collect taxes on the properties of all residents to cover the cost of public structures in case of disasters. This is an insurance tool based on the community, in which all residents pay a portion of the insurance in proportion to the value of their own property. Another example is to charge a fraction of each transaction that clients make in financial entities. This type of temporary measure has been implemented in Colombia (2/1000 which was later increased to 3/1000) and it has now been suggested that this tax be made permanent.

Other proposals have included establishing the transfer of a fraction of the value-added tax to pay for private insurance policies of all types. This would enable the government to collect complementary funds. If there is a feeling among legislators that the responsibility for the recuperation from disasters falls, in the first place, on the private sector or on the local level, then insurance, incentives, taxes and the effective application of construction codes will, in the future, have a much higher profile than they have today. These aspects, indubitably, deserve serious study.

Figure 3 illustrates a general diagram of a structure for retention and transfer of risk, considering the different possible instruments available.

Figure 3. General Diagram of a Risk-Retention and Transfer Structure



This diagram shows the complexity that exists among the different instruments or alternatives. The first layer (retention) is the responsibility of the state, through reserve funds or contingency loans. The second layer (transfer) comprises the value of the losses that may be transferred to the insurance or reinsurance sector. The following layers of losses (below the probable maximum loss or PML) could be taken to the capital markets. The highest layers, in most cases, could also be covered through credits with multilateral organizations. In order to retain budgetary resources corresponding to the payment of insurance premiums, it is necessary to come to agreements with national entities. Jointly insuring all of the entities through, for example, a national disaster or calamity fund would generate an economy of scale that might reflect on the value of the premium. As mentioned previously, there are two basic categories of financing and risk transfer instruments in the capital markets: fixed-income titles (cat bonds) and derivatives (options, swaps). These titles are currently issued by large insurance companies or reinsurers (Swiss Re, AON, among others) and their issue amounts, to date, have been relatively high. The first type of title has proven to be

highly tradable on the market. The opposite is the case of derivatives and options, which have shown low levels of tradability, and therefore have ceased to circulate in markets such as the Catastrophe Risk Exchange (CATEX).

5. RISK ASSUMED BY DIFFERENT SECTORS

The perception of risk for loss from disasters and the aversion to it varies from one sector to the other, defining as a sector, a wide segment of the community. Usually, the information and the type of decisions made regarding the reduction or mitigation of risk varies according to the internal and external factors of said groups. The following is a summary of certain characteristic aspects of some sectors. A later section of this chapter will specifically mention the public sector, given its special relevance.

5.1 Homeowners and the Mortgage Sector

Without a doubt, one of the social groups that bear the first line of risk from dangerous phenomena is the group made up of homeowners, renters and multifamily

building proprietors in disaster-prone areas. For most people, their home is probably the greatest investment they have, and with the investment that they have made in it, homeowners are carrying almost the entire risk of their potential losses. The risk may be reduced through mitigation measures, or by being transferred by diversifying their property, having insurance and mortgages. Renters usually bear the risk more directly, because they have little option of carrying out measures for risk reduction or mitigation and are limited to the option of transferring the risk through insurance. Unfortunately, it is widely recognized that today's landlords, in general, have shown little inclination to invest in mitigation measures on a voluntary basis. For this reason, it has become obvious that there is a need for economic incentives to promote the adoption of preventive measures. Although insurance is not considered a preventive-mitigation measure *per se*, the design of an integral insurance program, as suggested, could promote the adoption of these measures through incentives, such as reducing premiums and establishing low deductibles. The owners of homes and small businesses, unfortunately, tend to reject dedicating their frequently scarce resources to mitigation in general. They usually see the direct benefits of the costs assumed (i.e. the return on investment) as materializing only when an event has occurred and the property has suffered minor damages.

The aggregate impact, in terms of loss of housing, unemployment, abandonment of property, the cost of public services, etc. are subsidized social and economic costs, usually borne by the social system and therefore requiring the direct financial assistance of the government. To reduce the risk of potential damages in public buildings, where services are provided or social functions are held, is, therefore, a direct benefit, not only for the government sector, but also for the taxpaying public. When private risk becomes public or social risk, the reduction or mitigation of these risks, through both voluntary (private) action and that of the government (public), requires regulation that promotes prevention and gives it consistency. Two fundamental aspects that should be analyzed are:

- What factors or incentives are necessary to motivate the owners of private assets to involve themselves in activities of voluntary mitigation to reduce the risks of natural phenomena, especially in events of low probability occurrence yet high resulting consequences?
- Whose responsibility is it to carry out the measures for reducing the risks of dangerous natural phenomena? This can be interpreted, in the first place, as a response to a series of individual private decisions; and, in second place, as a public problem that requires the intervention of the public sector (i.e. where is the threshold after which the government should define the basic standards of prevention-mitigation of natural phenomena?).

To answer these questions, one needs a global comprehension of the risks imposed by natural hazards, for both the public and the private sectors, together with knowledge of the cost and effectiveness of the alternatives for mitigation or reduction. It is also vital to recognize the perceptions of risk held by different social actors or sectors and of the fundamental factors that are required to motivate behavior conducive to risk reduction.

The mortgage sector as well as those of insurance and of capital markets provide mechanisms for risk transfer. Mortgage banks do not typically retain much risk, given that these entities sell the majority of their loans in most of the countries where their activity exists. The buyers therefore carry the risk in many of their portfolios. These buyers, known as the secondary mortgage market, consequently, retain the associated risk, since, as pointed out, they are financial institutions that buy most of the mortgages.

A troubling situation is that by trying to buy a used house, it is common that the inspection required to facilitate the loan does not include any evaluation of the asset, for example, from the seismic standpoint. Some proprietors indicate that the people lending the money for the purchase do not recognize this risk, so

“why should the buyer have to?” The problem is that this risk is usually not very important to the lender, compared to other risks. Major earthquakes that have been tragic events for owners, which have caused many to be forced to abandon the loan and the property, result in a minimal loss, when statistically compared to the volume handled by the mortgage industry and its credit or default risk.

5.2 Small Businesses and Corporations

Various characteristics emerge in the case of small businesses. Given that this is an important sector of the economy, it is of great concern to figure out how it can survive after a disaster. The concern is even greater, because, unfortunately, the owners of small and medium businesses (which are the majority of businesses in developing countries) dedicate little of their income to preventive-measure investments and usually have no one dedicated to risk management in general. Small businesses also lack the same liberty to negotiate insurance coverage as do large businesses or corporations, and their options of diversification are very limited. Consequently, the risk carried by small businesses and commercial establishments is important and translates mainly, besides the damage, into the impact of interrupting its daily business, which is considered to be an indirect risk.

On the other hand, corporations or large companies usually do have the resources to invest in decisions associated with risk and have taken their management decisions into account, as to how to best manage said risks. Among the spectrum of possible decisions, corporations evaluate their alternatives, ranging from relocation, abandoning the premises after the disaster, waiting for the event and carrying out repairs and rehabilitation, to alternatives for transferring the risk to the insurance market and carrying out anticipated measures of reduction or mitigation. The risk for corporations or large companies includes not only the potential damage to their buildings, but also their contents and inventories, the possibility of suspending business due to physical damage to the property, damages in surrounding areas or in the region, and even the damage suffered by suppliers or clients. No doubt, in this case, the possibility

of interruption of business is the aspect of greatest concern in the evaluation of their financial risk, due to the hazard of dangerous natural phenomena.

5.3 Public Services Infrastructure

Public services companies carry risk of dangerous natural events, since, besides having office buildings, warehouses, maintenance shops, etc., their services are based on massive network systems constructed from innumerable components that are dispersed over a wide geographical area, with functional dependence, meaning that they are interconnected to perform their function as a group. These companies, unlike others, have restrictions as to their location (i.e. must be where they are) and therefore they do not have certain options for diversifying their risks. In general, the reduction of risk through preventive measures and transfer are the two fundamental alternatives that this sector has for managing risk. Of course, these vital systems have traditionally been managed from the public sector and, although there has been widespread privatization leading to a wider variety of options currently being offered by the private sector, many countries still conserve the administration of this type of services in hands of the government. Most of this infrastructure has never been insured and the norm has been for the risk to be almost totally retained.

It is also important to point out that developing countries are frequently financially incapable of insuring certain buildings, bridges, roadways, etc. because these assets were not constructed following the prescriptions of design and construction of the codes and standards of earthquake resistance. This makes certain works un-insurable or makes it economically unfeasible to insure them. Poorly designed and constructed structures are often severely damaged by even minor natural phenomena and have repeatedly had to be reconstructed with an increase over the initial investment in the order of 20% to 30%. These are increases with which the investment might have been protected against all events and multiple disasters. The perhaps apocryphal story is to say the bridge has been rebuilt seven times over (each time with external financing). The only beneficiary in this case has been the construction firm that kept its quote low (possibly, its quality as well) to enable it to win the public bid.

6. INTEGRAL RISK MANAGEMENT PROGRAMS

The design of a risk management program brings two visceral questions to mind that must be answered appropriately. The entire decision-making process depends on their answers:

- Who should assume the cost of making communities exposed to dangers and hazards, safe?
- Who should pay for the losses caused when a disaster happens?

Two criteria are normally used to answer these questions: *efficiency* and *equity*. Efficiency can be understood as *the adequate placement of economic resources to maximize the welfare of society and its quality of life*. Quality of life is defined by the citizenry and therefore varies from one political entity to another. A society that believes that each citizen should share the losses of disaster victims may find that taxes are the most efficient political instrument for generating the income necessary to cover these costs. If, on the other hand, society believes that each person should be individually responsible for assuming his or her own losses from natural risks, then some form of insurance, with variable rates, based on the risks involved, may be considered the most appropriate means of covering the costs of disasters. Equity refers to *the concern for welfare and distribution of resources*. An equitable distribution of resources may mean special treatment for certain individuals or groups of persons at the expense of others. Of course, what may be seen equitable at one time, for example, immediately following a disaster, may be seen as inefficient in a long-term perspective. As an example, if the un-insured victims of a disaster are guaranteed subsidies and low-interest loans for their rehabilitation or the reconstruction of their properties in danger-prone areas, the taxpayers will be obliged to pay higher taxes to attend to victims of future disasters. In other words, the situation considered equi-

table shortly after a disaster may be seen as inefficient from a sustainable long-term perspective.

Private insurance may be an important part of risk management programs, but it requires an orientation as to its role, regarding both the prevention and coverage of damages caused by disasters. If one thinks in broad terms about how insurance helps face these risks in the future, thanks to the progress of technology for analyzing the data and due to the recent availability of the capital market to fund the traditionally complementary reinsurance, one may expect that it will soon be feasible to design novel and effective programs. Progress in the sciences and engineering, now more than ever, suggest that it is feasible to establish a strategy that will allow insurance to play a very effective role, from the public, political, and social development point of view. A program of risk management of this type could be carefully developed, taking the following aspects into consideration:

- a) The improvement of risk estimation,
- b) Property audit and inspection,
- c) Emphasis on the faithful application of construction codes,
- d) Promotion of economic incentives for mitigation, and
- e) A broader scope of protection against losses from catastrophes.

Generally speaking, all of the aspects mentioned above are easily understandable and obvious, but the promotion of economic incentives is, perhaps, the one aspect that is not always easy to visualize. Figure 4 illustrates why neglect to modify the value of premiums tends to discourage the implementation of mitigation measures.

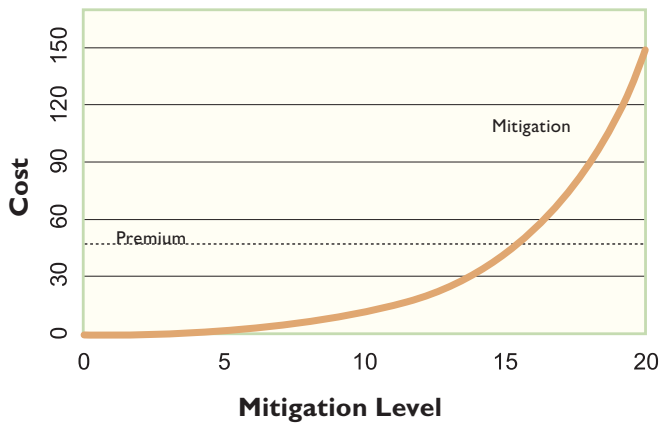


Figure 4. De-stimulation of Risk Mitigation due to Failure to Reduce Premiums

The following is an example of this type of measure: Consider that the cost of applying a measure for risk reduction at a site is \$1,500. If a good estimate by earthquake specialists indicates the probability of a major earthquake as being 1/100, and the loss reduction because of this investment to be \$27,500, then the annual expected benefit is \$275. A 20-year loan that the insurer could promote through a bank or other financial institution, for \$1,500 at an annual interest rate of 10%, would result in payments of \$145 per year. If the reduction of the annual premium of the insurance reflects the benefits of the risk reduction measure (i.e. \$275), then the owner of the secured house would have a lower total value of payment for the investment in mitigation as compared to not having carried out the measure.

This example also reflects the robustness of the risk estimate that would make it desirable for the insured owner to take out a long-term loan for mitigation. Furthermore, in case the annual probability of seismic activity were as low as 1/189, the owner would still be willing to take out a loan. If the probability of a quake were 1/189, the reduction of the annual premium would be \$145 (the same as he paid yearly for the loan). Similarly, if the probability were known, say 1/100, then the loss reduction due to mitigation could be as low as \$14,500 and the loan would still be attractive, because of the benefits of

reducing the insurance premium. Figure 5 illustrates how the reduction of the risk premium can stimulate investment in measures of prevention and mitigation.

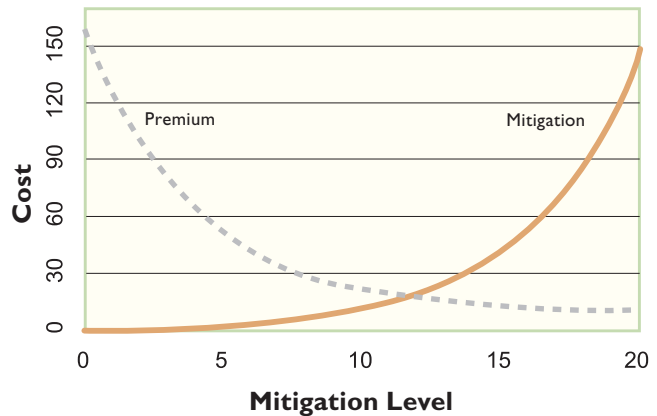


Figure 5. Incentive for Mitigation due to Down-Payment Reduction

Many houses, poorly constructed for poor families with very small incomes that are unable to assume the cost of mitigation measures or the cost of reconstruction, suffer damages from natural phenomena. Considerations of equity argue in favor of providing this group with very low-interest loans or subsidies, thus enabling them to adopt effective measures of risk reduction or, indeed, to relocate themselves to a safer area. Since low-income victims are the most probable recipients of government assistance, to cover their uninsured losses after a disaster, the subsidy of these mitigation measures may also be justified as pertinent to the area of efficiency. The question remains as to what would be the best alternatives for providing subsidies to these low-income families, in order to encourage them to adopt effective measures of risk reduction?

In conclusion, it is important to emphasize that the increase in subsidy, funded by the taxpayer, takes importance away from the role that private insurance might play in the coverage of damages associated with disasters. Over the long run, these subsidies for special groups could be maintained successfully under some type of social security. If the public concern is genuine,

and the increase in the cost of natural disasters is real, as is the current belief; a good system of insurance, with differential rates based on real risk, could serve as the cornerstone for an integral risk management program. Insurers then could orient the management of risk problems from a more integral and constructive perspective, in conjunction with other actors and through strategies that combine insurance with monetary incentives, sanctions, fiscal credits, properly applied construction codes and regulations on land usage. On the other hand, the effectiveness of implementing risk reduction or mitigation measures, such as the effective application of construction codes and regulations for land use, depends on the “institutional capacity” of the government at the local, provincial and national levels. Therefore, only by bolstering institutional capacity and organization for risk management can one start from a firm foundation that will make it possible to take on the challenge of achieving effective results in the convergence of the public and private sectors, in order to reduce the risk of future disasters.

7. THE EFFECT OF EXTREME DISASTERS ON GROWTH RATES AND THE SUSTAINABILITY OF PUBLIC FINANCES

Implementation of an optimal financial strategy for disaster management requires awareness of the institutional restrictions and limited resources that an administration is faced with in the short and medium timeframe. In the first place, it is vital to discuss the national context in which a fiscal policy is designed and the effects that a catastrophic event of high intensity might have on the government’s income and expenditures. The fiscal responsibility of the central or regional governments must comply with a series of financial and public debt sustainability requisites that limit its scope of freedom and action. The usual practice is to establish a “medium and long-term fiscal framework” for the central and territorial administrative bodies, which will serve as a reference point for the evaluation of the sustainability of fiscal

policy with a variable horizon. For the purposes of this argument we will use 10 years. Decision-making on matters of income, expenditures and public debt should stay in line with the projections and suppositions contained in the “fiscal framework.”

In this sense, the most important goal of this instrument is to have the annual budgets follow precise, specific, and coherent guidelines, with the basic rule of convergence of public finances, according to which *the present value of the primary surpluses should be equal to the initial debt*; this requires that the government compensate its excess spending through increases in net income from interest over the medium and long term. Generally, the contents of the financial plan contemplate fiscal equilibrium of public administration, the usual economic suppositions intended for projecting income, expenses, and public debt. The document should also include complete accounting for the so-called “contingency liabilities.” The objective of this section is to complement the analysis of the sustainability of the government’s public finances, introducing the effects that an extreme disaster might have on the country’s growth rate (region, state, department or city under analysis) and tax income. It is important to be aware of the projections in the medium and long-term fiscal framework in order to make the government’s “contingency liabilities” explicit. This will contribute to the transparency of public information and will make the authorities aware of and carry out the actions needed to provide the resources that will allow them to confront these events without threatening fiscal sustainability.

7.1 Impact on Growth Rates and Tax Income

The study by Albala-Bertrand (1993)¹⁰ is a good starting point for analyzing the negative impact of a catastrophic event on the growth rate of the gross domestic product (GDP). This author constructs an analytical framework that makes it possible to estimate a reasonable range of losses, in terms of percentage points of GDP growth, brought about by a disaster.

10 Albala-Bertrand, J.M. (1993). “Natural Disaster Situations and Growth: A Macroeconomic Model for Sudden Disaster,” *World Development*, Vol. 21, pp. 1417-1434.

A distinction must be made between two basic types of effects. The first is capital stock and the second concerns macroeconomic flows. A high intensity event can destroy a large part of the productive capacity of a city or region; for example, the fixed capital of businesses, housing units, public infrastructure, and human and social capital. All of this is reflected in a negative adjustment in the growth rate of the economy. Other negative consequences have also been identified that are derived from emergency and disaster situations. In a society plagued by problems of high poverty indices and concentration of income, a violently negative event can destroy the meager patrimony of the people with limited resources and severely affect their capacity for generating income, which can in turn lead to political disorder and problems of governance. All of this destroys public confidence and the willingness of investors to assume the risk, which will finally end up deepening the economic and social costs (Cooper and Olson, 1998). Although it is important to have a quantitative idea of all the costs of the disaster, the models are still being developed. These models employ calculations on losses in terms of capital stock, and basically share certain parameters:

1. The effects of the disaster are located on the margin, that is, they do not affect the whole territory in the same way or in the same magnitude.
2. Not all agents are affected in the same way by a natural event. In fact, the least productive capital and the poorest families with the least human capital usually suffer the greatest damage.
3. Not all types of capital are affected in the same way. In reality, the least productive capital usually suffers the greatest consequences.
4. The long-term rate of growth and of inflation will not be affected by the disaster. This supposition may be derived from the conventional models of exogenous growth (Okuyama, 2003).¹¹

5. Great disasters are very infrequent events.

These models allow us to calculate the expected decline in the rate of growth, for which the following factors must necessarily be recognized:

- Losses caused by disasters are not concentrated only in capital.
- Estimated capital losses are calculated at their cost of replacement in the market.
- Capital is heterogeneous, and therefore, the effect of the disaster is the differential among the types of capital.
- Capital is also heterogeneous within each type of capital.
- The growth of the GDP does not depend solely on the capital stock.

The first determination lies in estimating the potential losses caused by the disaster, including the loss of capital and the loss in current production, as well as the depreciation rate and the cost of replacement. Finally, since growth does not depend only on capital, but also on other factors such as labor, human capital, etc., the model should include additional factors that will optimize the results.

7.2 Minimum Compensatory Expenditure for Mitigating the Effect of the Disaster

The previous section derived the interval for losses of tax income. Now it is necessary to estimate the replacement expenditure that the government should make to compensate for the losses from the disaster. This will complement the analysis of the short-term fiscal pressure that will be seen reflected in the dynamic of the

11 Okuyama, Yasuhide (2003). "Economics of Natural Disasters. A Critical Review," Research Paper 2003-12, Virginia University. Also, IDEA (2005). Indicators of Disaster Risk and Risk Management, National University of Colombia and the Inter-American Development Bank, Bogotá Colombia.

debt, carried by the authorities to manage their medium and long-term liabilities. For this, the following suppositions should be assumed:

- Any additional expenditure beyond the emergency is for reconstruction of public and private infrastructure;
- Investment in reconstruction is an autonomous capital expenditure; and
- There is underutilized capacity in the construction sectors.

Starting with these suppositions, the simplest multiplier model can be used to determine the investment expenditure. Given that the government should commit itself only to a percentage of losses, that is, those affecting public infrastructure and poor homes in the lowest socio-economic strata, it is necessary to introduce elements of adjustment into the calculations; these adjustments are also necessary because part of the expenditure will get filtered to other regions of the country, reducing the potential of the autonomous demand.

The estimates include data on an open economy from a territory where taxes are paid and there is a propensity for savings, the tax rate and the propensity to import, obtaining the maximum and minimum increases in investment for the territory under study and allowing for the determination of the additional maximum and minimum expenditure that should be made after the emergency. This, together with the decline of tax income, will show the fiscal vulnerability of the government. It will be assumed that the fiscal deficit generated by the disaster will be financed with debt, and from the budgetary intertemporal identity of the government, it is inferred that the public debt will increase in the same proportion.

7.3 Reallocation of Expenditures in Case of Disasters, Financial Management Plan for Extreme Disasters: A Portfolio Approach

This section describes a simple financial model that enables us to identify the need for internal resources

to deal with the costs of reconstruction after a natural disaster. It also proposes the solution to a problem of simple optimization in order to determine the reallocation of public expenditures to minimize social loss.

Determining the amount of resources that can be obtained by reallocation implies a detailed knowledge of the budgetary process. That is, the norms and institutions that define the fiscal policy. Consider that the budget of a determined year should deal with appropriations that, for a variety of reasons, correspond to past considerations. This fact makes it necessary to take this aspect into account to determine the discretionary expenditure (investment) that can be reallocated at any given moment. The process can be subdivided into the following stages:

1. Appropriations: can be modified during the fiscal year; they can be increased, reduced or transferred between line items.
2. Commitments: when formal contracts are signed.
3. Obligations: when work has been completed and the goods and services delivered.
4. Payments: when checks are issued.
5. Cash: when the check is cashed

At the close of the fiscal year, not all jobs are finished, that is, commitments have been generated, but obligations have not, these line items, in some countries, are denominated “appropriation reserves,” and they maintain their applicability into the following period. In other cases, when jobs are concluded and delivered but checks have yet to be cut, there is an accumulation of “accounts payable” that remains in effect into the following fiscal year. This line item is denominated “floating debt.” The intertemporal accumulation of these obligations restricts the degree of liberty of territorial authorities. Finally, there are future commitments that comprise authorizations for the commitment of projects lasting more than one fiscal period (investments in services, physical infrastructure and others). From this, one finds that to determine the amount of discretionary expenses, one

must take into account (subtract) these items from the expense budget:

Total Expenditure – Operational Expense – Amortizations – Interest on Private Debt (Internal and External) – Floating Debt = Investment Expenditure + Future Commitments.

Therefore, it is proposed that the line items of investment expenditure plus future commitments be reassigned in case they are required to cover the costs of a natural disaster.

The authorities must define the best way to reallocate public expenses to cover the costs of financed reconstruction, using internal resources. One simple way to solve this problem is to minimize the cost of opportunity of changing the destination of the investment expense, subject to a Coob Douglas technique that allows for transforming public resources into reconstruction investment.

If it is true that the design of an optimal strategy for managing negative contingencies, such as the event of major earthquakes or hurricanes in densely populated areas, characterized by the presence of strong inter-industrial links, demands a combination of *ex-ante* actions – such as mitigation and prevention – and *ex-post* policies – oriented toward the attention to victims and the reconstruction of affected zones – then there is no reason to ignore the role of the markets and financial and insurance mechanisms within the package of available options for reducing or compensating the losses caused by natural disasters. As recognized by Robert Shiller, “the risks of mega-disasters can be managed by private financial markets, as long as these are able to capture all of the attention and interest of their portfolio investors.” In fact, after Katrina, it was possible to issue close to \$2.1 billion in catastrophe bonds in the stock markets. In this sense, the retention and transfer of risks is a substantial component of any risk management (or prevention and disaster assistance) program, especially when it is recognized that the government, like any other

agent, is subject to a series of financial and institutional restrictions. On one hand, the spending policy should comply with the government’s so-called intertemporal restriction, that is to say, *the condition in which the present value of the primary surpluses should be equal to the balances of the initial debt*. This means that the administration cannot accumulate balances of growing debt over long periods of time, because the markets understand that sooner or later the imbalance will have to be corrected. This may be reflected in an increase in the risk that the government will fail to fulfill its obligations and end up defaulting on the debt. In addition, there are national and fiscal management rules and standards that a government cannot evade. In this sense, it must be recognized that the resources are “scarce” and that the autonomy of regional governments has its limits. In this context, it is necessary for authorities to respond to a series of questions, in order to fulfill their objective of minimizing the cost of social welfare in case of disasters, and in the other context, this must be done in a consistent manner, without threatening financial stability and the sustainability of fiscal policy.

The first question that must be answered concerns the scope of the government’s action regarding its constitutional responsibility before its citizens. The priority of government action should be concentrated on the poorest and most vulnerable segment of its society. Of course, in a disaster situation, it is possible that the number of homes in this condition will increase dramatically and that the government must attend to their needs. In any case, it is important to establish certain minimum criteria that allow for the design of a viable and equitable plan for efficiently facing an adverse contingency. The second matter is the need for authorities to choose the instruments they will use for designing the intervention plan. It is worth pointing out that what matters is that they comply with certain basic rules of designing an optimal policy. For example, the number of objectives must be equal to the number of lineally independent instruments. The following sections will discuss these ideas and present a financial plan for managing “severe” disasters caused by extreme events.

7.4 Residual Responsibility: A Coherent Analytical Framework

In many circumstances it is practically impossible to determine the optimal assignation of costs and benefits. In events such as floods and earthquakes, it is likely that sectors of the population that before the catastrophic event were not the object of social policy, end up losing their patrimony and falling into conditions of poverty. A utilitarian would defend state subsidies in this situation.¹² This being the case, the responsibility of the governments may be extended, depending on the gravity of the event and the negative effects generated as a result of the disaster. Along these lines, it is important to establish a coherent framework that will allow us to rigorously determine the compatibility of the macroeconomical balance with the decisions and responsibilities of each of the agents comprising the economy. This section presents this conceptual scheme.¹³

For the purposes of this chapter the following agents are defined: homes, businesses, the state, the administration (national, state, departmental or municipal), the external sector, and the insurance companies. Homes make decisions concerning supply of labor, consumption-savings, asset insurance, and their portfolio. Businesses are the owners of the capital and contract labor to produce goods and services; they invest to increase the productive capacity of the economy and acquire insurance against, for example, floods and earthquakes. The state and the administration receive transfers from the businesses in the form of taxes; they carry out public spending, grant subsidies, and purchase insurance policies against earthquakes and floods. The state issues monetary and non-monetary liabilities, the administration issues only non-monetary liabilities. Insurance companies charge insurance policy premiums and attend to payments for the losses of homes, the state and businesses. The external sector makes donations and grants credits to the national government. Finally, there is Mother Nature, whose “blind” actions afflict the agents with

losses when disasters happen, in this case earthquakes and floods. Now, “the operations that occupy the agents should be coherent among themselves. This obligation, that we should always be well aware of, can be translated explicitly by a joint economical accounting, stated in abstract terms.”¹⁴

The accounting framework allows us to see how a catastrophic event affects the long-term growth of the economy. If, for any reason, capital losses resulting from an earthquake or large flood surpass global savings, the capital stock of the country is reduced, that is, there is a negative net investment. At any rate, it is important to note that even when there are financial compensations and the savings necessary to cover the losses, the dynamic of capital accumulation at the global level slows down. This can be clearly seen when the value zero is assigned to the losses from an earthquake or flood. In this case, it is obvious that the level of net investment is much greater. This is reflected in a higher rhythm of growth.

To determine the residual responsibility of the state and the administration, it is convenient to concentrate on the flow accounts of the homes. Homes face the losses of natural disasters, net of donations and insurance payments through negative adjustments in their financial assets and savings. From this result, it is clearly deducible that the state and the administration should assist the homes that lack financial assets, savings and coverage by the insurance markets. The target population that meets those characteristics can initially be associated with families from the lowest socioeconomic strata. Of course, the criteria of equity must be real and effective. This leads to the conclusion that the state has the obligation of counteracting all of the disadvantages that affect the discriminated and marginalized, the weak and most vulnerable of its population. The most important instrument the state has to achieve the “equality of opportunities” is public social spending. The criteria of its management and assignation have a clear distributional bias.

¹² Sen, Amartya (2002). *Development and Freedom*, Planet.

¹³ We adapt a scheme presented by the DNP and World Bank (2005).

¹⁴ Malinvaud, Edmund (1986). *Macroeconomic Theory*, Editorial Alliance.

It is important to point out that even though the definition of social spending is vague, and fails to establish clear defining criteria, it can be said that spending in prevention of disasters and insurance for the poorest is, indubitably, *social spending* and as such, should be understood and recorded within the public budget. The reason is evident: landslides, floods, and earthquakes affect all the population in an adverse manner, but their effects on the poor is devastating; from this we gather that, in order for the action of the state to be concordant with the concept of equity, it must necessarily eliminate the conditions of natural hazard on the minimal assets of inhabitants from the lowest socioeconomic strata.

Assuming that private businesses and the government are protected from the losses caused by earthquakes or floods, through savings and insurance, there remains only the home sector, from which we can exclude those of high socioeconomic strata that have the financial assets, savings and other mechanism to cover their capital market risks. In this way, attention can be directed to the families that lack financial assets, that are simultaneously rationed by the capital markets and spend everything they earn – in other words, they have no savings. Of course, if state and government spending fails to cover their losses, the homes will suffer the consequences, reducing their capital assets (durable goods and houses) and thereby deepening their level of poverty.

Now, the central government's and the administration's critical points of intervention still must be defined. It is clear that in the case of small disasters, such as flooding and landslides, the government must act to compensate the poorest of its citizens; however, the guidelines of government responsibility get hazier when the event is a high-intensity earthquake that destroys an important part of the city's capital and generates a significant number of deaths and victims. It seems that the way this problem could be handled would be to assign the role of insurer, in the first instance, to the government of the territory involved, and the role of a kind of reinsurer to the national government. That is to say, a minimum value of losses can be established, after which the nation should assume the costs of the disaster, given that the magnitude of the event surpasses the financial

capacity of the local government. The thresholds obey economic and financial factors as well as the economic policy of the problem.

7.5 Financial Model for Risk Management in a Territorial Unit

Constructing a financial model that allows us to define the optimal strategies to be followed – by the territorial unit – to manage and respond to the risk of a natural disaster, requires having information on the probable losses resulting from this type of event within its jurisdiction. These simulations come from models of catastrophes designed by engineers and specialists in earth sciences. Once the range of losses, and their respective probabilities, have been established, the most appropriate instruments and financial options for minimizing the social losses should be selected. The criteria for optimization are simple. A general model is built and the benefits and costs of the existing options, from the insurance and capital markets and those of the government, are introduced into it; thus a portfolio of resources is compiled that allows authorities to make use of these resources to confront the consequences of an earthquake or other disaster of great proportions, without compromising the government's financial and fiscal stability.

The first step in the design of this model of financial engineering is to estimate the PML. This indicator is a measure of the risk corresponding to the greatest loss that a territorial unit could experience, derived from calculations of the catastrophe model. The PML is estimated for a given period of return. For example, a PML of \$100 million for the period of return of 500 years implies that losses above that value have a probability of 0.2% of occurring in any given year. A complementary tool is the curve showing the probability that the event will exceed expectations, for a given value of monetary losses. Once the function of excess probability is estimated, the risks become explicit. The territorial authorities should establish that part of these probable losses fall under their responsibility, according to their constitutional mandate and to government programs. Later it will be necessary to determine what part of this risk can be retained and what part can be transferred to other agents, which might be the national gov-

ernment, insurance companies or capital markets. Once it has been decided that the territorial administration shall assume the responsibilities for disaster losses up to a value of X millions, it must generate the resources nec-

essary to make the pertinent compensations. There are several financial instruments and institutional arrangements that may be used, as previously explained.



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ANNEX I. TABLE SUMMARY OF FINANCIAL AND RISK TRANSFER INSTRUMENTS

Instrument for Financing	Characteristics	Observations
Disaster Funds	Resources earmarked for disaster assistance. The funds accumulated in this account should be maintained in liquid assets, that is, in papers or bank accounts that can be cashed out quickly, without any significant costs of transaction. To the extent that these resources are needed to react to contingencies and catastrophic events, the investments should be low risk and therefore small yield. Ultimately, they should be considered as “demand deposits.”	The government incurs in the cost of opportunity, because these funds could be used in other investments with higher rates of social return, such as education, health care or employment programs. However, the decision depends on the balance between the marginal cost and benefits of holding idle money until the worst happens.
Debt	The government may resort to the national or international banking markets and borrow funds either to cover direct costs resulting from the disaster or to contract contingency credit.	In the first case, there may be problems in obtaining the resources, owing to the fact that in a disaster situation, the demand for credit from all sectors increases, making the resources and financial risk more expensive. Intermediaries will be less predisposed to grant loans and possibly the rationing problems will multiply. On the other hand, if losses are excessive, it is possible that the government will be unable to obtain the resources needed and must resort to assistance from the central government or the international banking sector, which may even be more adverse to the concept of granting credit to the central administration if there are no guarantees from the central government, especially when the qualification of the public debt risk bonds have deteriorated significantly. On the other hand, the problem of contingency credit is similar to that of disaster funds, the government incurs in the financial cost implied by reducing expenditures in other areas of greater social profitability. Finally, the contingency credits have a huge disadvantage in that if the decision is made to use them, the government increases its debt with the multilateral banking system.
Issuing New Debt in the Form of Bonds	Another alternative for obtaining resources is to issue public debt bonds.	Again, this source of resources may be seriously limited if the markets consider that the fiscal situation is deteriorating and therefore demand high-risk premiums that may make it practically impossible to place new certificates on the market.

Instrument for Financing	Characteristics	Observations
Insurance	<p>A contract through which an insurance company promises to assume the risk that an uncertain event will occur, obliging itself to pay for the losses that the subscriber may incur from the effects of the risk determined in the contract. As a counterobligation, the subscriber must pay a premium to the insurer. This mechanism is possible, thanks to the principle of mutuality; which states that there is compensation among persons subject to a similar risk.</p>	<p>It is of vital importance that the central government and the decentralized entities implement new strategies to stimulate the development of the primary insurance market against the different hazards represented by natural catastrophes, giving special importance to transferring the risk of damages to public physical infrastructure. This first step allows for the reduction of the governments' physical burden after a catastrophic event and will open the path for facilitating access to the private insurance market sector.</p>
Reinsurance	<p>This is the insurance of the insurance companies. In other words, it is the transfer of risk to a second insurer by a company that acquired the risk directly from its clients. The insurer uses reinsurance to limit the temporary fluctuations during a disastrous event, before the clients it is responsible for and to protect itself against insolvency in case of a catastrophe.</p>	<p>The prices of insurance and reinsurance tend to vary widely on the world level. After a catastrophe of significant proportions, the premiums for insurance or reinsurance will increase suddenly and dramatically. These increases tend to fade in time, but this decrease is much slower than the explosive increase. This behavior of the prices can be explained by the attempt of the reinsurers to obtain compensation through prices for the losses incurred after a disaster, given that the contracts between insurance and reinsurance companies are long term. Another factor that influences this cyclical behavior of prices is the revision that insurance companies make of the potential damages from a disaster. So the tendency of insurers is to reduce their level of reinsurance as the magnitude of the disaster increases and the probability of its occurrence decreases. This indicates that insurance companies, contrary to the theory, do indeed retain the risk.</p>

Instrument for Financing	Characteristics	Observations
<p>Catastrophe Bonds (Cat Bonds)</p>	<p>These bonds are differentiated from the simplest form of bonds in that they are subject to credit risk (risk of non-payment or default on the part of the issuer) on all or part of the principal and/or the coupons, in case of the occurrence of certain previously specified natural disasters, thus becoming instruments of risk transfer. The funds that are obtained from the sale of these bonds are invested at a risk-free rate, and the yields of that investment are in turn used to pay the interest or bond coupon. In compensation for the credit risk that these bonds represent, they offer higher interest rates and yields than those offered in the market.</p>	<p>In general, in the process of issuing a cat bond, both parties (issuer and investor) use the special purpose vehicle (SPV) as an intermediary in the process of titling the risk through the bond.¹⁵ This SPV is a legal, independent entity that issues the cat bond, receiving a payment from the investor that buys the title. In turn, the SPV establishes an insurance contract with the insurance company through which the latter covers the risks established in the bond in exchange for periodic premiums that are used by the SPV to pay the coupons to the investor. The amount the SPV receives for the sale of the bond is deposited in an investment company or deposit bank (trust) that issues credit-risk-free treasury titles as collateral. The insurance companies that seek to cover their risk through this bond have incentives for using an SPV to avoid the risk of solvency that the insurance firm may occasionally face.¹⁶ The territorial government may combine all of these instruments to cover the losses caused by a high intensity catastrophic event. The use of these instruments depends on their financial or opportunity costs and on the possibility of accessing those resources.</p>

15 Titling assets is defined as the issue of titles (in this case catastrophe bonds) using one or several assets as collateral for the issue. In this case, the assets that back the issue are the insurance premiums that are received from the insured.

16 Grossi, Patricia, and Kunreuther, Howard (2005). *Catastrophe Modeling: A New Approach to Managing Risk*, Springer Science.

*PRACTICAL EXPERIENCES FOR RISK REDUCTION
IN BOGOTÁ, D.C.*

*Investment Project: Retrofitting, Improvement,
and Standardization of Secretariat of Education Schools*

*and Financial Strategy for Integral Risk Management in the
Capital District's Program for Vulnerability Reduction*

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Practical Experiences for Risk Reduction in Bogotá, D.C.

I INTRODUCTION

From a variety of angles, Bogotá, D.C., has consolidated its actions for risk management. The prevention actions have integrated themselves over time and currently consist of a coherent set of policies being brought to completion.

This section seeks to identify, through an investment project for the mitigation of seismic risk and the explicit inclusion of a financial strategy within the city's finances, good practices in the process of their definition and execution.

On one hand, the project **“Retrofitting, Improvement and Standardization of Public Schools,”** and on the other, the **“Financial Strategy for Integral Risk Management,”** were selected because they are considered the successful result of a series of efforts made under different city administrations. These two projects have brought about improvement in quality of life for an important segment of the student population, projections for the financial and physical protection of the city against risk, and continuity in the development of projects, criteria and financial tools.

The section compiles and organizes different actions that have taken place in the capital district that have made the execution of these projects possible, giving them financial sustainability and retaining them in the development plan.

The best practices are identified as making the right decisions in the development process of a project. There are direct decisions and others that the previous ones make possible. A good practice is applicable and replicable depending on the adjustments that one can make to the different realities, while retaining their essence.

It is clear that formulas for guaranteed success do not exist as such. However, there are indeed a series of key elements that allow and facilitate the incorporation of risk issues into the high priority planning of a city.

This section highlights and explains the different links that contributed and continue to contribute directly to the fact that both the school project and the financial strategy are now being carried out.

The section is divided into three parts. The first reviews the background, describes the principal legal facts, planning and management that have led to the occurrence of the experiences being analyzed. The other two parts detail the principal elements used to develop the project and the strategy.

2 BACKGROUND

This section tells the story of the main actions that took place in the city of Bogotá leading to its addressing the issue of natural risks.

Technical affairs and planning tend to take place to the extent that legislation requires certain actions be undertaken by the government and its institutions. Thus, the incorporation of risk tends to have legal origins, but is a starting point that, unless there is political determination to assume the costs of an issue with so many sources of action, could remain on paper and be indefinitely postponed.

In the two cases to be documented, the existence of planning, legal and political willingness were determining factors for making the decisions required to generate, solidify and carry out the respective processes.

City planning, in its diverse aspects, has incorporated the issue of risk into the design and application of three important instruments: the formulation of the land use management plan that establishes the guidelines for growth and development of the city and incorporates the factors of geological and environmental risk, the development plan, and the formulation of general and sectoral plans for the state and the population to assume the consequences of possible catastrophic events.

Protection against hazards is traditionally assumed after the catastrophe has happened, in the period of reconstruction and recovery. Afterwards, it ceases to be urgent and becomes just another third rate issue, more so in countries with major unsatisfied basic needs. This is why it is really admirable that Bogotá, D.C., after more than 10 years, has addressed the uncertainty of potentially catastrophic events by creating concrete projects, and simultaneously undertaken the improvement of the quality of life of its inhabitants.

2.1 Legal Background

Before 1983, the public administration had negligible awareness of the latent hazards in its territory and their consequences to the extent that the population and the state were completely vulnerable. The Popayan Earthquake in 1983 began a process of awareness on the part of the government.

As a consequence, in 1984¹ the first seismic-resistance norm was issued. The process was reinforced by the eruption of the Nevado de Ruiz Volcano and the severe consequences it produced: the disappearance of the prosperous city of Armero. With these two events, Law 46 of 1988² was issued as a guide for sectoral, regional and municipal planning for disaster prevention and response. It organizes the different pertinent institutions, giving them specific functions, and during situations of disaster gives them the capacity to act under a special regimen.

Bogotá organized itself institutionally and financially to respond to emergencies and to assume the consequences of risk in the city, creating in 1987³ the Fund for Emergency Prevention and Response (FOPAE) and in 1990, the Office of Emergency Response and Preven-

tion (DPAE). In this framework, the FOPAE accumulated financial resources, while the DPAE organized itself technically and took charge of the process of becoming knowledgeable about risks and planning actions for protecting the city.

By 1997-1998, Law and Regulatory Norm NSR98⁴ had been passed, establishing the regulations for seismic resistance for all new buildings in the country. This set of normative instruments classifies buildings according to their function and utility for community recovery in case of emergency, and establishes the specific conditions of seismic resistance for each type of building.

These norms also established a period of three to six years, respectively, for carrying out seismic vulnerability studies and for retrofitting all buildings considered critical, within the normative framework.

In 1998, after 10 years of promoting a legislative action that required it, the National Plan for Disaster Prevention and Response (PNPAD)⁵ was passed, requiring the “incorporation of preventive and safety criteria into plans for development,” which included and structured the four axes for risk management that serve as input for all subsequent planning and establishment of norms.

At the same time that the initiatives for national order were being put into place, the local process began with the initiation of district efforts in building the framework for seismic resistance of public buildings.

In 2001, Bogotá issued Decree 074, whereby seismic microzoning was adopted, thereby consolidating the process of seismic hazard evaluation in the city. This process was led by DPAE in conjunction with the academic sector.

1 See Annex 1: Timeline.

2 Ibid.

3 Ibid.

4 Ibid, see Annex 2.

5 Decree 93 of 1998, see Annex 1.

Other tasks of diagnosis and evaluation of hazards and risks were carried out over a 15-year period until the present, when we can speak in terms of an ample infrastructure of information, and excellent technical and executive capacity to face emergencies and lead the processes of prevention and mitigation.

The national system is a general legal framework for developing the issue of city protection against catastrophes. Measures that have impact on the incorporation of this protection into the legislative and executive agendas are either taken or not taken in cities within a decentralized structure for risk management.

Municipalities and cities have administrative and budgetary autonomy to face their needs for protection against disasters. This fact has the advantage that it enables them to act efficiently. Making decisions is direct. The relationships between national and regional entities are more a collaboration than a dependency.

Beyond the judicial background and planning for these projects, there is ever-greater capacity for action on the part of the entity in charge of leading risk management in the city. Evidently, legislation and the establishment of norms tends to consist in pointing out the problems and the possible solutions, but that legislation itself, or the tools for planning, are far from being capable of generating the conditions necessary for enforcing their fulfillment.

In this sense, the work of leadership and positioning carried out by the entity in charge of integral management of risk in the city has been fundamental.

It seems obvious that there is a need for leadership to make technical and building decisions for the processes of city protection. DPAE was created as the entity in charge of risk management, but as important or more so, is the fact that this situation inserts the concept of *risk* into the city administration's agenda, and has provided the reins for leading the processes of appropriating laws for city protection against natural disasters.

DPAE covers the national and local levels of interinstitutional coordination of activities, projects and programs that assume risk in the city. This is an excellent practice since it has the technical and organizational capacity to accompany the different city entities in applying and carrying out actions for prevention, mitigation and response to emergencies.

DPAE was created as a dependency of the Secretariat of the Government, and this fact is in itself a good practice in that, as an entity that works directly with the mayor, it has the greatest and most efficient capacity for convocation. However, this fact in and of itself would be of insignificant importance without the proactive capability that DPAE has, to place it in a high priority position among the issues of government.

FOPAE was created with a stable and specific source of financing to fund a good part of the direct investment that the city makes for its integral risk management.

With the latest law of seismic resistance, the DPAE convened district entities to initiate the process of seismic evaluation of buildings in each jurisdiction. Each entity initiates its own contracting of seismic vulnerability studies and its respective retrofitting designs.

In 2002, the District Technical Committee, an entity hosting the participation of all of the city's technical service entities, considered the matter of retrofitting all of the city's critical facilities as urgent, so much so that the project was established as a priority in the working agenda of the district administration.

Law 400 of 1997 put a time limit on the evaluation of seismic vulnerability of critical facilities and their retrofitting.

2.2 Planning Background

The risks that Bogotá faces due to the potential occurrence of natural disasters have been approached from the normative, institutional and executive perspectives

through the city's development plans. The plan is the pivotal executive point of each administration. It has been more than a decade since the subject of risk management was incorporated and approached. The projects described here are the result of a series of events, among which are those that identify "good practices" that make the city's investment in risk reduction and protection of the inhabitants less costly.

As was mentioned earlier, the country has been consolidating policy directives for protection against disaster risks on the national level within the development of its local planning instruments. Those instruments include the plans for land use management and development. In fact, Bogotá consolidated land use management via Decree 619 in 2000, which incorporated hazard zones due to land mass movements, flooding and seismic activity, and defined the directives in the area of risk management.

The fact that the country and the city are planning their activity over the medium term, breaking with the tradition of governing on a day-to-day basis, must be emphasized. The land use management plan covers 10 years, and its basic structure is not subject to modification. The development plan is a government instrument that, over time, has assumed a more rigorous character. The controls and follow-up on it have been fine-tuned in such a way that it has progressed from being a document of rules to becoming a practical procedures manual for the institutional activities of the government.

In the area of risk management, the city has been carrying out efforts in research, organization and management as such.

In the year 2002, the designated District Technical Committee, which is the overarching directorate for all of the technical entities of the city, was working in the area of emergency response and prevention. Regarding the subject of seismic resistance, DPAE insisted on the need to implement a strategy of retrofitting of public buildings. DPAE took an inventory of the buildings and found out which of the district entities had specific studies for each sector, and continued with the process of coordinating the actions of assuming responsibility for complying with the law on seismic resistance.

Most of the city grew informally, and environmental legislation dealing with land use management and with seismic resistance is a relatively recent guide for the development of the city. The different city administrations have worked under different situations, which has produced inconsistency and the respective associated costs implied by disorder and lack of control.

Prior to Law 400 of 1997, the very general Law 1400 of 1984 covered seismic resistance. In general terms, the city's development was based on parameters dependent on the Colombian idiosyncrasy, in which owning your own home is fundamental and the construction of public assets at the lower levels is generally managed and carried out by the communities themselves.

The new norms for construction and land use management have been subject to events that have made them very difficult to fulfill, due to *de facto* situations. Strict compliance with the norms would make it impossible to carry out the projects. Solutions to these problems were found that, without ignoring the norms, gave more flexibility to their application.

2.2.1 Factual Situations in the Growth of the City

Risk management in the city must face a number of existing conditions:

1. The urban growth of most of the city has happened informally: the perimeter has expanded in different geographic directions with a total absence of any type of planning and without the follow-up instruments and control required by the complexity and size of this city.
2. Most of the buildings are in violation of the basic requirements of seismic resistance.
3. The city is located in a zone with a medium level of seismic hazard with ample areas subject to geologic and flood hazards.
4. Bogotá, D.C., now has a population of nearly 7 million inhabitants and one of the highest

growth rates of the country. Political violence and poverty in other areas of the country are among the factors that contribute to this growth, in addition to other stimuli for migration and autonomous growth. This burgeoning population that settles in the city migrates in a totally detached form from the city's own patrimony and settles informally in zones of proven risk.

The administration is generating the planning mechanisms and instruments that will allow it to regulate and organize city growth, while producing a greater supply of formal housing and economic incentives to promote rational growth and city planning.

2.2.2 The Development Plan and its Financing

Currently, the vote for popular election of the mayor is a programmed event. That means that once the development plan is approved, it is mandatory. It is noteworthy that the four administrations that have been in power during the past decade have maintained basic work guidelines for risk management.

More than 15 years ago, Bogotá entered into a process of correction and improvement of its finances, with the result that there have been reforms leading to an increase in real income coming from better fiscal performance, an increase in the surcharge on the consumption of gasoline, and a smaller rate of growth in public spending.

The last four city administrations have managed a conservative fiscal and financial discipline. They have made financing basic investments possible for the integral development of the city in terms of an increase in health coverage, education, public services, and the strengthening of infrastructure, which has resulted in general improvement of the population's quality of life.

In synthesis, the cleanup of finances and continuity of programs and projects within the development plans

have provided the propitious basis from which to assume risk management with effective resources.

3 RETROFITTING, IMPROVEMENT AND STANDARDIZATION OF SCHOOLS

3.1 Building the Project

This section will relate aspects that made possible the project up to the point of its preparation for implementation.

The decisions that made it possible to reach that point go back to the specific events described below.

In 1999, the Secretariat of Education, in an attempt to gain a perspective of the status, in terms of the seismic resistance, of the buildings that formed a part of the district school system, contracted a study on the seismic vulnerability of the buildings on all school campuses in the district.

3.1.1 The Study

The study "Analysis of the Seismic Vulnerability of Secretariat of Education Buildings in the District and Designs for Retrofitting Some of Them" analyzed the vulnerability of all the public school buildings in 2000, and designed the retrofitting of eight, as well as providing indices for setting priorities and selecting them according to technical coefficients of vulnerability.

The study is divided into six parts, beginning with the design of the forms for compiling information in the field, data collection on these forms, control and data entry, creation of a database with the collected information, calculation of primary analysis of seismic vulnerability, and the design for retrofitting some buildings.

The process of collecting information

To collect the necessary information, the consulting company carried out training for the staff of the Secretariat of Education covering the identification of

possible points of seismic vulnerability in the school buildings. In this way, the staff received training on matters of geotechnic information, seismic information on structural elements, seismic information on architectural elements, furniture and contents, as well as an evaluation of evacuation plans.

In this case, incorporating the staff into the process of elaborating the studies was a practice that created an institutional memory and empowered the human resources available to the institution to follow-up on the state of the school buildings' construction.

The study took into consideration a total of 637 schools under the auspices of the city's Secretariat of Education, carried out a campus-by-campus review, and later set priorities so that based on the initial evaluation three indices were applied for classification of risk or relative urgency of attention.

Of the schools evaluated, 430 were selected for the category of "highly vulnerable."

The evaluation of all the buildings was quite complete. The technical data collection and filtering needed to calculate the indices of overstress, flexibility and expected damage of those deemed to be above the acceptable level of seismic vulnerability of the construction defined in the norm of seismic resistance of 1998, was the parameter for classification.

The fact that an inventory was taken and criteria defined for selecting buildings and identifying priority schools to undergo retrofitting work (technical indicators of seismic resistance, cost/benefit indicators, location, number of buildings available, population benefited, density of student population per locale), constitutes an excellent practice on the part of the government.

Although there may be a thousand criteria, there were three technical parameters used to set the priorities, and the execution of the project was stated in those terms. In that sense, it a good government practice because it rules out any political or local interests. There is a clear focus on risk reduction in these determinations. The indicators have advantages and disadvantages, but they

definitely offer a technical parameter for execution.

In the process of formulating the project, some obstacles arose. Resistance to making implementation possible was overcome. The focus presented here demonstrates these obstacles and the actions taken to overcome them.

Below are two summary figures and the results of the project according to the indices of evaluation that were used. For more information, the database and its review with the detailed description of the indices is found in an annex to this document.

Table I. Classification of Schools according to Criteria of Seismic Vulnerability

Classification of School Buildings according to Criteria of Seismic Vulnerability			
Index		Buildings	Percentage
Overstress	ISE<1	1,782	71%
	1<ISE<5	622	25%
	ISE<5	114	5%
Flexibility	IFL<1	1,423	57%
	1<IFL<5	756	30%
	IFL<5	339	13%
Hassan and Sozen	Light	1,663	66%
	Moderate	558	22%
	Severe	297	12%
Total Schools		2,518	

Source: Projects and Designs, Secretariat of Education, District of Bogotá.
Calculations: PPAE. September 2006.

Classification of Schools according to Criteria of Seismic Vulnerability			
Index		Schools	Percentage
Overstress	ISE<1	202	32%
	1<ISE<5	331	52%
	ISE<5	103	16%
Flexibility	IFL<1	151	24%
	1<IFL<5	284	45%
	IFL<5	201	32%
Hassan and Sozen	Light	156	24%
	Moderate	264	41%
	Severe	217	34%
Total Schools		637	

Source: Projects and Designs, Secretariat of Education, District of Bogotá.
Calculations: PPAE. September 2006.

The first 10 schools were chosen because they were the most vulnerable. However, in the process of presenting the designs and property documents validating the institutions for acquiring the permits for retrofitting and reconstruction, voids began to appear, particularly referring to the ownership of the buildings and their respective parcels.

On one hand, the fact that problems arose in presenting the property titles of the schools produced a reselection of the schools eligible for retrofitting, under the criteria of complying with the legal requirements to carry out the work, and on the other hand, it prompted the creation of a team of lawyers dedicated to clearing up the situation of titles and urban legalization.

However, and in spite of these measures, the time required for clearing titles created a high level of uncertainty. The serious risk of the schools and the exposure of large groups of students was a fact that the Secretariat of Education assumed in its entirety by making the process of legal clearing parallel and simultaneous to the retrofitting of the schools. The Secretariat acknowledged the privilege of the right to life and well-being of the student population at risk without detriment to the fulfillment of the construction permits, although these did not take place precisely at the same time.

The selection of the first schools to be reinforced gave evidence to certain important aspects about the risk of the general universe of buildings under the auspices of the Secretariat – very old buildings with very poor maintenance.

In the process of selecting the first schools, beside the findings in terms of seismic resistance mentioned earlier, deficiencies were seen in the spatial functionality, security measures, and above all, in the utilization of some of the buildings.

An interesting aspect of the construction methods became evident when it was observed that lower economic population groups had, historically, used a school construction process with the participation of the community, which while demonstrating solidarity, produces very deficient buildings in regards to seismic resistance and adequate spaces.

A problem of institutional informality was also found in the construction of building enlargements and new buildings. Most of the enlargements and physical reforms to the schools did not employ factors of architectural design and engineering, resulting in weak and inadequate buildings that, nevertheless, satisfied the specific spatial needs at a given time.

3.2 Project Execution

This section describes how the project began its execution and was carried out. It emphasizes the point of the obstacles and incentives during the execution of the project, from which desirable and potentially replicable practices may be derived.

In 2004, the Secretariat of Education contracted a construction company to reinforce the first 10 schools. This project originally began in the strict framework of structural retrofitting of the school buildings. The intervention was under the auspices of the District University.

The gradual nature of executing the project allowed permanent adjustments to be made to its objectives, and to many aspects that were not contemplated at first, thus making it possible to carry them out at the project contracting level as well as comply with the urban and construction norms of the city.

The result of this work demonstrated that although the schools needed to be retrofitted, there were still problems that affected the quality of the spaces affected by the process of retrofitting. Many of them took on a patchwork aspect, losing the uniformity of design and their original appearance; others lost circulation space, light, and many other desirable characteristics for the functional harmony and esthetics of the building.

The Secretariat of Education carried out an evaluation of the work in these first 10 schools and stated that the project should cover both the improvement and the standardization of the schools.

How was this process accomplished? How was the decision made? What technical and budgetary implications were considered?

The initial study was made with the objective of evaluating the condition of the structure of the schools in light of the potential risk of collapse or failure in the event of seismic activity of different intensities; consequently, actions taken were directed at approaching the matter in those terms.

At this point, the flexibility that the process presented in terms of questioning the initial objectives is notable, to the point of restating those objectives and expanding them to include the improvement and standardization of the buildings. The decision was revised, not to annul the process, but to expand it.

The possibility of limiting the project to retrofitting was extremely high. They overcame the barriers. What were they? How did the change come about? What kinds of adjustments were made in the contracts, in the overall organization of the project?

In the end, it was the most ambitious, yet realistic, project possible in terms of the needs for improvement in the city's school buildings.

Another important point is that the first 10 schools unintentionally served as a pilot project.

The project of retrofitting the schools lay in a desk drawer for several years until 2004, when the Secretariat of Education recovered the study made five years earlier by P&D, a notably uncommon event for Colombia, where the plans of previous administrations are thrown out by the political game of discrediting opposing political parties.

The retrofitting work on the first 10 schools was an astounding retrofitting success, *per se*. However, the functionality and esthetic value of several of the buildings was severely affected. Here, the original project was expanded to include improvement and standardization.

Simultaneously, as this process progressed, there was also progress in consolidating the financial strategy

for the district's Integral Program of Risk Management with the help of World Bank. The retrofitting project was included in this strategy as part of the component actions for risk reduction.

Due to this experience, the decision was made to expand the project to "Retrofitting, Improvement and Standardization of schools," improving the infrastructure of the schools in an integral manner.

What is improvement and standardization?

Today, Bogotá is in the process of approving the "Master Plan for Educational Facilities," a document regulating the architectural, equipment and urban standards of new and old buildings that district entities are obliged to fulfill to be in compliance with their educational mandate in the best way possible, and as soon as the plan is approved. It is projected nine years into the future.

This constitutes a major landmark in the country's planning, since it is the first time that a city is establishing specific goals with a plan for "how to do it" for such a long range, breaking the "planning by terms in office" so common in Latin American countries.

These standards set minimum requirements for issues such as actions promoting urban integration, minimum installations by type of space,⁶ conditions of accessibility (minimum width of doors and hallways according to the number of students, the number of exits, the width of sidewalks or platforms, among other things), sound and heating comfort, floor area per student, open area per student, classroom area per student, and specific open space areas according to the conditions surrounding the school, among others.

The master plan also includes strategies and schedules for fulfilling the goals and school improvement work for achieving the levels demanded by the plan, specific conditions for teaching spaces according to their usage, and establishes the manner in which the city understands how its educational institutions should be.

6 This refers to areas such as libraries, conference rooms, bathrooms, administration offices, etc.

The year 2005

During the process of retrofitting and standardizing the schools, one of the problems that came up was the legal condition of the land. The construction of many schools was done without title clarification and legal formalities regarding title to property, and in other cases were constructed informally by the community with the same results. Furthermore, many schools were located in high hazard zones. Both conditions generated delays in the initiation of the retrofitting projects, since the construction licenses required a condition of optimal property title and compliance with urban norms. However, some of the work was started parallel to the process of clearing up and formalization of titles.

This measure was taken considering that the development of the projects had to be done outside of the school year, that all of the campuses should be utilized to the extent possible, and that any other option would require the suspension of academic activities. So the retrofitting, improvement and standardization work began on the workday following the beginning of school vacations so that the work that would most affect the educational process would be advanced while the students were on vacation.

As of this writing, work on one school is under way, and work on 52 other schools is in the process of contract adjudication. The hope is to complete the paperwork for 32 additional schools during 2007 and finish the first phase to complete 201 more schools in 2008.

3.3 Final Commentaries

Important progress has been made in the development and ongoing adjustment of this project, especially as it relates to the matter of clearing up titles and urban legalization. By the middle of the second half of 2006, 470 of the 710 schools that the present administration received, had been legalized.

This project was expanded from its original scope in such a way that implied the increase of the original coverage to include a greater number of schools, and it became more complex by moving from a project exclusively meant for retrofitting to include the improvement and standardization of the campuses. This has required a greater demand for financial resources, good will and flexibility on the part of the administration to provide these things.

One of the important consequences of this expression of political will to execute the project is the doubling of the number of schools to retrofit, improve and standardize. Initially, retrofitting was projected for 102 schools, and this has been expanded to 201, with projects of not only retrofitting, but also improvement and standardization, elevating the quality of the infrastructure at the service of education and benefiting a much greater number of children.

Finally, this project demonstrates that risk prevention and mitigation transcends other aspects, per se, and becomes a factor of real improvement in the quality of life of the population.

Table 2. Executing of Projects for Retrofitting, Improvement and Standardization of Critical Facilities for the District's Entities

		1998	1999	2000	2001	2002	2003	2004	2005
Education	Integral improvement of infrastructure and risk prevention in the educational institutions of the district.	0	0	0	0	0	0	36,108	126,570
	Construction and provision of district sites.	8,212	68,484	58,007	12,682	5,440	25,277	42,738	91,160
	School improvement.	8,971	44,501	13,944	2,714	13,664	18,671	2,078	0
	Total Education	17,183	112,986	71,591	15,396	19,105	43,948	80,924	217,729
Social Welfare	Construction, remodeling, and maintenance of school campuses.	9,199	5,765	2,298	4,514	2,603	5,889	7,017	24,630
	Total Social Welfare	9,199	5,765	2,298	4,514	2,603	5,889	7,017	24,630
Health	Development of the office of the territorial health system And strengthening of the public hospital network.	0	0	0	0	0	0	12,698	51,755
	Master plan for equipping health-care facilities.	0	0	0	0	0	0	0	378
	Improvement of the physical infrastructure and provision of the ESE.	21,074	26,519	22,982	3,197	11,716	12,503	940	0
	Total Health	21,074	26,519	22,982	3,197	11,716	12,503	13,637	52,133
Fire Dept.	Modernization of official fire depts.	1,502	3,774	2,662	470	2,200	3,645	2,934	9,951

Source: SEGPLAN

Calculations: Fund for Emergency Prevention and Attention (FOPAE). September 2006.

4 FINANCIAL STRATEGY FOR INTEGRATED RISK MANAGEMENT

The investment required to protect the city has a variety of sources of financing, the most important of which comes from its own resources: part are those obligatorily allocated as a proportion of the annual budget, and part are those funds that come from the allotments established in the development plan. Other sources include credit and the private sector, both national and international.

When we refer to the financial strategy for integral risk management in Bogotá, we are explicitly talking about the structural incorporation of protecting the city against the occurrence of natural disasters, in a dependency and the explicit functions of the Secretariat of Internal Revenue, formalized in Decree 109 of March 17, 2006.

There has been continuous work on the process of tying up loose ends that flow into the office of analysis for the control of financial risk of the Internal Revenue Secretariat, in which the subject of natural disasters is directly included among the financial risks as contingent obligations related to administrative contracts, public credit operations and judgments against the Internal Revenue Secretariat.

Again, the subject of city protection against disasters assumes direct financial commitment of its resources. This is formally stipulated at the beginning of studies and actions required for formalizing and structuring the financial strategy for its coverage by the Internal Revenue Secretariat.

The study “Estimation of Economic Losses for Different Scenarios of Risk in Public and Private Buildings in Bogotá” was conducted with financial support from the Internal Revenue Secretariat, technical support from the DPAE, and administrative support by the National Development Fund (FONADE). This is one of the advances in the task of structuring the strategy.

In this sense, it is worth noting that the Internal Revenue Secretariat now has a new team of persons in the Office of Risk Analysis with the challenge of contributing to the consolidation of the strategy.

The steps they have taken for structuring and formalizing this strategic process are another real contribution toward protecting the city.

The main instruments for financing the protection of Bogotá, D.C., are as follows:

- Creation of FOPAE,
- Development plan,
- External credit, and
- Financial strategy for risk management against natural disasters.

They are summarized below:

The 1987 creation of the Fund for Emergency Assistance and Prevention (FOPAE), with its financial assets destined for the exclusive purpose of financing the protection of the city, measuring and evaluating the risks, executing prevention programs and projects, mitigation and operational structuring of the entity in charge of managing this task in Bogotá. This is an unprecedented landmark in the country and makes city protection a highly viable concept.

An annual mandatory sum of no less than 0.5% of the central administration’s current tax income was destined for the district’s budget. This determination has been fundamental for the development and consolidation over time of the work necessary for the actual protection of the city against catastrophic events.

As government practices, these actions demonstrate the true accomplishment that the city has achieved in the process of assuming responsibility for its own protection. In the national context, Bogotá has some very particular characteristics that imply great challenges that with the occurrence of a disastrous event would have transcendental consequences on the economy of the country.

Thus, as Bogotá over time has built up integral approaches to achieve the initiation of the processes for true protection of the city and its population – permanent financial resources, leadership and clarity of the opera-

tive and coordinating entity, and, finally, the backing and political will needed to continue developing diverse lines of action.

By 2002, Colombia was initiating studies on the fiscal vulnerability of the country and received a donation to carry out studies on the matter. The institutions in charge of integral risk management and of the city's finances, the Office of Emergency Response and Prevention (DPAE) and the Internal Revenue Secretariat, took over the study "Strategy for the Transfer, Retention, and Mitigation of Seismic Risk in Critical Buildings Used for Attention to the Community of the Capital District" contracted by the National Department of Planning in the framework of credit that the city had acquired to carry out the program of reducing the city's fiscal vulnerability.

The fact that a local entity has assumed as its own a study conducted by another entity deserves special mention. We can affirm that the probability of a study conducted at the national level being appropriated locally is negligible. In this sense, we can once again identify a good practice to work with quality technical criteria and willing enthusiasm for the work, overcoming the prejudices and rivalry that sometimes appear between national, regional or local entities. In other words, the degree of political maturity that places results above political interests; they are working for the well-being of the population.

The program, documented in the National Council of Economic and Social Policy (CONPES 3318) of 2004, is divided into five components and four phases, two of a national and two of a local nature. (Other aspects can be seen in Annex 2.)

Simultaneously, Bogotá was making great efforts in issues of seismic resistance to adjust the critical facilities to the applicable norms. The plan that Bogotá had been following was based on the four components mentioned in the National Plan for Emergency Response and Prevention that was revised in the framework of CONPES document 3146 of 2001. These components are:

1. Identification of the risk,

2. Projects of risk mitigation,
3. Institutional strengthening, and
4. Divuligation of and education about the risk.

Additionally, and under the orientation and leadership of DPAE, several district institutions were conducting studies or advancing work related to risk management in Bogotá, projects that were selected and oriented for a common purpose in the district's Development Plan for the Reduction of Fiscal Vulnerability.

The institutions that were advancing work or had designs and/or studies included:

The Popular Housing Fund (CVP), which was making progress on a project for the integral improvement of housing,

The Fund for Emergency Response and Prevention, which was making progress on and constantly monitoring existing vulnerability and risk in the capital district, as well as the evaluation of potentially affected families,

The Secretariat of Public Health (SS), which was advancing seismic vulnerability and functional studies for the hospitals of the city,

The District Secretariat of Education (SED), which had done a study on seismic vulnerability of all school buildings, and was advancing an educational plan on risk for teachers to pass along to students,

The Administrative Department of Social Welfare (DABS), which was doing the study for structural retrofitting of Infant Development Units,

The Secretariat of Government (SG), which was advancing the modernization of the Official Fire Department and the retrofitting of certain stations,

The Environmental Administration Department (DAMA), which was in the process of strengthening itself, and

The Administrative Department of District Planning (DAPD), which was entering into a policy of population resettlement from places of immitigable high risk.

With the progress of the studies on the public sector’s vulnerability, and the efforts and interest demonstrated by the city for a strategy for vulnerability reduction against natural disasters, the World Bank made a donation to finance a study for the construction of a “Strategy for Transfer, Retention, and Mitigation of Seismic Risk in Critical Buildings Used for Attention to the Community of the Capital District.” With that study under the coordination of DPAE and FOPAE, Bogotá advanced in the subject of taking action against seismic risk on a broader front.

To initiate that program, it conducted a process of coordination, knowledge, and mutual learning on the part of the two entities responsible for coordinating the program, the Internal Revenue Secretariat and the DPAE. This allowed the Internal Revenue Secretariat to incorporate the risk of natural and man-made emergencies within the asset and liability management project that its financial risk program manages in its office of Analysis and Risk Control.

Recently, with District Decree 109 of 2006, the organizational structure of the Internal Revenue Secretariat was partially modified, and the functions of its dependencies were defined, through which the Office of Risk Analysis and Control is explicitly responsible, among many other things, for proposing a financial strategy to cover the district against the occurrence of natural disasters.

This formalizes a completed act with its origins in the legal precedents, of DPAE planning and management, which incorporates the area of risk management into the financial and planning structure of the city.

4.1 Importance of Bogotá, D.C., in the National Context

The result of all this is that Bogotá continues to move ahead, determined to protect itself, and minimize costs as well as risks. It should be stressed that the work Bogotá is doing in generally cleaning up its finances and the effort of assuming the protection of the city and its population against the occurrence of natural events is of special transcendence: Bogotá is the country’s largest city, and concentrates a good part of the country’s economic activities on all of its fronts, that of informal employment, of the population, of the provision of services; it is the home of the central government and a major part of the industries are headquartered in this capital.

Table 3. The Importance of Bogotá, D.C, in Colombia

The Importance of Bogotá, D.C, in Colombia			
	Bogotá	Colombia	Percentage of National Total
Population	6,778,691	41,468,384	16.35%
GDP	50,436,642	219,183,973	23.01%
Taxes	6,221,993	19,961,933	31.17%
Financial Intermediation	5,324,520	11,440,572	46.54%

Source: DANE, GIP, Value Added by Department 2003.
 Note: With the exception of population, figures are millions of Colombian pesos.

The occurrence of a catastrophic event would have grave consequences and a negative impact on the rest of the country. The city has a clear understanding that prevention and continuous attention to risk management will provide permanent benefits.

Table 4. Distribution of the 2006-2008 Budget for the District's Fiscal Vulnerability Reduction Program

Component	Entity (Project)	Categories Project	Total	World Bank	Shared
Distribution of the 2006-2008 Budget for the District's Fiscal Vulnerability Reduction Program					
Component A Identification, and Monitoring of Risk					
Sub-component A.1 Hazard, Vulnerability and Risk Evaluation Studies		Elaboration of sociotational risk evaluation studies Technical assistance to families for housing improvement	8,847	-	8,847
A.1.1 Analysis and evaluation of risks in the capital district	FOPAE (7302)		1,357	-	1,357
A.1.2 Housing improvement	CVP(7328)		5,981	-	5,981
A.1.3 Development of system direction territorial health system and strengthening the public hospital network	Sec. of Health (342)		1,509	-	1,509
Sub-component A.2 Hazard Monitoring		Monitoring hazards	286	-	286
A.2.1 Risk analysis and evaluation in the capital district	FOPAE (7302)		286	-	286
Component B Risk Reduction					
Sub-component B.1 Seismic Mitigation in Education Sector		Improvement and retrofitting	286	-	286
B.1.1 Integral improvement of infrastructure and prevention of risks in district educational	FOPAE (7302)		286	-	286
Sub-component B.2 Seismic Mitigation in Social Welfare Sector		Structural retrofitting of Infant Development Units	104,945	79,066	25,879
B.2.1 Construction, Remodeling and maintenance			38,683	29,328	9,354
Sub-component B.3. Seismic Mitigation in Health sector		Strengthening and financial support for physical infrastructure of health institutions	38,683	29,328	9,354
B.3.1 Development of system direction territorial health system and bolstering public hospital network	Sec. Health (312)		13,372	10,138	3,234
Sub-component B.4 Mitigation for Mass Evacuation and Floods		Evacuation of families affected by emergencies and rehabilitation of risk protection zones	13,372	10,138	3,234
B.4.1 Integral Management for risk reduction in the capital district.	DABS (4027) Sec. Health (342)		52,230	39,600	12,630
			660	-	660
	FOPAE (7301)		660	-	660
Component C Institutional Strengthening and Follow-Up			7,576	777	6,799
Sub-component C.1 Project Coordination		Training for district system institutions in emergency response and prevention	1,059	777	282
C.1.1 Training for institutions	UICP Sec. Gov.		1,059	777	282
Sub-component C.2 Institutional Strengthening		Advance program of fire department training	6,517	-	6,517
C.2.1 Modernization of Fire Department.		Monitoring environmental and habitat quality	6,031	-	6,031
C.2.2 Implementation of environmental management strategy in construction and updating infrastructure	DAMA (254) Other inst. DAPD		485	-	485
C.2.3 Political development of resettlements			-	-	-
C.2.4 Strengthening of other SDPAE institutions	SDPAE		-	-	-
Total Components A,B,C			121,654	79,843	41,811

Source: Internal Revenue Secretariat
Note: Figures in millions of Colombian pesos.

Table 4. Distribution of the 2006-2008 Budget for the District's Fiscal Vulnerability Reduction Program

Distribution of the 2006-2008 Budget for the District's Fiscal Vulnerability Reduction Program (Cont'd)					
Component	Entity (Project)	Categories Project	Total	World Bank	Shared
Component D Presentation and Awareness of Risk			18,590	-	18,590
Sub-component D.1 Education on Risk			542	-	542
D.1.1 Formulation and implementation of an information strategy, education and liaison for risk management in Bogotá	FOPAE (276)	Strengthening science, education and technology for risk management	387	-	387
D.1.2 Integral improvement of infrastructure and prevention of risks in district educational institutions	Sec. of Educ (342)	Risk prevention	155	-	155
Sub-component D.2 Mass Communication			248	-	248
D.2.1 Formulation and implementation of information strategy and liaison for risk management in Bogotá	FOPAE (276)	Strengthening campaign for massive divulgation of risk management in Bogotá	248	-	248
Sub-component D.3 Socioenvironmental Actions for Risk Reduction			1,421	-	1,421
D.3.1 Socioenvironmental actions for risk reduction	DAMA (285)	Strengthening environmental management capacity and housing in localities	1,421	-	1,421
Sub-component D.4 Integral Resettlement of Families in Inmitigable High-Risk Zones			16,379	-	16,379
D.4.1 Integrated resettlement of homes located in inmitigable high-risk zones	Popular Housing Fund (3075)	Non-financed consulting	13,753	-	13,753
D.4.2 Prevent and control of urbanization and illegal construction in high-hazard zones	DAMA (296)	Protection and management of strategic ecosystems	2,626	-	2,626
Component E Financial Coverage for Risk Mitigation			491	157	334
E.1.1 Analysis and evaluation of risks in the capital district	FOPAE(7302)	Financial strategy for reduction and transfer of risk	491	157	334
E.1.2 Financial strategy for disaster mitigation	District Internal Revenue Secretariat	Financial strategy for reduction and transfer of risk	174	-	174
Total Components D & E			1,033	157	876
Total Components A, B, C			121,654	79,843	41,811
Grand Total			140,735	80,000	60,735

Source: Internal Revenue Secretariat
 Note: Figures in millions of Colombian pesos.

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ANNEX I: TIMELINE – LEGAL AND PLANNING LANDMARKS FOR RISK CONTROL IN THE DOCUMENTATION OF TWO EXPERIENCES

1980s	<ul style="list-style-type: none"> • Law 1400 of 1984: First seismic resistance norm in Colombia. • Accord 11 of 1987: Creates the Fund for Emergency Response and Prevention in Bogotá. • Law 46 of 1988: Establishes the National System for Emergency Response and Prevention (SNPAE) in Bogotá. • Decree 919 of 1989: Regulates SNPAE, establishing responsibilities between national and local governments and creating the National Office for Disaster Prevention and Response, giving it the responsibility of designing the National Plan for Disaster Prevention and Response.
1990-1995	<ul style="list-style-type: none"> • Accord 13 of 1990: Creates the Office for Emergency Response and Prevention (DPAE).
1996	
1997	<ul style="list-style-type: none"> • Law 400 of 1997: Establishes the basic norms for seismic resistance. Defines which buildings are critical and establishes a timeframe for them to be studied and reinforced.
1998	<ul style="list-style-type: none"> • NSR-98: Regulatory Decree of Law 400. Establishes the technical requirements for all buildings. Contains greater specifications for buildings considered critical. • Decree 93 of 1998: Creates the National Plan for Disaster Prevention and Response. For the first time, the four initial components of disaster prevention and response are documented. (Art. 6).
1999	<ul style="list-style-type: none"> • Decree 723 of 1999: Creates the District System for Emergency Response and Prevention of Bogotá.
2000	<ul style="list-style-type: none"> • “Analysis of Seismic Vulnerability of District Education Secretariat Buildings and Retrofitting Designs for Some of Them”: Technical evaluation of seismic resistance for district schools, which establishes prioritization through technical parameters for their intervention and retrofitting.
2001	<ul style="list-style-type: none"> • Decree 074 of 2001: Adopts microzoning of Bogotá. • CONPES 3146: Establishes the strategy for consolidation of the National Plan for Disaster Prevention and Response from the perspective of setting priorities and finance.
2002	<ul style="list-style-type: none"> • World Bank provides donations to the country and city for contracting studies leading to credit for fiscal vulnerability reduction in the nation.

2003	<ul style="list-style-type: none"> • Law 819 of 2003: Establishes dispositions on the budget. Includes stipulations on contingent liabilities for possible emergencies. • Decree 312 of 2003: Creates the Advisory Office for Risk Management, and assigns its functions.
2004	<ul style="list-style-type: none"> • Master Plan for Educational Equipping: Sets necessary standards for school improvement. • Project Implementation Plan (PIP): Basis of the program for fiscal vulnerability reduction of the capital district. • CONPES 3318: Authorizes the nation borrow \$260 million from the World Bank, for state fiscal vulnerability reduction in the face of natural disasters. • Decree 332 of 2004: Organizes the Structure and System for Emergency Response and Prevention in Bogotá.
2005	<ul style="list-style-type: none"> • “Strategy for Transfer, Retention, Mitigation and Seismic Resistance in Critical Buildings Used for Community Attention in the Capital District”: Takes an inventory of all critical facilities in the city, making an economic evaluation of the risks they represent and establishing priorities on that basis. • CONPES 3398: Authorizes the government to guarantee the credit operation of Bogotá for \$80 million for the city’s fiscal vulnerability reduction in the face of natural disasters. • Initiate retrofitting, improvement and standardization of district schools
2006	<ul style="list-style-type: none"> • Decree 109 of 2006: Reorganizes the Internal Revenue Secretariat, assigning new functions to the Advisory Office for Risk Management, including financial risk management for natural disasters.

ANNEX 2: REVIEW OF LITERATURE ON LEGAL PRECEDENTS

Introduction

As a result of the Armero and Armenia disasters in the 1980s, a series of measures was developed to create the National System for Emergency Response and Prevention.

Law 46 of 1988

Creates the National System for Emergency Response and Prevention, defines what is considered a disaster, and creates the National Office for Disaster Prevention and Response, which functions as an organ for implementing the system.

It also establishes the basic rules for the system in the operational and institutional aspects, creates the National Committee for Disaster Prevention and Response, headed by the President of the Republic, and the Region-

al and Operational Local Committees, headed by the executive president of each respective entity.

Finally, it establishes the conditions necessary for the declaration of a disaster situation, as well as granting extraordinary functions to the President in the case of such declaration, and to regulate the law.

Decree 919 of 1989

This decree regulates Law 46 of 1988. It establishes the functions of the National System for Emergency Response and Prevention and its participating agencies.

It gives the National Office for Emergency Response and Prevention (ONPAE) the responsibility for creating the National Plan for Emergency Response and Prevention. It also obliges related entities (public or private) to provide the information necessary for ONPAE to elaborate the plan.

Decree 919 also establishes the specific steps to follow in case of disasters, the conditions for temporary occupation and demolition of affected properties, enlargement of accesses to private properties and the purchase and expropriation of the same.

Law 400 of 1997

Law 400 of 1997 is the guide for setting seismic resistance norms in Colombia. This law results in the NSR (the technical norms set out as the regulatory decree of this Law).

It is important to stress that this law defines what can be considered a critical building. According to this law, they are:

“Those buildings used for attending the community, that should function during and after a seismic event, whose operation cannot be moved quickly to an alternate place, such as hospitals of complexity levels 2 and 3 and operation and control centers of lifelines.”

It also establishes, with respect to this type of building, that they should be evaluated for seismic resistance within no more than three years, in all areas of medium or high seismic risk. It also requires that interventions be taken in the next six years to bring them into compliance with the dispositions of the regulatory decrees of the Law (the so-called NSR, currently NSR-98).

Regarding its regulatory decrees and the critical facilities, it specifies in special clauses in Title A (general requisites for seismic-resistant design and construction) referring to the design, and the special seismic-resistant characteristics that should be fulfilled for attending to the community.

It also creates the Permanent Advisory Commission for the administration of seismic-resistant construction, as a consulting organism of the national government. This organization should serve to respond to technical inquiries, direct and supervise studies on seismic resistance and establish the procedures for accrediting professionals to carry out seismic resistance design work and certification.

District Program for Reducing Vulnerability against Natural Disasters - Formulation of the Project Implementation Plan: Bogotá City Hall

This plan starts with a review of CONPES 3318, which authorized the national government to borrow \$260 million in order to carry out a project for the reduction of the nation's fiscal vulnerability when faced with natural disasters.

The subject of risk in Bogotá is handled by DPAE and the funds are channeled through FOPAE. It also has contingency funds managed by the secretariats of Government and Internal Revenue.

The principal risks that Bogotá faces are the phenomena of mass evacuation, floods and seismic events, as well as forest and building fires, chemical spills and disasters during catastrophic events.

The project:

The overall objective of the project is to reduce the vulnerability of the district in the face of natural disasters, through an integral strategy of risk management. To do this, it carries out a series of specific objectives, such as: increasing knowledge regarding risks, through technical studies and monitoring, specific actions for risk reduction, strengthening the capacity of the citizenry, creation of a program of risk transfer, development and realization of actions to control the environment, designing strategies for the rehabilitation of high-risk zones, and the design and application of a financial strategy that allows for reducing the district's fiscal vulnerability.

The project is divided into five basic components as follows:

- (A) Identification, evaluation and monitoring of risk,
- (B) Risk mitigation works,
- (C) Institutional strengthening,

(D) Prevention and awareness of risk, and

(E) Financial coverage.

Each of these components has several sub-components that lead to the effective reduction of the city's risk factors. Components of identification, evaluation and monitoring of risk have the following sub-components:

1. Identification of the risk, which in turn is made up of three elements: analysis and evaluation of risk in the capital district, housing improvement, development of the Office for the Territorial Health System and strengthening the public hospital network.⁷
2. Monitoring the risk.

The component of risk mitigation work has the following sub components:

1. Mitigation of seismic risk in the education sector: This is the basic component for the project of retrofitting, improvement, and standardization of schools. This document mentions the diagnosis of 696 schools existing in the year 2000 in Bogotá. This document prioritized the retrofitting of 104 schools and notes that 210 were actually reinforced (with improvement and standardization).
2. Seismic risk mitigation in the social welfare sector: This sub-component is intended to improve the conditions of 40 social welfare centers. Currently there are 138 infant development institutions, of which 40 are constructed and 118 centers have been upgraded, so there will now be 158 centers in perfect condition.
3. Seismic risk mitigation in the health sector: 25 hospitals, including 18 health clinics, five level 3

hospitals and one second and third level have been retrofitted. This project takes into consideration the characteristics and needs of each hospital according to its time of service in order to make improvements not only in seismic resistance but also in the necessary updating within the health care institutions. As with the education sector, priorities were set although they took not only the technical aspects into account, but also the location and importance of the assistance center.

4. Risk mitigation for mass evacuations and floods: This sub-component will lead to 21 risk mitigation projects by FOPAE. It will also identify and prioritize resettlement of 278 families located in immitigable high-risk areas, and will adequate 417 residential lots located in high-risk zones.

The component dealing with institutional strengthening also has a series of sub-components:

1. Project follow-up.
2. Institutional strengthening: This project modernized the Official Fire Department with the construction of two new stations. It also retrofitted three stations in 2005 in addition to the seven that had already been retrofitted.

During the 2006-2008 period it will also replace two stations and should retrofit the rest.

1. Prevention and awareness lesson plans for the city's schools.
2. Mass communications: This sub-component will provide for the creation of audiovisual material for public dissemination.

⁷ This component has a close relation to the Critical Facilities Upgrade Project.

3. Socioenvironmental actions for risk prevention: This sub-component will help to avoid the re-occupation of 50 hectares that have been recuperated. It will also augment the environmental management capacity of the localities.
4. Resettlement of households located in immitigable high-risk zones: Thanks to this sub-component, 2,540 households located in immitigable high-risk zones will be relocated.

Component for financial coverage in risk management: This component has only one sub-component given that its objective is to transfer residual risk of disasters to third parties.

Master Plan for Educational Equipping

This project presents the physical conditions that all Bogotá schools should have, whether public, private or mixed.

This plan establishes the minimum standards of interaction for making school buildings more functional for the community. It also sets architectural standards, among which are emphasized the obligatory requirement of bringing all buildings up to the norms of seismic resistance, and minimum width of corridors, ramps and circulation spaces measuring 1.80 meters and 1.20 meters for office hallways and stairwells. It also establishes a minimum width for doors of instructional space at 0.90 meters and 1.20 meters for instructional space with a capacity of more than 100 persons. At the same time, it decrees the minimum number of exits according to the capacity of the instructional space. It also establishes standards of lighting and sound control depending on the type of instructional space and use of space on the school campus.

This plan also establishes the minimum area in square meters per student for all educational institutions in dimensions and built area. These requirements are as follows:

Table 5. Minimum Space Requirements for New Schools

UNIT	SURROUNDINGS	Minimum standards for new schools in m ² / student.				Minimum standards for existing schools in m ² / student.			
		Preschool	Basic primary	Basic secondary and intermediate	All primary and secondary	Preschool	Basic primary	Basic secondary and intermediate	All primary and secondary
Area of Lot (1)	Flat - Urban	6.00	6.00	7.00	6.50	4.50	4.50	5.60	4.90
	Slope — Urban/ perif. - rural	8.40	8.40	9.80	9.10	6.30	6.30	7.40	6.90
Open space and enclosed areas	Open space flat lot 1st floor (2)	3.60	3.60	4.20	3.90	2.25	2.25	2.65	2.45
	Open space flat lot other floors (3) (8) (5))		1.00	1.20	1.10		0.60	0.70	0.60
	Total open space flat lot	3.60	4.60	5.40	5.00	2.25	2.85	3.35	3.05
	Open space sloped lot 1st floor	5.00	5.00	5.90	5.50	3.20	3.20	3.70	3.50
	Open space sloped lot other floors		1.40	1.68	1.54		0.84	0.98	0.84
	Total open space sloped lot	5.00	6.40	7.58	7.04	3.20	4.04	4.68	4.34
	Enclosed area	3.20	4.30	4.50	5.00	2.70	3.50	3.70	4.10
Indices	Index of occupation	54%	40%	40%	40%	50%	50%	50%	50%

- (1) Useful lot area without urban cessions. To calculate total lot area, add 8% of the area for cessions and in the cases that so require, also consider areas corresponding to the results of usage of each of the lots.
- (2) For preschool, 100% of open space should be on the first floor.
- (3) For nuclei of pedagogical support, 33% of the open space may be outside the first floor, following the indications of the table of surroundings, according to the scholastic levels.
- (4) Functional circulation is equivalent to 30% of the total constructed area and transitions, walls and structure (hallways, expansions, etc.) are equivalent to 15% of the total constructed area.
- (5) (Optional) In every case it is mandatory to comply with the total open space.

Similarly, it establishes regulations for the minimum area per student as well as the recommended capacity per instructional space for each of the school rooms, including classrooms (preschool, primary, middle and secondary school), activity rooms, laboratories, mechanical areas, libraries, bathrooms, nursing stations and administrative services.

A short-term plan was also made for the rehabilitation of 325 schools (before 2001) and the construction of 76 new schools during the same period. In the medium and long term (the period between 2012 and 2019), construction is projected for 84 new schools, increasing the supply of student spaces in the city to 711,500 spaces.

CONPES Document 3318 of November 2004 – National Council of Economic and Social Planning: Authorization for the Nation to Contract External Credit Operations with the Multilateral Banking System for up to \$260 Million to Partially Finance the Fiscal Vulnerability Reduction Program of the Public Sector in the Face of Natural Disasters

This document provides authorization for the national government to obtain a loan from the World Bank for up to \$260 million to be used in the country’s fiscal vulnerability reduction project for facing disaster events.

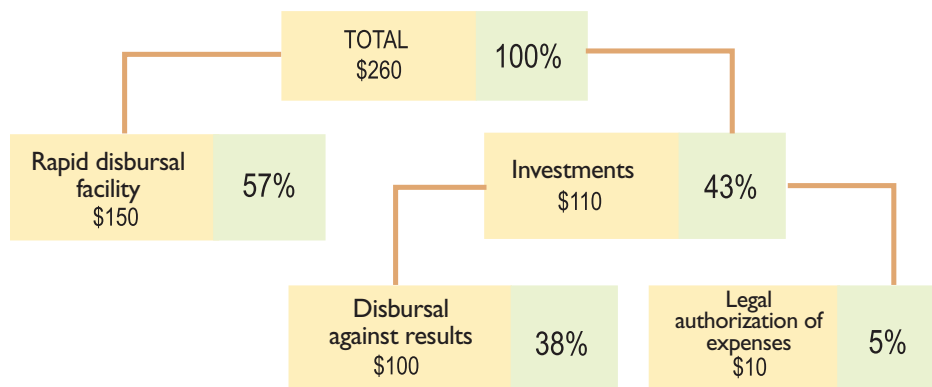
The document starts by relating the background leading to the authorization, which includes Law 86 of 1988, Decree 919 of 1989, and CONPES 3146, documents that comprise the basis of the National System for Emergency Response and Prevention.

The credit program is meant to reduce the fiscal vulnerability of the country in case of natural disasters. For this purpose, it established several specific objectives, such as: improving knowledge of risks through their evaluation, monitoring and fortifying integrated information systems, strengthening the processes of development planning, both sectoral and territorial, giving support to risk reduction actions developed by the different state entities, bolstering the institutional and financial capacity of the National System for Disaster Prevention and Response (SNPAD), promoting instruments for transferring risk in order to provide financial protection to the state through the increase in insurance coverage in the public and private sectors and other mechanisms for financial risk management, and to guarantee macroeconomic stability after a national disaster through a rapidly disburseable emergency fund.

As shown in Graphic I, the program has two fundamental components: one facility for rapid disbursement when a disaster happens (\$150 million), and the other for investments (\$110 million).

Graphic I. Costs and Structure of the Program ⁸

PROGRAM COSTS – VALUES IN MILLIONS OF U.S. DOLLARS



⁸ Taken from CONPES document 3318.

The program comprises five basic components: 1) identification and risk monitoring; 2) risk reduction; 3) development of policies and institutional strengthening; 4) risk management information and awareness building; and, 5) financial transfer of residual risk.

The program is also divided into four phases: APL-1 to be carried out between 2005 and 2009, for which the credit

is being authorized; APL-2 and APL-3 at the regional level; and APL-4 to be carried out between 2010 and 2014.

Finally, the program costs are demonstrated in the following table:⁹

Table 6. Division of Expenses for the National Program for Vulnerability Reduction

Component	Modality	Facility for rapid disbursement	Disbursement against results	Legal authorization of expenses	Total cost
A. Risk identification and monitoring				\$ 5.6	\$ 5.6
B. Risk reduction			\$ 100	\$ 3.1	\$ 103.1
C. Policies and institutional strengthening				\$ 0.8	\$ 0.8
D. Information and awareness of risk management				\$ 0.2	\$ 0.2
E. Risk transfer and rapid disbursement mechanisms		\$ 150		\$ 0.3	\$ 150.3
TOTALS		\$ 150	\$ 100	\$ 10	\$ 260

CONPES Document 3398 of November 2005 – National Council on Economic and Social Policy, National Planning Department: The National Government’s Guarantee for Bogotá, D.C., for Contracting an External Public Credit Operation with the Multilateral Banking System for \$80 Million, or its Equivalent in Other Currencies, to Partially Finance the Fiscal and Physical Vulnerability Reduction Program of the Capital District in the Face of Natural Disasters.

This document from the National Council on Economic and Social Policy deals with the guarantee on the part of the national government for Bogotá to contract a loan of \$80 million with the World Bank to implement a plan for reducing the fiscal vulnerability of the capital district.

The objectives of this project are the same as those of the project approved in CONPES 3318, only they are applied to the capital district.

It should be pointed out that the component of risk reduction covers 169 critical facilities and 21 stabilization and recuperation projects in specific zones. The total cost of the project is \$141 million, financed with the \$80 million loan and a \$61 million government counterpart.

The entities coordinating the project are: the Office of Emergency Response and Prevention and the Internal Revenue Secretariat.

ANNEX 3: REVIEW OF LITERATURE ON TECHNICAL DOCUMENTS

Seismic Vulnerability Analysis of the District’s Secretariat of Education Buildings and the Design for Retrofitting Some of Them. Projects and Designs, April 2000.

This study makes a seismic analysis of the buildings of all district schools, contrasting the seismic resistance features of each with the legislation that regulates the subject.¹⁰

9 Taken from CONPES document 3318.
10 Law 400 of 1997 and Decree 33 of 1998 (NSR-98).

The work is divided into six basic sections, as follows: 1) scope of the work and an explanation of seismic vulnerability and the indices used, 2) field work, 3) database, 4) results of the analysis, 5) prototypes of buildings found, 6) detailed studies of seismic vulnerability and rehabilitation. Each section is in turn divided into sub-sections with a greater level of detail.

Scope of the Work and an Explanation of Seismic Vulnerability and the Indices Used

In the scope of the work is a redefinition of the methodology to be used and a brief explanation of the different parts of the work in general.

The second section recounts the works that have been completed according to the specifications given in NSR-98, which briefly explains each of the procedures necessary for evaluating structures.

Indices used:

1. Index of Overstress: Looks at the resistance of the elements of the structure or the structure itself, comparing it to the resistance required by the prevailing norm (NSR-98). So the overstress index follows the formula:

$$IOS = \frac{\text{Required Resistance}}{\text{Resistance}} = \frac{\text{NSR-98}}{\text{Resistance}}$$

So, a higher IOS will result in a more vulnerable structure, since unity is the value of the index that exactly meets the norm.

Given the progress in civil engineering as it refers to seismic resistance over recent years, it can be

assumed that older structures are more vulnerable given their resistance is oriented to vertical rather than horizontal load.

2. Flexibility Index: This index measures how flexible the structure is when faced with horizontal loads. So greater flexibility means less seismic vulnerability. The index used in the study is as follows:

$$IFL = \frac{\text{Sway}}{\text{Required Sway}} = \frac{\text{Sway}}{\text{NSR-98}}$$

As in the case of the overstress index, the comparative index with NSR-98 is greater when the building is more vulnerable.

3. The Hassan and Sozen Methodology: This methodology is based on using parameters of the building to determine the possible damage it will suffer in a seismic event. The methodology classifies the expected damage as severe, moderate and light, considering severe to indicate the risk of collapse, moderate signifies damages that may affect people and light means minor damages.

With these two indices and the methodology and addition factors such as the location of the site, a global qualification of the vulnerability of the building is generated, thus allowing for setting priorities for intervention.

Furthermore, this section gives a short explanation of the correct interpretation of the results obtained according to a skeleton curve that measures the structure's behavior and classifies it into one of three groups which are: immediate occupation, life safety and prevention of collapse. It is understood that schools should be in the second group, since they are not considered critical facilities.

Field Work

This section describes the formats used for inspecting the buildings, and provides a brief description of the procedures used for the inspections, ending in a summary of the findings during the visits.

Among the findings, we can mention:

1. There is a negative correlation between the community's income and its participation in the construction and expansion of its schools, which leads to poor structural design and high seismic vulnerability of the buildings;
2. Most of the buildings have no blueprints or technical documents;
3. There is high risk for schools because of the seismic vulnerability of the neighboring buildings;
4. Schools with a single principal are better conserved than those with principals for each shift;
5. Schools that have done their own repair and expansion usually fail to comply with seismic resistance norms;
6. Most schools lack adequate foundations;
7. Foundations are, in many cases, in poor conditions and put the building in danger;
8. Most of the structural prototypes are not seismic resistant;
9. There are several schools in high risk zones due to other types of hazards;
10. The modifications and expansions do not, for the most part, take into account their structural effect on the building;

11. Prefabricated structures were very deteriorated;
12. The roofs, water tanks, and non-structural elements are not properly attached to the structure;
13. Shelves are not attached to the floor and constitute a risk to the students; and
14. Many schools lack an evacuation plan.

Databases

This section explains the process of data entry, giving special emphasis to the filters used to avoid errors. It also gives a brief description of the database and the tables it contains, as well as explanations for introducing new fields and producing reports.

Results of the Analysis

This section presents the results of the analysis in a summarized form by location. It also presents general tables with the percentages and totals of the number of buildings classified according to the previously described indices. These tables are transcribed and can be seen at the end of this document.

The last two sections analyze the designs of the most common building prototypes in district schools and make detailed studies of the vulnerability and retrofitting of eight of them.

Strategy for Transfer, Retention, and Mitigation of Seismic Risk in Critical Buildings Used for Attention to the Community in the Capital District (CEDERI-University of the Andes), May 2005

The objective of this study is to design an efficient strategy of retention and transfer of seismic risk in the critical facilities of the capital district.

The procedure used involves microzoning the city, using parameters of seismic intensity and simulations that,

together with evaluation of the critical facilities, gives the basis for the strategy mentioned.

Database

The database uses, as its fundamental input, the list of critical facilities found in the Office for Emergency Response and Prevention. This database is complemented with field information and data from other studies.

Hazard, Vulnerability and Risk

This section briefly explains the concepts mentioned above. It also defines the expressions “Pure Risk Premium”¹¹ and “Maximum Probable Loss (MPL)”¹².

General Results of the Study

As the retrofitting was carried out on each of the buildings, giving them the level of seismic resistance required in NSR-98, the reduction obtained was between 3.9% and 1.5%, while the MPL fell on average almost 40%. In sectors where buildings were reinforced within the district’s fiscal vulnerability reduction project, the Pure Premium in the education sector fell from 4.51% to 0.1%, in health from 8.69% to 0.9%, and in the security sector (including the Official Fire Department) from 14.12% to 0.8%.

Setting Priorities for Interventions

In the first place, an estimation of the costs per square meter of structural and functional retrofitting of the buildings was conducted. Given these indicators, the retrofitting costs were calculated, which led to building the indicators.

Technical Criteria: There are three indicators that measure technical criteria for setting priorities. The first of these criteria measures the percentage reduction of expected loss, as follows:

$$I_{Loss} = \frac{LOSS_{no\ retrofitting} - LOSS_{retrofitting}}{LOSS_{no\ retrofitting}} * 100\%$$

The second indicator measures the cost reduction of the premiums, also on a percentage basis, as follows:

$$I_{premium} = \frac{Premium_{no\ retrofitting} - Premium_{retrofitting}}{Premium_{no\ retrofitting}} * 100\%$$

The third index measures not only the financial benefits of retrofitting, but also its cost, comparing these two items for the purpose of observing the financial profitability of carrying out the retrofitting project. As follows:

$$I_{B/C} = \frac{LOSS_{no\ retrofitting} - LOSS_{retrofitting}}{Cost\ of\ retrofitting_{no\ retrofitting}}$$

Based on the important social indices obtained from adding the use index and the size index, this sum is multiplied by the difference in the change in MPL brought about by the retrofitting. This criteria is the most pertinent, given that all buildings studied are those classified for immediate occupation, and an intervention is later undertaken without regard to the financial benefit that is reported to the city.

Retention and Transfer

The study recommends covering the residual risks in the insurance market. It also recommends obtaining contingency loans and World Bank resources, as well as a reserve fund to cover the part of the risk that the district is obliged to cover in deductibles and reinsurance limits.

However, and given the cost of insurance, it recommends a temporary measure while carrying out the rehabilitation work on all buildings to cover the total risk of the buildings with the lowest levels of risk.

11 Pure Risk Premium is the expected annual loss. If the administrative costs are added to this value, the effective value of an insurance policy should result.

12 Maximum Probable Loss (MPL): The greatest loss that can be reasonably expected during a single event.

It also recommends the creation of a FOPAE sub-fund for attending minor damages, for which a rule of optimum income and expenditures is established. This sub-account will be managed by the DPAE and the Internal Revenue Secretariat, and should cover the expected losses for a period no longer than 1,000 years, in order to limit the amount of money necessary for building that fund.

ANNEX 4: TWO PRACTICAL EXPERIENCES OF RISK REDUCTION IN BOGOTÁ, D.C.

Good and Better Practices

- Bogotá assumed the issue of protecting the city against natural risk with an earmarked budget and continued political will.
- Bogotá, D.C., after prolonged efforts for more than 10 years, solidified several projects that take specific protection measures against potentially catastrophic events and simultaneously improve the lives of its inhabitants.
- The city's administration is aware that a norm with operational scope is useless without financial and operational resources that allow it to function and guarantees a supply of financial resources by first creating a fund for this purpose (FOPAE) and then creating the operating entity (DPAE).
- Applying the norm takes a prudent amount of time on the part of those involved (Law 400 of 1997 and NSR 98).
- The operational entity has advantages being the only body in charge of the matters and issues of city protection against catastrophic events and by being a direct dependent of the district government: On one hand, it avoids the duplicity of functions and receives government backing to make effective the great interinstitutional coordination it needs; and on the other, the local technical capacity for identifying, formulating and carrying out the city's projects, as well as the realization of activities that require attention during emergencies.
- The municipalities and cities have administrative and budgetary autonomy to meet the needs of protection against disasters. This fact has the advantage that it makes it possible to act efficiently, the decision-making process is direct, and the relationships with national and regional entities are more collaborative than dependent in nature.
- Legislation and adherence to existing norms tend to point out problems and their possible solutions, but the legislation in and of itself, or the planning tools, are far from generating the conditions necessary for their compliance. It requires leadership for making the technical decisions and building the processes of protecting the city.
- The DPAE was created as a dependency of the Secretariat of Government and this fact is, in itself, a good practice in that as an entity working directly with the mayor, it has greater and more efficient convening powers. However, this factor alone would be insignificant without the proactive capacity of the DPAE to promote itself as a priority in the matters of government.
- The 1987 creation of the Fund for Emergency Response and Prevention (FOPAE), with its assets exclusively destined to financing processes of city protection in measuring and evaluating risks, execution of preventive programs and projects, mitigation and operative structuring of the entity in charge of managing this work in Bogotá, is a landmark without precedent in the country, and makes protection of the city a highly viable prospect.
- An obligatory annual sum included in the district budget of no less than 0.5% of the current tax income of the central administration is earmarked for this purpose.
- This determination has been fundamental in the development and consolidation over time of the effort needed to truly provide protection for the city against catastrophic events.

- The city development plans have maintained the continuity of integral risk management programs and projects, guaranteeing financial resources and execution.
- A concerted effort has been made for a continuous process of tying up loose ends that flow through the office of financial risk analysis and control: contingent obligations related to administrative contracts, public credit operations and judgments against the Internal Revenue Secretariat.
- The act of creating an inventory and criteria for selection of priority building retrofitting projects (technical indicators of seismic resistance, cost/benefit indicators, location, number of buildings available, population benefited, density of student population by locality), constitute a good practice of government.



COMMENTARIES

Prepared by:

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COMMENTARIES

Since May 2007, when the Spanish version of the book “Passing the Baton” was launched at Florida International University in Miami, there have been interesting advances of the topics covered in this document and the interaction between them. The continuity of the work of the original communities of practice, considered the essence of the strategy selected by USAID/OFDA, has permitted the incorporation of new professionals, experts, practitioners, and researchers in different areas related to development – ratifying the appropriateness of the decision to mainstream disaster risk reduction within the Latin America and Caribbean region.

This fifth chapter of the English version of the book is another example of the metaphor of “passing the baton.” The comments included in this section, coming from renowned experts in the topics of risk management, environment and development, make reference to the book as a whole or focus on a specific chapter or subject. Their contributions constitute constructive observations that enrich the discussions, reinforcing, complementing, or expanding what is already in the book.

Special thanks to Stephen Bender, David Etkin, Philippe Masure and Carla Prater for taking the time to analyze the contents of this book and share their thoughts, insights, and reflections.

This chapter is an invitation for researchers, professionals, and practitioners to continue working on the analysis of how society contributes to risk construction and consequently how we can explore ways to modify behaviors and practices in search of security and sustainability for future generations.

THE SUCCESS OF THE HAND-OFF

By **STEPHEN BENDER**
Independent Consultant

In Chapter I of *Time to Pass the Baton – Disaster Risk Reduction from the Perspective of Environmental Management, Land Use Management, Finance and Public Investment* (page 9) it states that the baton is to pass “... from the traditional treatment of the subject of disaster risk management and especially that of risk reduction in the Americas, thereby transcending the conventional focus.” Picking the imagery of passing the baton, often the most critical and difficult procedure in a race that is long and hard, is quite appropriate for addressing the issue of dealing with natural hazard risk management in the context of development. The evolution at all levels of government and the private sector throughout the Americas of environmental management, land use management, finance and public investment as discrete, parallel and sometimes isolated development themes, and the paucity of consideration of risk to natural hazard events in these themes during at least the past 20 years has created the need to call for a transition from the present situation to an integrated approach for risk management in development.

As with producing, printing, and disseminating this document, USAID supported in a similar way a document

published in 1990 that states, “Following the El Niño occurrence of 1982-83, the member states of the Organization of American States (OAS) expressed the need for technical cooperation in natural hazard management... The services of technical cooperation, training and technology transfer focus on hazard assessment and mitigation as elements of the processes of environmental assessment, natural resource evaluation, and project formulation.”

It goes on to state, “Specifically, it is hoped that the experience will persuade: Development agencies in the member states to incorporate natural hazard considerations into the process of integrated development planning; International technical cooperation and financing agencies to incorporate hazard considerations into the formulation of investment projects at the earliest stages; Governments and financing agencies to place more emphasis on risk awareness in evaluating investment projects, and to assume a stance of risk avoidance rather than risk neutrality; and Bilateral and multilateral aid donors to re-evaluate the distribution of their disaster assistance funds, increasing the proportion for prevention activities.”¹

¹ Organization of American States. *Disasters, Planning, and Development: Managing Natural Hazards to Reduce Loss*. OAS, Washington, D.C., December 1990. p v.

Quite frankly, not much persuasion took place from 1990 forward. Specialized agencies, disciplines and agendas were and are abundant in the development community. There were at the time other documents circulating from a limited number of sources pointing to the fact that it is the vulnerability, not the disaster event itself, which most imperils development.² However, the forces internal and external to the involved institutions and disciplines pushed toward the creation of a specialized “disaster community.” Such a separation can still be seen in many corners of the world today.³

Time to Pass the Baton presents in Chapters II, III and IV a clear and instructive overview of the themes of environmental management, land use management, and finance and public investment from the 1990s forward. These themes became identifiable if not separate methodological as well as professional tracks in burgeoning international, national, and local approaches to development policy and practice. Chapter I presents an equally adept overview of the challenges of risk management as a strategy of multisectoral and participative intervention at the service of development. Taken together, these chapters give the reader a sense of why at this time the imagery of the title of the document is appropriate. Risk and the challenge of risk management are seen now to affect the goals and objectives of these themes. To disregard or dismiss risk and risk management of natural hazards in the context of development is to put in question if not jeopardy the expected outcomes of environmental management, land use management and finance and public investment, even as the development community still struggles with the integration of the processes these themes embody.

Land use management should draw the particular attention of the reader to the challenges and opportunities for natural hazard risk management. To begin, the manner in which societies occupy the landscape, bring about the built environment, and designate or otherwise allow for the use of space, reflects without an equal indicator the core values of society, the role of government in the name of its citizens, and the rights of the individual. Second, environmental management, and finance and public investment, together with land use management, are the principal instruments of society in shaping physical environments. Third, land use management is perhaps the process that most quickly and definitely draws in the public and private sectors at all levels representing whatever interests because of the impact of the decisions made by society about land use.

From this perspective, it is worthy at this point to mention what is perhaps the most overlooked, but thought-provoking, statement from the adopted Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA), a resolve by States to deal with risk management. To wit, the Hyogo Declaration states, “We, delegates to the World Conference on Disaster Reduction... are convinced that disasters seriously undermine the results of development investments in a very short time, and therefore, remain a major impediment to sustainable development and poverty eradication. We are also cognizant that development investments that fail to appropriately consider disaster risks could increase vulnerability. Coping with and reducing disasters so as to enable and strengthen nations’ sustainable development is, therefore, one of the most critical challenges facing the international community.” The HFA goes on to state (in part):

- 2 These documents include Wijkman, A. and Timberlake, L. *Natural Disasters: Acts of God or Acts of Man?* (Washington, D.C.: Earthscan, 1984); Hagman, G. *Prevention Better than Cure* (Stockholm, Sweden: Swedish Red Cross, 1984); OAS. *Incorporating Natural Hazards Assessment and Mitigation into Project Preparation* (Washington, D.C.: Committee of International Development Institutions on the Environment (CIDIE), 1989); OAS. *Primer on Natural Hazard Management in Integrated Regional Development Planning* (Washington, D.C.: OAS, 1991). Regarding CIDIE, USAID along with the OAS, IFIs, UNDP and UNEP were among its participants who sponsored the publication series.
- 3 There are several examples of the separation, including the ongoing struggles that multilateral, bilateral, national and local government agencies and NGOs are having in dealing with natural hazard risk management as a development issue; the role of uniformed services in disaster risk management (DRR) apart from crisis or emergency management; the role in disaster risk management of non-governmental entities at all levels alongside official entities; and the incorporation of climate change adaptation, a unique set of natural hazard risk management issues, into mainstream development initiatives.

- III Priorities for action 2005-2015
 - B. Priorities for action
 - 4. Reduce the underlying risk factors...

- 19. Disaster risks related to changing social, economic, environmental conditions and land use, and the impact of hazards associated with geological events, weather, water, climate variability and climate change are addressed in sector development planning and programmes as well as in post-disaster situations....

Key activities:

- (i) Environmental and natural resource management
- (a) Encourage the sustainable use and management of ecosystems, including through better land-use planning and development activities to reduce risk and vulnerabilities.

There is perhaps no more far-reaching statement in the HFA than this call for land use planning as an instrument for risk reduction. It addresses the underlying organization of a nation's territory. It calls into play all sectors of society and, equally important if not more so, all specialized agencies of the international community.

To lay the groundwork for integrating risk management into other processes that shape national territory, it is necessary to keep in mind, as explained in Chapter I, the multidisciplinary focus, the interdisciplinary focus and the transdisciplinary focus to work toward a systematic vision, coherency in policies and decisions and rationality in the use of resources. This begins with recognition of the role risk plays in development through each of the three processes.

The emphasis placed in Chapter II on local actors is more than appropriate. It is at the community level, and with the participation of the local population, that recognition of risk and implementation of its reduction to acceptable levels is played out. Occupation and land use are not only at the center of population, demand and production of goods and services, production and disposal of waste and disaster events, but also at the center of a manifestation of society's choices. Vulnerability is

inherent in development actions, even if it is not identified. Existing guidelines for environmental management, including instruments and procedures such as land use planning, provide an ample opportunity for using hazard, vulnerability and risk information to shape decisions.

Chapter III is a rare, insightful, well-reasoned, comprehensive and most needed look at land use management policy and practice with its ties to environmental management, finance and public investment as seen through the prism of risk management. The detailed discussion of territory and its occupation, explained through economic, social, environmental, and political and institutional dimensions as conditioned by competing interests, conflicts, waste, and vulnerability and risk in the framework of time and investment, goes far in presenting the challenges and opportunities of including risk management in shaping territory. The discussion of the evolution in Latin America of methodologies and ideologies of territory and land use planning, with its methods and instruments, leaves little doubt that while risk can be constructed through development, so too can participatory processes to examine, evaluate, implement, and validate risk-reduction measures as part of development. From a physical planning point of view, this chapter fills a large void both in theory and practice in Latin America.

Passing forward the baton is influenced in a significant way by the hand of financial issues, and by private as well as public investment. Chapter IV and the succeeding practical experience present, respectively, the description and the practice of financial risk management while noting relevant links with economic and physical risk. They provide in some detail an explanation of how financial risk affecting the public and private sectors can and should be measured, evaluated, and acted upon to complement the identification of finance and public investment issues in the earlier discussion of environmental management and land use management. On the one hand, the issue of integrating risk management into finance and public investment reflects many of the integration issues related to environment and land use. On the other hand, it is shown that the experience of committing to and following through with responsible public financial investment in risk management is impacted by, and takes advantage of, many of the types of methods and instruments identified in Chapters II and III.

The time for passing the baton is now. The need for such a move reflects not only the sorted history of development and disaster risk management, but also the enduring opportunity and prospect for change.

There is a no more appropriate strategy than to integrate on a priority basis natural hazard risk reduction into environmental management, land use management, finance and public investment. As noted in this book,

a compilation of tools and instruments, both available and needed, is important. In the future, the success of the hand-off will be seen measured as to the extent disciplines, institutions, professionals, and models used in these processes examine, formulate, evaluate, and act on natural hazard risk commensurate with not only the powers at be in society, but also stated universal goals for development.

GLOBAL CHANGE AND RISK MANAGEMENT

By DAVID ETKIN
York University

Chapter I, “The Challenge of Risk Management as a Strategy of Multisectoral and Participative Intervention at the Service of Development,” by Dr. Juan Pablo Sarmiento, presents an excellent overview of risk management from a disaster perspective. I would like to comment and expand upon two themes presented in this chapter, the first being global change and the second being disconnects within the risk management process.

Global Change

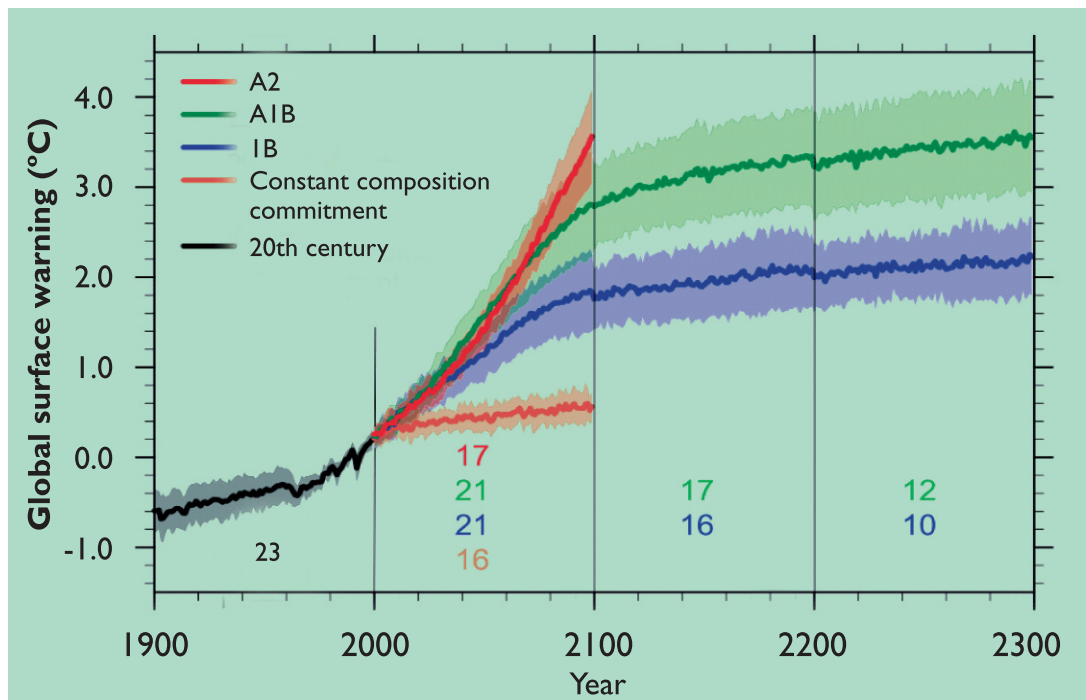
Several aspects of global change are noted, each of which alter the risk context within which society operates. These include infrastructure mega projects (such as the Three Gorges Dam in China), environmental degradation (such as deforestation), social change (such as the development of mega cities, population dispersion, growth and concentration), and economic shifts (such as the increasing gap between the rich and the poor).

An additional aspect of global change that has been receiving increasing attention over the past few decades is climate warming. International assessments published by the Intergovernmental Panel on Climate Change¹ (IPCC) indicate that the increasing emissions of greenhouse gases such as carbon dioxide and methane will result in climate warming – an event that will likely have serious effects on the Earth’s climate and particularly upon those systems that depend upon it. Associated with this will be an altered hazards regime for a number of natural hazards, including the frequency and intensity of heat waves, floods, droughts, and possibly storm/hurricane frequency and or intensity.² The extent of these changes, which will continue to accumulate over the coming decades and (probably) centuries, is so large that the Earth’s climate will enter a regime different from any experienced during the time of Homo sapiens on this planet. Figure I shows the reconstructed global average temperature record along with a range of future predictions from a number of climate models.

1 This panel submits a set of reports every five years, summarizing the state of science related to climate change. The panel received the Nobel Peace Prize in 2007. Its reports can be found at <http://www.ipcc.ch>.

2 The IPCC says, “it is likely that future tropical cyclones will become more intense,” but also notes that they may become less frequent.

Figure 1. Global Average Surface Temperature from Year 1900 to 2300



The black curve represents the historical record while the colored lines are predictions from various climate scenarios. **Source:** IPCC Working Group I. (<http://www.ipcc.ch/graphics/graphics/ar4-wg1/ppt/figure10.ppt#260,5,Figure 10.4>)

These changes are expected to be highly regional. For example, temperature changes will be greatest in the polar regions as a result of positive feedbacks related to temperature, radiation and ice. Reductions in land and sea ice, which have been observed over the past several decades,³ result in more absorbed radiation, which means warmer surface temperature, which means less ice. With changing storm tracks some regions will receive greater precipitation while others will receive less. More rain, though, is likely to come in heavier downpours, which will contribute to flooding issues. Ironically, corresponding to the increase in heavy rainfall will be more frequent drought conditions as a result of an intensified hydrological cycle. According to various climate studies, by the

end of this century, heavy rainfall events will be occurring more frequently over most of the globe.⁴

One interesting area of discussion is the extent to which changes will happen in a continuous fashion, or whether they might occur suddenly. Climate reconstructions from polar ice cores and deep ocean sediments show that in the past sudden changes have occurred in the climate system. Such an event might happen as a result of a shut down of the Ocean Conveyor Belt⁵ or a collapse of the Antarctic ice sheet. Such a sudden shift in climate could lead to disastrous impacts. Even if the climate system does evolve in a continuous manner, its effects will almost certainly result in sudden changes in various ecological

3 National Snow and Ice Data Centre. http://nsidc.org/news/press/2007_seaiceminimum/20070810_index.html

4 IPCC Fourth Assessment Report (2007). Working Group I Report "The Physical Science Basis."

5 Broecker, W.S. (1997) Thermohaline Circulation, the Achilles Heel of Our Climate System: Will Man-Made CO₂ Upset the Current Balance? *Science* 28 :Vol. 278. no. 5343, pp. 1582 - 1588

and social systems, as a result of the passing of critical thresholds. These may well be exacerbated by other systemic changes related to pollution, species extinction or human dependence upon environmental and technological systems.

Thus, from the viewpoint of disaster as a function of hazard and vulnerability, the future can be viewed as an increasingly threatening place since both vulnerability and hazard are getting worse.

There are two implications of this in terms of risk management. The first is that estimates of the probability and severity of some natural hazards that have been based upon historical data will become increasingly poor. Thus, any risk manager engaged in long-range planning (of decades or longer) where being reactive on short time scales is not an acceptable adaptive strategy would be wise to take this into account. It must be noted that this is certainly a challenging task, since there are large uncertainties with respect to how hazard will change, particularly at local levels. The second implication relates to the emission of greenhouse gases. International efforts have been undertaken to reduce global emissions of greenhouse gases (i.e. The Kyoto Protocol) in order to mitigate the climate warming threat; however, in spite of these efforts global emissions have continued to rise. Development can contribute to this effort by “going green” (i.e. minimizing its carbon and ecological footprint). Such a sustainable development strategy can also serve other goals, such as energy conservation or the creation of ecological retreats and parkland.

Risk Disconnectedness

This is a common theme in much of the risk and environmental literature and has relevance to both climate change and disaster management.

One fundamental commonality of climate change and disaster management is that they both deal with future impacts that are perceived as uncertain in terms of timing and magnitude, and often location as well. Decisions related to managing risk, therefore, reflect an important

disconnect in time and sometimes geography. Decision-makers are therefore faced with potentially large upfront costs related to risk reduction measures with an uncertain payoff, particularly within defined time frames (such as an electoral term). This results in a perception of uncertain rewards but a certain cost.

From a cost-benefit perspective, even though research in disaster management shows positive payoffs for mitigation strategies (if they are well conceived and carried out) and many climate change adaptation strategies do as well, those who benefit are often (and perhaps even generally), a different group of people than those who bear current costs. They might be our descendents or people living in other parts of the world. Investing, from an individual perspective, thus becomes an altruistic act.

These disconnects have important consequences in terms of how the social discourse is framed within the public sphere. Social decisions related to reducing greenhouse gas emissions have faced fierce opposition from institutions in society that benefit from the status quo; some of these have funded various groups to engage in public campaigns to discredit both the science of climate change as it relates to anthropogenic global warming, or actions that might be taken to mitigate it (for example, the Nongovernmental International Panel on Climate Change, which publishes various reports through the Heartland Institute, a right-wing think tank reported as being funded by Exxon and the cigarette industry⁶).

Climate change and natural disasters are both examples of socially constructed risk. Global warming results from the set of social decisions that define our technological society, and can be viewed as an example of Beck’s “Risk Society”⁷ in that we must increasingly respond and adapt to risks that we ourselves have created. This can be seen in the increasing impact of natural disasters in our world, which in large part exists because of development issues that place people and communities in harm’s way, but that also degrade the natural environment that has historically provided some protection. For example, as more people move to and live in flood plains and coastal regions, more flood-related disasters will occur. As countries continue

6 http://www.sourcewatch.org/index.php?title=Heartland_Institute

7 Beck, Ulrich (1992) Risk Society: Towards a New Modernity. New Delhi: Sage.

to develop for the purposes of wealth creation (which is viewed by many economists as important in terms of creating capacity for adaptation), more greenhouse gas emissions will occur, thereby exacerbating global warming. And adaptive responses to increased risk that are fundamentally technological as opposed to behavioral or value-based and which do not address the root causes of risk, often contribute to the magnitude of the problem instead of the solution.⁸

Disaster managers are truly faced with a Herculean task.

They are charged with the job of creating a safer society, but must do so in the face of many barriers such as political indifference, public apathy, and competing agendas. As well, the global context is shifting such that disaster risk is increasing in many regions. Certainly, it is beyond the ability of any single group of people, no matter how devoted or professional, to mitigate or prevent risk by themselves. It requires a broad effort by many groups in society working together, addressing not only unsafe conditions but also the root causes that create them.

8 An example of this within the disaster realm is the building of levees to protect New Orleans, and then allowing extensive development in low-lying areas. Within the climate change realm, it relates to arguments that more economic development is needed to create the capacity to adapt to climate change, even though that development will contribute to global warming.

ENVIRONMENTAL MANAGEMENT AND PREVENTIVE PLANNING: KEY INSTRUMENTS FOR SUSTAINABILITY

By PHILIPPE MASURE
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(Editor's note: The following text was prepared for the initial community of practice meetings in 2005; however, because of its lasting value we decided to include it in this commentary section.)

I. INTRODUCTION

The 1972 Stockholm Conference on the Human Environment affirmed “the right of human beings to a healthy environment and their duty to protect this environment and to improve it for the good of future generations.” Specific laws and regulations were decided, aiming for the protection or the rehabilitation of the environment (impact analyses, environmental assessment of projects, etc.), and which remain in force. The Stockholm Conference gave place to the development of extremely rich methods of environmental planning. Unfortunately, these methods gradually disappeared during the 1980s and were curiously ignored by the working group chaired by Mrs. Bau Harlem Bruntland, which published in 1987 “Our Common Future,” defining principles of sustainable development.

The 1992 Rio Conference on the Environment and Development reaffirmed the conclusions of the Stockholm Conference and promoted new concepts of sustainable development. The aim of this paradigm is to respond more effectively to the often-irreversible impacts of demographic pressure on the environment and the serious socioeconomic consequences it represents. The principles of sustainable development aim to ensure the basic needs of societies by considering limitations of the environment and the needs of future generations.

Sustainable development projects are based on a social, economic, and environmental approach to problems with the dual aim of continued improvement and permanent control. They presuppose a certain capacity to control local situations, take the long term into account, reduce

inequalities, and democratically manage common property.

A number of principles are attached to this paradigm: precaution, continuity (of sustainable management), social equality, solidarity, participation, and information (local democracy).

The global effects that countries have to deal with in today's world (climatic changes, in particular increased climatic variations, species extinction and thus reduced biodiversity, growing demographic pressure on the environment, explosion of mega cities, desertification, and deforestation, etc.) increasingly tend to make this paradigm a part of international treaties and public policy.

Despite the advances of science and technology, the vulnerability of modern societies to natural disasters is increasing steadily. Environmental degradation, the greater concentration of people and economic assets in exposed areas associated with the urban phenomenon, the unchecked growth of mega cities and the pauperization of many developing countries contribute to this worrying trend.

The goal of the U.N. International Decade for Natural Disasters Reduction (IDNDR) during the 1990s was to improve each country's capacity to prevent or diminish adverse effects from natural disasters and to establish guidelines to reduce the impact of natural disasters. Natural disasters reduction strategies contribute to social and economic stability in the countries at risk. Together with environmental protection, they should be an integral component of international action promoting sustainable development.

Prevention and development liaise on an ad hoc basis but no consistency has been required in recent times in U.N. programs, either through the specialized agencies or in the development aid banks (except in some recent U.N. Development Programme projects). The action plans arising from world conferences organized by the United Nations since the early 1990s are not coordinated. The Rio Conference didn't give any place to the IDNDR...

The sustainable development principle requires a global approach to development planning and the application of instruments of environmental and preventive planning essentially used in developed countries, but with new incentives in developing countries:

- Impact analysis and environmental assessment of projects,
- Environment monitoring and management (environment protection and rehabilitation programs),
- Hazards and risk mapping, safe land-use and territorial planning at national, regional and local levels (including risk prevention plans), and
- Local Agendas 21.

The object of this short document is not to detail the corresponding principles and methodologies, but to give some practical experiences or initiatives in urban areas to start the discussion of the Latin American Forum organized by USAID/OFDA. It refers to old experiences of environmental planning (La Paz, Bolivia) and ancient ecumene paradigm up to recent applications of the GEMITIS programs of preventive planning in cities threatened by earthquakes (the Caribbean and Europe) with systemic approaches.

2. SOME REFERENCES ON ENVIRONMENTAL PLANNING AND THE ECUMENE PARADIGM

2.1. The Concept of Environmental Planning

A name is directly associated with the concept of environmental planning: Ian L. McHarg. He was the first to define the principles of environmental planning and to

present them in an essential book published in the United States in 1969 and entitled "*Design With Nature.*"

It proposes a method taking into account the aptitudes of the physical environment in the projects of territorial planning. Based on concrete examples (the construction of a highway in the United States, and the study of the New Jersey littoral), he highlights the need for such an environmental and social approach and defines how to implement the stated principles.

Infrastructure and land-use planning must not consider exclusively economic criteria in the short run, but also the welfare benefits of projects and the different "costs" (financial, social, environmental...) that they imply. The layout of a highway, for example, will be defined by the superposition of the natural elements – their physical capacities, determining factor of the costs – and social elements, or social value of the concerned sites. The adopted project will imply the zones of less social value and lower technical cost.

Environmental planning appears as an important discipline based on the cartography of the environmental and social features and allowing intelligent impact studies. It especially makes it possible to:

- Define a spatial organization to conform to the aptitudes (and limits) of the medium taking into consideration each potential use by society;
- Realize a thematic and hierarchical cartography describing the natural and social environment, which in fact constitutes the reference index of an environmental database.
- Give an essential approach for the impact studies and environmental assessment of projects.

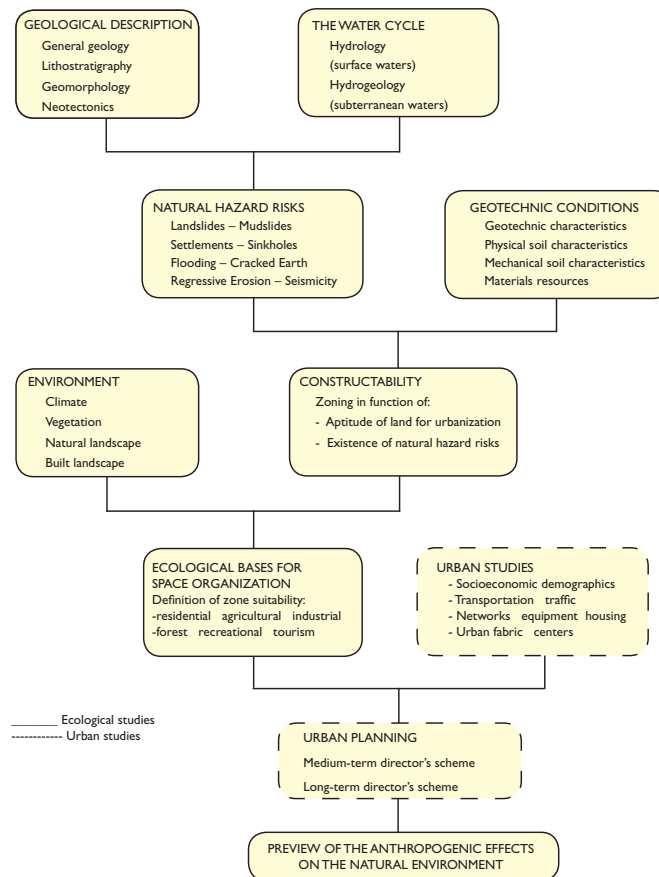
2.2. An Application of Environmental Planning in La Paz, Bolivia

The goal of environmental planning is to evaluate the constraints and the potentialities that the natural environment presents for territorial planning. It makes it possible to propose a spatial organization in conformity with the aptitudes of the medium compared to each potential land use. It also makes it possible to avoid the irreversible impacts installation can generate.

As part of the urban development planning of the city of La Paz, Bolivia, at the end of the 1970s, the environmental approach proceeded in eight principal phases:

1. Geological setting analysis at regional and local levels: lithology, geomorphology, tectonics, neotectonics, etc.
2. Climatic conditions: surface and underground waters, resources and vulnerability.
3. Ecological medium: vegetation and fauna, landscapes.
4. First level of synthesis (maps):
 - Evaluation and zoning of the natural hazards; fragility of the medium.
 - Geotechnical synthesis: geotechnical facets (physical and mechanical characteristics, aptitude of the grounds for land use, construction, etc.).
5. Second level of synthesis (maps):
 - Aptitude for construction, integrating natural hazards and geotechnical microzoning.
- Natural resources: water and materials resources, sites for waste disposal, etc.
6. Organization of urban space: type of habitat, urban fabric, activity centers, equipment, lifelines, infrastructure, roadway systems, price of land, etc.
7. Third level of synthesis: projection of environmental organization of space, based on an integration of the data relating to the physical and ecological environment and on the determination of the aptitude (vocation) of the elementary zones of the city for land use (residential, agricultural, industrial, leisure, etc.).
8. Adaptation of the land-use plans based on impact analysis of the proposed town planning schemes; action plans on environmental management (environmental protection, rehabilitation of the environment) and risk reduction (especially for floods and landslides).

Figure 1. Principal Steps of the Environmental Approach to the Urban Planning of La Paz, Bolivia



Urban planners respected the corresponding information and recommendations. The Urban Development Plan of La Paz (1978) can be considered as an example of environmental planning application. If the principles of environmental planning bring a dimension essential to planning, they are not enough to ensure a sustainable development. For that, the city planning method implemented in La Paz considered three main aspects:

- The physical environment (its potentialities, fragility, and instability) and natural hazards or hazards induced by the impacts of urban development on this medium;
- The urban system, its structure and functions, development and productions;
- The processes of governance and decision regarding city planning, environment, crisis and risk management.

2.3. Later Applications

Based on the experience of the 1970s, we consider that the projects of sustainable development should integrate the principles of environmental management to ensure the health and safety of inhabitants. The projects must be defined to:

- Improve the quality of life and safety;
- Protect or rehabilitate environmental quality;
- Ensure that the natural resources and patrimony will not be degraded;
- Ensure that the threat of natural hazards will not be increased.

The concept of sustainable development requires a global approach to the problems, considering all the elements that can influence the environment in city planning:

- Environmental assessment of projects and environmental protection;
- Monitoring and management of the environment;
- Risk analysis and disaster management, including risk reduction plans and crises preparedness;
- Constitution and use of spatial models of environment.

In this context, the management of the physical environment and natural hazards constitutes an important factor

of territorial planning that should not be neglected. The conceptual approach for environmental planning in urban development was then organized according to a logical framework as follows at the beginning the 1990s:

Environmental analysis of the urban biotope (as a new medium):

- I) “Natural” environment:
Geology, geochemistry, geotechnics, underground and surface waters (hydrogeology and hydrology), climatology, botany, biology, etc.
- II) “Built” environment: Spatial organization, principal phases of urban development, land use and occupation, distribution of the population, infrastructure, type and codes of construction, urban fabric, industrial plants, sources of pollution (human effluents, waste storage, industrial wastes, etc.).
- III) Local organization for environment and risk management.

Physical instability processes and urban development:

- I) Impact of city development on the environment (anthropogenic impact):
Piezometric variations of underground waters; subsidence; loss of bearing capacity of soils; instability of slopes and underground cavities; water pollution; air pollution; exploitation of natural resources; etc.
- II) Natural hazards assessment for preventive urban planning:
The natural hazards to be considered are numerous: seismicity, storms, cyclones, floods, mud flows, flash floods, landslides, rock falls, avalanches of snow or of debris, volcanic eruptions, swelling and desiccation of soils, coastal erosion or sedimentation, tsunamis, etc. The hazards evaluation is made on deterministic and probabilistic approaches, considering direct and induced effects; it is expressed on maps of hazard microzoning.
- III) Interaction of natural hazards and urban impacts on the environment:
Physical instability and ecological vulnerability of the urban environment lead to induced hazards that should be analyzed.

Evaluation of the socioeconomic impact of physical instability on the urban development. Risk analysis:

Vulnerability and impact assessment (human lives, potential damages, rupture of the systems of production, services dysfunction, critical facilities, municipal and other organizations); evaluation of the risk through crisis scenario simulations.

Environment and risk management:

- I) Means of reduction or prevention of risks related to physical instabilities: Technical measures (structural or engineering measures).
- II) Actions for protection and rehabilitation of the urban environment:
Monitoring and control, forecasting and early warning, crises preparedness and disaster management, health and relief resources and facilities, construction codes, land use and occupation, environmental management, protection and rehabilitation of the environment, planning and regulation, reinforcement of lifelines, education and training, information and awareness.

Decision-making aids for the environmental management of cities:

- I) Evaluation of the geo-ecological (environmental) capacity of the urban sites (resources and fragility) and environmental bases for the territorial planning (spatial aptitude for land use and occupation).
- II) Analysis of the cost/benefit ratio of prevention or reduction of natural disasters and/or environmental protection.
- III) Management of systems of data and expression of knowledge accessible to the users; decision-making aid processes.

Institutional system and governance: finances, development planning, action plans, operation control, preparedness, and training, monitoring, early warning and relief.

Communication plan: information and awareness of decision makers, public services, private sector, and the population.

More recently, the old concept of ecumene was updated by some authors, especially in France. It is an interesting lecture for land use and development planning.

2.4. The Ecumene Paradigm

The implementation of development planning in urban areas requires fixing a “readable” scheme for the city’s decision makers, stakeholders and the population, in terms of living environment (or medium), constructibility, risk, and preventive actions.

An interesting reference is that of ecumene defined by geographers at the end of the 19th century. The concept of ecumene, from the Greek *oikos* meaning habitation, refers to the portion of the Earth inhabited by humans. There no longer remain areas totally lacking human presence. Thought will be given to the relationship of humanity to the land mass (see Augustin Berque, “*Etre humain sur la Terre*” (“*Be human on the Earth*”), 1996).

The concepts associated with ecumene are those of adapted or appropriate land use. They deal not only with relationships between humans and the sites they inhabit, but also between human societies and the Earth. They naturally lead to considering the conditions of habitability of “natural” milieus.

Ecumene paradigm is not reduced to the biosphere (ecological dimension) or the planet (physical dimension). It includes culture, civilization, the sense and value accorded to places where we live (symbolic and social dimension). A given milieu can be identified by four basic attributes:

- Resources,
- Limitations,
- Hazards,
- Amenities.

The “sense” of the milieu includes a spiritual dimension (meanings), an emotional dimension (feelings), a functional dimension (capacities in terms of use) and a physical dimension (spatial orientations and temporal changes).

In the context of a systemic approach, ecumene can be defined by three components:

- Structure, which refers to the physical milieu (geology and construction),
- Function, which involves ecosystems and human activities (production, consumption, exchanges), and
- Development logic (policy, intelligence, control). Intelligence is the logic of the system that deals with organization, governance, land use and development planning choices.

The ecumene paradigm is very close to the environmental management approaches developed during the 1970s and a part of the 1980s. Considering risk paradigm, “natural” disasters are an expression of an inadequate relationship between the development model (spatial organization model) and the environment that sustains the model. We have to adapt the development models of urban areas to sites capacities and limitations, and to reduce the residual risk. That is the purpose of preventive planning.

3. PREVENTIVE PLANNING

3.1. An Introduction to Preventive Planning

Development planning and risk reduction are generally separate approaches. But inappropriate development can lead to an intensification of natural hazards or to greater vulnerability to natural disasters. Conversely, land use control, the characterization of construction rules or preventive development in exposed areas, environment-friendly protection works, and rehabilitation projects of fragile environments are all essential elements of a prevention policy. Such approaches must be integrated to achieve the sustainable development of human communities. It is the purpose of the GEMITIS approach (Masure, 1996).¹

Sustainable human development aims to establish equilibrium between natural ecosystems and the communities that occupy and utilize them.

The principles of preventive planning proposed by the author² are those of sustainable development:

- Environmental, economic, and social approach to urban development.
- Appropriate land-use and territorial planning based on the site capacity assessment of the natural milieu.
- Respect for local specificity (culture, history).
- Global and long-term diagnoses.

- Simple, pragmatic, local, and short-term strategies.
- Gradual but immediate implementation.
- New governance based on gradual integration of local players and local active appropriation process.
- Citizen information, education, and preparedness.

Its aims are:

- To establish a risk-reduction and environmental-protection policy integrated into the urban planning and development schemes, promoting an appropriate legislative and standards framework;
- To adapt community organization, developing municipal structures and preparing for crisis management;
- To educate and train local officials in risk reduction and crisis management; train architects and engineers;
- To spread public information and awareness, and prepare the most exposed sectors for emergency situations; and
- To establish a support framework in the event of a natural disaster.

3.2. The GEMITIS Method: A Systemic Approach to Territories at the City Level

3.2.1. Introduction to GEMITIS

In a given territory, risk is usually considered to be the combination of three main components:

Risk = Hazard probability × Exposure value × Vulnerability / Resilience

Where:

- The term “Hazard” represents the probability

1 Masure, Ph.. Preventive Planning, Condition for the Sustainable Development of Cities. Methodological Bases of the GEMITIS Programs. DHA News, N° 18, April-May 1996.

2 Masure, Ph. Risk Management and Preventive Planning in Megapolises: Scientific Developments for Action, UNCRD, Report of Technical Committee Session C, World Conference on Natural Disaster Reduction, Yokohama, Japan, May 1994.

- of occurrence of an event of determined intensity in a given period and geographic space;
- The term “Exposure” refers to the system at risk, and “Exposure value” represents the global value of elements at risk in the considered territory;
 - The term “Vulnerability” commonly represents the fragility of the elements at risk of the territorial system expressed on a scale from 0 (no damage) to 1 (total loss). This term should also consider the human and social components of the risk. But these components are often neglected because of difficulty to quantify them.
 - The term “Resilience” regards the social and systemic component of the risk. It qualifies the individual and collective capacity to take the aggression, recover and rebound.

According to this definition, risk is the probability of damage and dysfunction during a given period of time. It includes the potential effects of correlative impacts (socioeconomic impacts on employment, production, etc.) or induced effects (hazardous industries impacts, dam collapses, fires and explosions, etc.) and the human or social dimension through the analysis of “vulnerability/resilience factors” (demographic, social, economic, organizational, political, educational, and cultural aspects).

During the 1980s, some authors proposed the suppression of the variable “Exposure” given that it is implicit in the notion of “Vulnerability.” They recommended the convolution of the two factors “Hazard” and “Vulnerability” in the expression of “Risk.” This proposal induced some shifts in the “Risk” assessment process. The importance of the “Exposure” assessment (including a value assessment) of the threatened geographic systems has been reduced to the elements of risk analysis. Now, a geographic system at risk has a global vulnerability and capacity or resilience that can’t be limited to the vulnerability analyses of its physical elements.

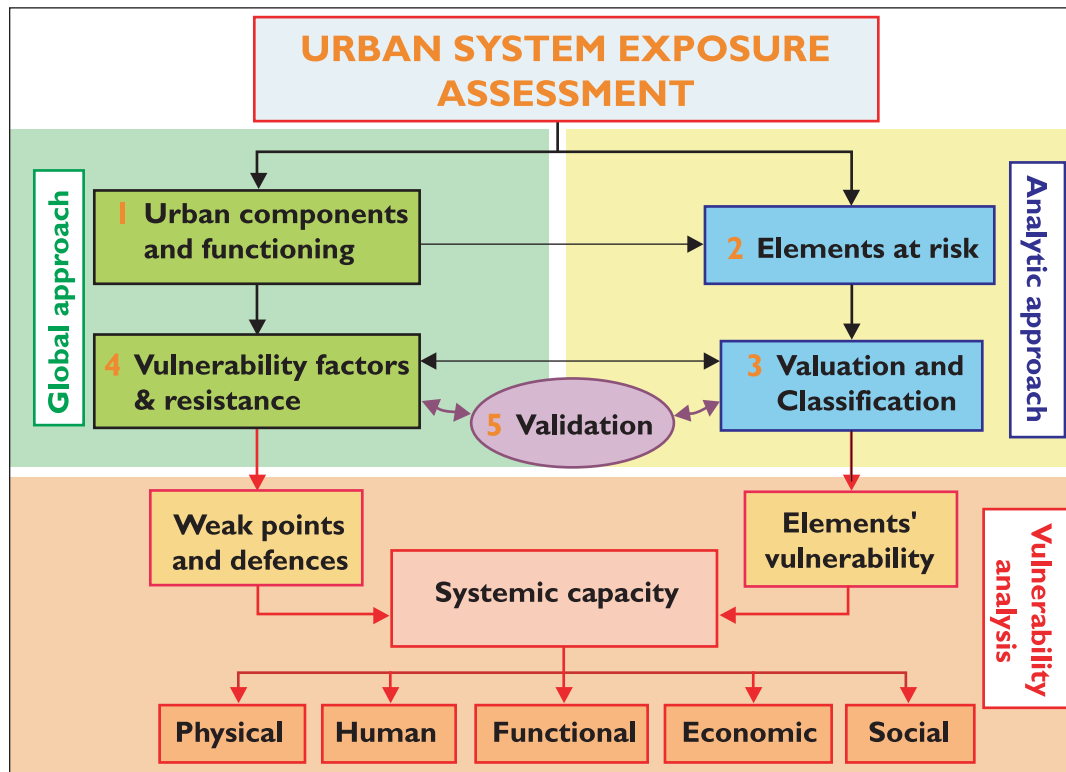
Urban-risk analyses, for instance, must consider all exposed elements, be they human, material (environment, buildings, infrastructure, lifelines, architectural patrimony, natural resources, etc.), or immaterial (culture, social fabric, heritage, image), and also the functional relations between the elements, urban activities (production, consumption, exchanges), government and governance of the city, relations of the city with its surrounding environment, etc. Finally, it should evaluate the chain reactions that can be caused by a weak link in the system or its limitation by multi-barriers resistance. A vulnerability diagnosis must cover the urban system as a whole, i.e. the constituting elements either taken individually or in homogeneous groups, and also the system as such, with its structure, components, internal functioning, and relations with the outside environment.

According to the GEMITIS method implemented for urban agglomerations, the clear analyses of the systemic exposure of cities is a basic argument for the integration of risk reduction policies in land-use, spatial and development planning. In that sense, GEMITIS proposes a new approach based on a distinction between:

- The territorial system analysis (systemic approach of a city, for instance, urban system characterization) with the assessment of the specific values of its distinct components;
- The main elements of risk analysis and classification based on their global value in the geographic system, which will give main stakes to be protected and the reference for the vulnerability analysis.

It is not the object of this document to give the detailed methodology and we only mention the main items to be analyzed. If necessary, a part of the information can be obtained through interviews of adequate actors (administration, collectivities, public services, economic leaders, the media, etc.). In any case, the proposed methodology needs a final validation phase by the corresponding actors.

Figure 2. The Main Steps of Urban System Exposure Assessment



The urban system exposure (USE) assessment proposed for cities' applications is a systemic approach and can be divided into five main steps:

1. Global analysis of the urban system's components and its functioning; urban indicators.
2. Analysis of elements at risk.
3. Analysis of the vulnerability and resilience factors; identification of weak points and defenses of the urban system.
4. Evaluation and classification of elements at risk through a global-value analysis. Identification of the main stakes.
5. Validation phase with the local actors.

These different steps are shown in Figure 2. Their implementation requires a global approach to the urban system (steps 1 and 3) and an analytical approach to the city's elements (steps 2 and 4).

It is complemented by a vulnerability analysis of material and immaterial elements at risk. Emphasis is made on main issues and critical facilities.

3.2.2. Global Approach to the Urban System

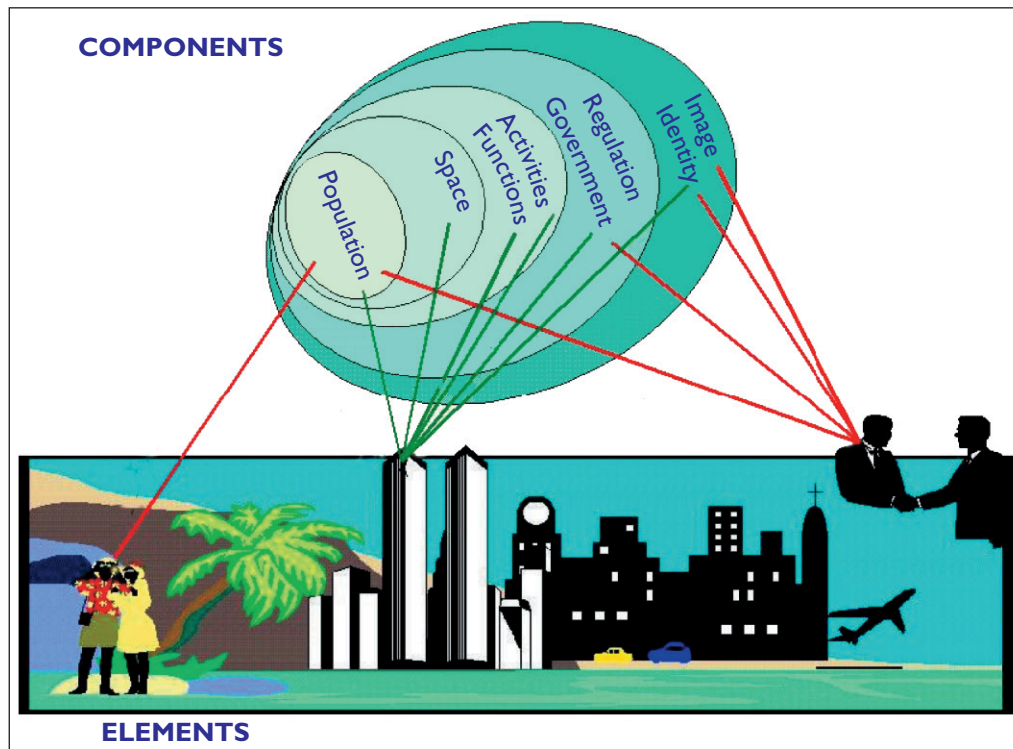
As part of a systemic approach, a city can be characterized by seven components (Figure 3) that refer to its human content, physical space, operation, activities, government, identity and radiance, and resilience. These seven components are defined through the study of data bearing on:

1. Population: inhabitants (age, social level, etc.), workers, tourists, transients, demographic distribution, demographic growth, etc. The inhabitants are the city's heart and a part of the city's vulnerability. After all, "Cities don't exist without population."
2. Urban space: natural environment (air, water, soil, sub-soil, biotope), built environment (buildings, infrastructure, lifelines, etc.), and policy environment (spatial organization, land use, urban fabric, natural features, and natural resources). It is the physical support of the city, and the first damaged by an earthquake.
3. Urban functions and services that bear on the main urban services: housing, supply, sanitation, transport-

- tation, communication, social and emergency functions, presenting different levels of adaptation to natural threats.
4. Urban activities: economic (production, consumption, exchanges), administrative, and cultural activities that are variably vulnerable to natural hazards.
 5. Urban government and actors: institutional, socio-economic, and political organizations, urban actors,

6. Identity, culture, and radiance: local culture and history (with special emphasis on the culture and memory of risks), symbolic images and representations, external image, regional position, etc.
7. Resilience: social cohesion, preparedness, education, preventive regulations and control, etc.

Figure 3. Urban System Characterization



Finally, the analysis should consider the city’s growth, its evolution through space and time, and the necessary adaptations in terms of spatial organization of the environment and of collective organization. This aspect is of particular importance in the search for solutions that will reduce urban vulnerability.

3.2.3. Analytical Approach to the Urban Elements at Risk

In an analytical approach, an urban system can be characterized by three groups of elements – material, human,

and immaterial – that are potentially exposed to natural risks.

- I. Material (or Physical) Elements:
 - Buildings: housing, economic activity units (industry, commerce, services), administrative activity units (governmental, municipal, social, judicial, financial), cultural and sports activity units, and urban-function units (health, safety, education).
 - Main infrastructure and roads: transportation terminals (airport, port, terrestrial, etc.) and

civil engineering infrastructure: highways, roads, streets, bridges, etc.

- Lifelines and reservoirs: energy systems (electricity, gas, oil, etc.), potable water systems, sewage systems, waste-disposal systems, telecommunications systems; radio systems, etc.
- Patrimony: natural resources (forest, bodies of water, etc.), historical buildings, other physical symbols.
- Areas or geographic units identified as being homogeneous according to a given reference criterion (commercial areas, residential areas, etc.).

2. Human Elements:

- City users: citizens, visitors (tourists, etc.), workers, etc.
- Urban actors: Institutional and socioeconomic managers, political and economic actors, decision-makers (economic, associations, etc.), public-service representatives, health and crisis management specialists, etc.
- Outstanding personalities: Key political figures (mayor, governor, etc.), industry leaders; renowned artists; etc. Such persons can play determinant roles in city life, either directly, such as the mayor, or indirectly, such as industry leaders.

3. Immaterial Elements:

- Immaterial elements correspond to certain symbols or representations of the city, related to inhabitants, image, culture, or to its social fabric or history. One place will be considered as particularly young and dynamic, whereas another will be known for its calm atmosphere and good life. Such immaterial and subjective – though quite real – elements share in a city's development and its position in relation to the outside world. Just like the other elements, they are vulnerable to a major disaster such as an earthquake.
- Identity: culture, history, social cohesion, preparedness.
- Resilience/Vulnerability of the system: social cohesion, preparedness, education, external relationship, preventive regulations and controls, etc.

3.2.4. Characterization of the Urban System through Indicators

The global analysis of a city aims to identify the remarkable characteristics that form the basis of an urban identity and are the mainsprings of the city. Underlain by risk-management preoccupations, this sub-approach should help in defining the characteristic entities of each component. Even though most of these entities can be considered as constant, regardless of the city, others vary from city to city. Table I lists the various components and entities that we used for interpretation of data collected in the city of Nice (in Southeast France).

Table I. Representative Indicators of the Urban System Components of the City of Nice

Component	Entities / Indicators
Population	- Number of residents - Number of workers - Number of visitors/day
Space	- Natural (capacity, limits, resources) - Built-up (buildings, infrastructure)
Functions	- Housing - Shelters - Supply (energy, water, etc.) - Transportation - Telecommunication - Emergency resources - Maintenance
Activities	- Business-Trade - Administration - Culture-Leisure
Government	- Decision power - Emergency managers
Identity	- Identity-Culture
Radiance	- External relationship - Image

The distinction of entities within components thus helps in refining the definition of an urban system in different situations. These entities also help in the quantitative or qualitative evaluation of the different aspects of the city. In that sense, they are indicators with specific measuring units such as: population density for the “Population” component, job numbers and turnover figures for the

economic activity, etc. They thus underlie the analytical approach of the urban system, measuring the importance of each of the entities within the components.

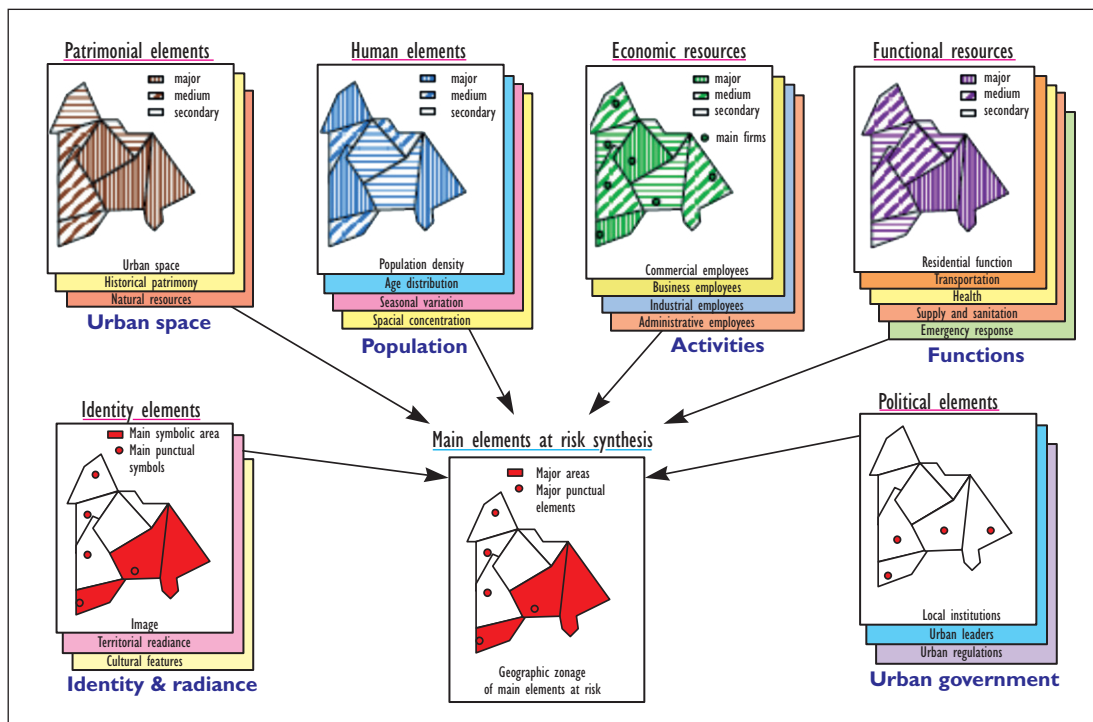
3.2.5. Urban Space

- Urban site topography.
- Urban size and territorial organization: urban spread in the geographical space, agglomeration structure (centers, suburbs, etc.), regional maps and images (satellite, aerial, etc.).
- Environmental features and resources: geo-

graphic situation, accessibility, climate, geology, water or raw-material resources, landscape, natural sites of interest and natural patrimony (forests, lakes, beaches), capacity and limits for land use, etc.

- Built medium: buildings, main infrastructure elements, lifelines, and reservoirs.
- City growth: urban growth and trends, historical expansion (especially in the 20th century), main disturbances due to past disasters, open areas for urban expansion, main perspectives for the future.

Figure 4. Schematic Urban Data Organization through GIS



3.3. Urban Data Collection and Organization

The data obtained through analysis of an urban system should be organized in a Geographical Information System (GIS) for optimum implementation of the subsequent steps:

- Value analysis of the elements at risk,
- Assessment of element interdependency and vulnerability factors,
- Vulnerability analysis, and

- Implementation of earthquake scenarios.

Figure 4 illustrates the process; hereafter, we explain the data characteristics and organization for easy integration within the next phases of risk analysis.

3.3.1. Element Formats

The elements at risk must be represented as geo-referenced units. The question is how to represent and evaluate all the elements that make up a city, apart from the

question of whether they really have to be represented individually.

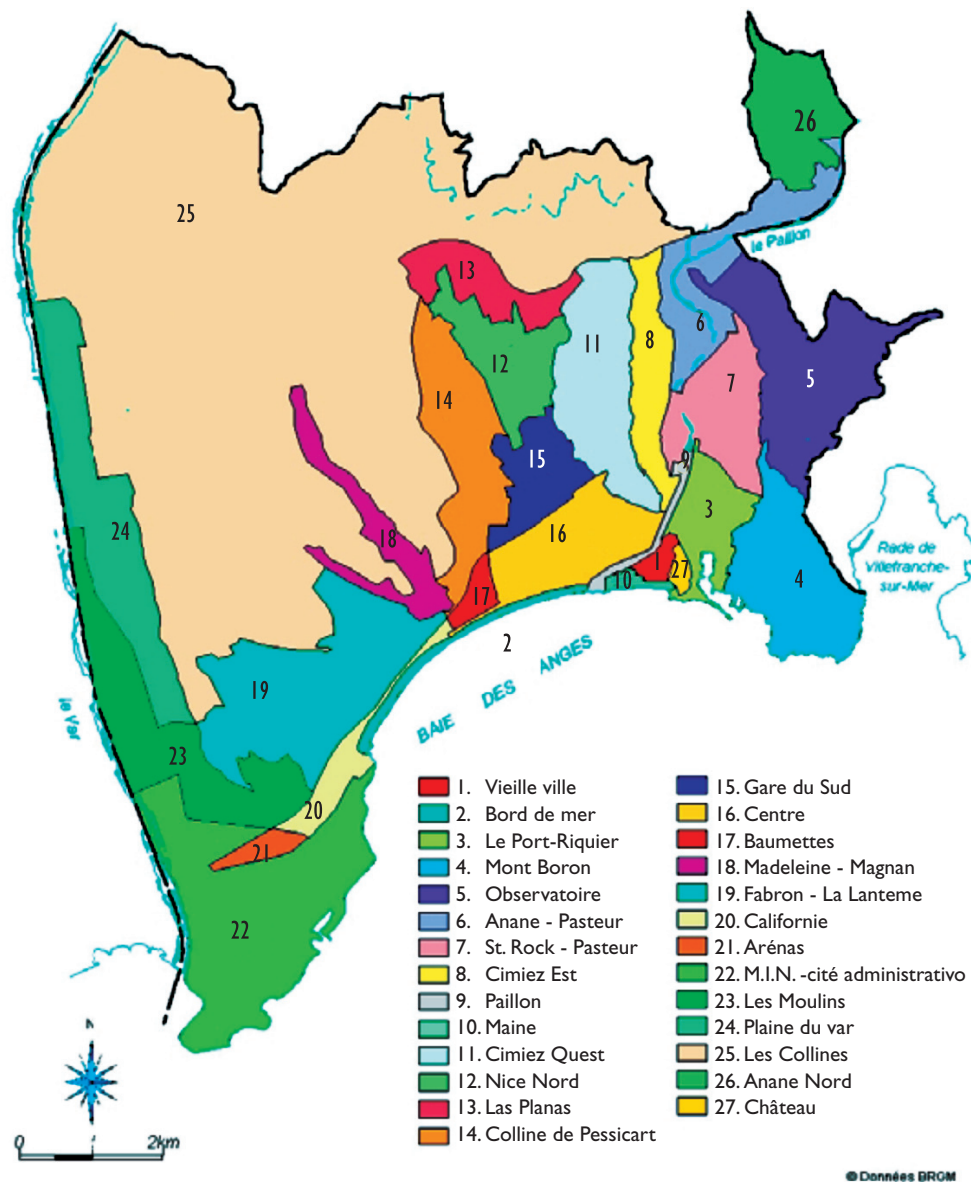
A first answer to these questions involves appropriate geographic formats of urban elements. We can distinguish three main formats that can be directly included in the GIS:

- Point elements: buildings, lifelines nodes, etc.
- Linear elements: lifeline networks, roads, etc.

- Zonal elements (areas).

The last format needs to be precise. As said before, it is not pertinent to show all elements individually; some can be identified through statistically representative samples of geographic units. This concerns population concentration, housing (construction types), activities, natural or cultural resources, etc. The corresponding statistical analysis has suitable forms that can be chosen by specialized teams.

Figure 5. Homogeneous Units of Urban Fabric in Nice



The definition of geographic units (or homogeneous units of urban fabric³) is a very useful support for data integration (Figure 5). There are two main approaches or techniques to be used for their identification:

- Geographic or urban-planning expertise (environment, history, etc.) for defining landscape units.
- Satellite-image or aerial-photo analysis for defining morphologic units.

The characterization of urban units emphasizes:

- Topography and natural environment;
- Roads, streets, and the main organization and features of the infrastructure fabric;
- Construction types; and
- Types of activities.

3.3.2. The GIS Organization

The data are integrated in several layers of a GIS database. The GIS structure depends on the available data formats and will be different for each city.

To facilitate the treatment of such data, we recommend grouping all point data into a single layer with a coding that allows keeping the information on the nature of such points:

- Public works, roads, railways;
- Transformers, gas-distribution sources, etc.;
- Reservoirs, water-treatment or waste-incineration plants, drinking-water wells, etc.;
- Telephone switchboards;
- Hospitals, clinics, first-aid centers, etc.;
- Decision-making centers;
- Symbolic elements;
- Main administrative units and buildings receiving the public;
- Education centers, cultural centers, etc.; and
- Significant companies and industrial sites.

Each layer must contain:

- Identification of the element: ID / Name / Type code.

- Type of collected data: i.e., number of inhabitants for the population, number of jobs and financial turnover for an industrial installation.
- Data needed for analyzing the value of elements, or resulting from this analysis (i.e., global value of each element by period).

The final structure of the layers is guided by the steps taken for analyzing the value of elements and their ranking in main issues, regular issues and secondary issues.

3.4. Vulnerability or Resilience Factors; Specific Vulnerability of Elements at Risk

It is interesting to introduce the concept of “factors of vulnerability,” those accumulative processes of permanent fragilities, deficiencies, and limitations that play a role in the existence of higher levels of vulnerability. The “factors of resilience,” on the other hand, should emphasize good practices such as preparedness, social cohesion, environmental planning, rehabilitation and protection processes, responsibility, education, training, preventive regulations, and controls, etc.

The causal factors or processes (of predisposition) of risk accumulation can be divided into:

- Social: community cohesion, cultural, ideological, educational, economic, judicial;
- Governmental: decision making, institutional structures, organizational, legislation and regulation, mobilization capability, resistance and resilience;
- Planning (spatial and development at national, regional and urban levels): physical, environmental (ecumene), socioeconomic, local Agenda 21; and
- Design and practice: engineering (systems, services), construction (state of the art), control, education and training.

Some global processes require more attention than others:

- Population growth,
- Rapid urban development,
- Financial pressures (international and national),
- Degradation of the Earth,

3 Such homogeneous units are generally different from administrative districts.

- Global environment change and warming, and
- War.

The global analysis of the urban system gives information on the factors of vulnerability or resilience. This approach can be complemented by feedback from crisis experiences, and potential vulnerability/resilience factors can be determined for each urban component. For instance:

- Urban space and environment: urban density, fire propagation factors (accessibility, street width), etc.;
- Population: spatial concentration and sociocultural characteristics (age, risk understanding, etc.);
- Main activities and employment: nature of the activities and size of the structures, external dependence;
- Urban functional activities: external dependence, concentration, substitution capability;
- Urban government and actors: the knowledge, perception, and consciousness of potential risk and its consequences; and
- City identity and external image: risk culture awareness, mass-media sensitivity.

Certain sensitive (critical) sites require a specific analysis because of their potential risk-generating nature. Examples are the transport of dangerous substances by road or rail, tinder-dry forests, the presence of industrial complexes (especially with environmentally sensitive installations), tank farms, gas-cylinder depots, energy networks (pipelines, high-tension lines, etc.), harbor installations, airports, train stations and other public buildings, especially those that receive large numbers of persons such as sports stadiums. In the same manner, all elements that could serve to mitigate such hazards, or which would serve as substitutions in case of a breakdown of other elements, must be analyzed in terms of resilience factors for the urban system.

The factors of vulnerability are determined through the global approach of the urban system with its components analysis, when the specific vulnerability (or fragility) of elements at risk is assessed through the analytic approach.

3.5. Evaluation and Classification of the Elements at Risk of the Urban System

To evaluate the consequences of a natural hazard, the GEMITIS method aims to identify the main issues or critical facilities (essential elements) for the functioning and development of an urban system through a value analysis of its elements. This refers to the elements of greatest overall value, in terms of social or utility value for city operations. This ranking is necessary for fine-tuning the vulnerability analyses, by subjecting the main issues or critical facilities to in-depth analysis and limiting the secondary issues to a rapid evaluation.

Based on experience, emphasis should be made on:

- Population density repartition;
- Main institutional actors and decision-makers;
- Public buildings;
- Utility systems: water, sanitation, electricity, gas, liquid fuel, radio, telecommunications;
- Transportation: roads and highways, railways, seaports, airports;
- Essential facilities: critical facilities (dangerous plants or industries), strategic constructions in terms of crisis management (hospitals, fire, etc.), main economic issues or facilities in terms of employment, production, trade and services (industrial plants, trade centers, main services, etc.); and
- Cultural and historical patrimony.

3.6. Validation Phase: A Critical Approach with Local Actors

The main issues defined with the GEMITIS method have to be validated and, if necessary, adapted through a critical approach with local actors. This can be the mayor or a member of the municipal council, directors of technical services, economic leaders, persons in charge of civil defense or public services, university professors (urban planners or geographers), and representatives of local associations. The preliminary results obtained with the Urban System Exposure method are compared with the experience and ideas of the primary interested parties, which should also facilitate acceptance of the project by the latter.

The meetings with local actors and decision-makers should emphasize:

- Development issues,

- Vital and strategic issues, critical facilities,
- Autonomy issues, and
- Social and cultural issues (including identity issues).

Involving local actors helps to verify the reality of the thresholds retained for the indicators and, if necessary, helps in their redefinition.

4. CONCLUSION

The good practice aims to establish a risk-reduction and environmental-protection policy integrated into the urban planning and development schemes at national, regional and local levels, promoting an appropriate legislative and standards framework. The four steps of the risk-management plan are:

- 1) Risk assessment (individual perceptions, social representation, objective estimations):
 - Physical, environmental, social, economic and cultural vulnerability,
 - Classification of development problems and deficiencies, and
 - Prioritization of political, economic, social and environmental actions to achieve balanced development.
- 2) Risk reduction (prevention, mitigation, protection, preparedness).
- 3) Disaster management (preparedness, monitoring, early warning, response, relief, recovery).
- 4) Risk transfer: insurance, financial protection (solidarity, mutuality, sharing).

The risk of natural disasters in urban areas can be reduced on the basis of resilience initiatives, which include:

- Reduction of the vulnerability of structures,
- Reduction of the exposure (elements at risk),
- Adapted or appropriate land-use to environment and improvement of urban settlements,
- Business continuity.

The effectiveness of public expenditures to be utilized for prevention should be compared with the cost of repair after the disaster. Urban settlements can be improved by changing their functional characteristics through pre-

ventive planning and increasing the redundancy of the infrastructure, such as building an additional bridge at a strategic crossing, for instance.

So, the main preventive initiatives in territorial planning, construction and infrastructure can be organized as follows :

1. Preventive planning at national, regional and urban levels: land-use control, urban fabric and main infrastructure, etc.
2. Prevention in construction: strengthening of vital and strategic buildings, new constructions control, etc.
3. Sector-related measures to reduce the sectoral vulnerability (lifelines, transportation, communication, services, architectural heritage, business continuity, etc.).

A close collaboration and continuity (relationship and linking) between central and local administrations is needed for ensuring necessary incentives to transfer foreign investment and development aid as well as national income to threatened territories, for reducing the population's concentration, for co-producing sector plans, encouraging tourism, services, trade, industry, as well as for a global crisis management preparedness.

According to the referenced methods and considerations, the main steps of a sustainable land-use and urban or territorial planning approach can be summarized as follows:

- Environmental resources and limitations assessment (water, construction materials, minerals, energy, etc.).
- Geology and geotechnical setting assessment (zoning, 3D modeling and mapping).
- Natural and man-made hazards assessment at national, regional and local scales; site effects and induced effects; hazard mapping.
- Past disasters and historical data analyses; reference events for prospective scenarios.
- Geographic or territorial systems analysis: physical, human, social dimensions, government practices, etc.
- Main issues and critical facilities identification of territorial systems
- Vulnerability and resilience factors analysis.
- Specific vulnerability analysis of elements and sectoral (sub)systems at risk.

- Global vulnerability (fragility, susceptibility) and resilience of the threatened system as a whole.
- Risk assessment, disaster scenario and appropriate preventive planning.
- Control of construction and land-use or land occupation.
- Monitoring of the environmental changes (degradation and instability, rehabilitation).
- Impact assessment, environmental assessment of projects.
- Risk prevention planning: actions that reduce the vulnerability factors and that stimulate the strengths and capacity of exposed communities; emergency or contingency plans.

Good practices on land-use and territorial planning that consider three main components, the environment, the territorial system, and natural hazards, should refer to:

1. Environmental component:
 - Environmental resources and limitations analyses (GIS atlas, maps, data collection, etc.).
2. Territorial system component:
 - Geological and geotechnical mapping especially at local scales (3D models).
 - Environmental planning.
 - Environmental assessment of projects.
 - Environmental monitoring and control.
3. Hazard component:
 - Main issues and critical facilities identification, not only in terms of emergencies.
 - Land-use limitations regulation and control.
 - Preventive construction regulation.
 - Local Agenda 21 implementation or other sustainable development planning.

- Natural hazards mapping, site effects assessment and local zoning.
- Regulations for resistant construction and land-use or appropriate land occupation.
- Disaster scenarios generation.

INCORPORATING RISK IN LAND USE MANAGEMENT

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Incidents such as the Santa Fe, Argentina, flood of 1993 described by Cerdán, de Benegas and Cad in Chapter III are not unique to Latin America. As evidence, the 2005 flooding of New Orleans (population 484,674, U.S. Census 2006) was produced by the failure of defensive structures that had not been finished, and were not even properly designed (Van Heerden and Bryan 2006). The results of the New Orleans flood were similar to those of the Santa Fe flood, including high levels of economic damages (total damages for Hurricane Katrina equaled \$81 billion, Pielke et al 2008) environmental damages (about 80% of the city under water, van Heerden and Bryan 2006), population dislocation (down 53.9%, U.S. Census 2006), and casualties (>1,300 dead, van Heerden and Bryan 2006). These results highlight the cross-national nature of the challenges we face in attempting to integrate risk management and land use planning. Although political and institutional arrangements differ, the basic problems and the range of possible solutions are very similar across nations.

The intersection of land use and risk management is increasingly crowded, fortunately for us all. For too long, they worked in isolation, with few if any operational or theoretical linkages. For example, few municipal emergency managers or risk managers have working relationships with the land use managers in their jurisdiction, and few if any land use managers are accustomed to incorporating the presence of natural and technological hazards into their land use decision process. This situation has begun to change due at least in part to physical pressures (i.e. global climate change) that have forced land use managers in the governmental sector and risk managers in the economic sector to learn each other's languages and develop methods of working together.

This process has been simplified by the fact that both groups of managers used the same basic processes, consisting of a problem definition stage, a fact-finding or analysis stage, a stage wherein alternatives are developed, a comparison of alternatives and selection of the

one judged superior, and finally the implementation of the chosen alternative through various technical means, hopefully followed by a feedback loop. This, in very broad outlines, is the decision analysis process, the planning process, and the policy process. Differences among these processes arise when we attempt to define the process participants, goals, and the values to be considered. Some decisions are narrower in scope and number of stakeholders than others, which affects the complexity of the process (Stern and Fineberg 1996).

Traditionally, land use management was concerned with spatial and socioeconomic issues such as housing, the placement of industry, providing sanitation and transportation facilities adequate to the population, etc. Its roots can be found in ancient civilizations such as those found in the Indus Valley, with the grid pattern of the Roman imperial city being probably the most well-known exemplar of early land use management (Kaplan, Wheeler and Holloway 2004). As the industrial revolution proceeded, its impacts on health and safety became too great to ignore, and the separation of uses came into favor as a method of protecting the population from noxious fumes and liquids (this is the rationale for so-called Euclidean zoning). Thus we see that land use management has a long history of addressing risks, even though the concept was not fully developed or understood.

Risk management was originally confined to economic actors, who attempted to reduce their financial vulnerability in economically hazardous occupations such as shipping (Bernstein 1996). In the last century, with the development of the insurance industry, risk management has become a necessary operation of large businesses and governments. While smaller governments and businesses also need to manage their exposure to financial risk, few if any do so, due either to lack of understanding or lack of resources.

Interestingly, the coordination of land use management and risk management has been driven to some extent by

the interest of extremely large and powerful actors such as Swiss Re and Munich Re. By now, these large reinsurers are pushing smaller companies to put pressure on governments to integrate risk management into land use management practices (Munich Re 2002).

Land use management covers a wider range of goals than risk management, including economic development, environmental protections, and protection of the health, safety and welfare of the populace. Therefore it is most useful to think in terms of incorporating risk management into land use management. In order to do so, we need to address three things: social understanding of risk, political will to manage risk, and capacity to manage risks associated with land use.

It is not easy to understand risk, which involves uncertainties that are not easily quantified. When risks are quantified, they are most often expressed in terms of probabilities, which are notoriously difficult for most people to understand (Slovic, Fischhoff and Liechtenstein 1980, Kahneman and Tversky 1984). Without a broader social understanding of risk, and of the risks we are constructing through our current land use practices, we cannot proceed to develop the political will to reduce these risks through improvements in land use management. In democratic societies, such as those that predominate in the Americas, the consent of the governed is a necessity. Top-down solutions cannot be adequately implemented if the populace does not understand the problem (environmental hazards) or its severity. In authoritarian systems the track record of managing risk through land use management is even worse, as is shown by the ecological catastrophes of the late Soviet Union and those currently unfolding in China. So we can posit a link between understanding and political will.

On the other hand, if there is no capacity to manage risk through land use management, it is difficult to develop political will or to keep society's will strong enough to undertake the difficult and long-term processes necessary to reduce our hazard exposure (or risk). Such capacity means having adequate land use management policies at the local, state or provincial, national, and international levels. In many ways, Latin America is farther along on this road than other regions, having several examples of national legislation on land use planning (well described

by Cerdán, de Benegas and Cad). In contrast, all such decisions are left to the states in the United States, with the predictable result that land use management is very uneven and driven by economic goals, rather than environmental or social goals. This is problematic in that environmental hazards, whether "natural" or "technological," are no respecters of political boundaries. For technological hazards, the European Union has moved farther than the U.S. by requiring the use of land use planning to reduce exposure to technological hazards in the Seveso II Directive (96/82/EC Article 12.), while the United States has left the decision up to local governments, with the provision of information on chemical use to local governments being the only national requirement (Title 42, Chapter 116 of the U.S. Code, the Emergency Planning and Community Right to Know Act).

Local governments frequently lack the technical capacity to address environmental hazards in their land use management process, so one of the most useful elements of any national policy is to provide technical assistance and funding to local governments. Such programs can go a long way toward overcoming barriers of ignorance and apathy (Burby 1998). The role of technical advisor at the supranational level has been assumed with mixed results by components of the United Nations, the Inter-American Development Bank, and other international agencies, as well as national level agencies such as USAID. One important contribution such agencies can make is encouraging regional approaches to land use management, because as mentioned previously, hazards do not respect political boundaries.

Another significant problem in the integration of risk into land use management is the lack of control governments frequently have over decisions. Governments at some level have nominal legal control over land use policy but in practice their control is often limited, overridden by economic actors with more real than legal power. In fact, economic forces driving development are often stronger than even national governments, let alone local ones. Economic decisions in their turn are, under the current system, unlikely to incorporate environmental or social factors, which are called "externalities," and ignored in practice. The most important factor in most business decisions is to make the next quarterly balance sheet look good, not to think in terms of long-range effects land use

decisions may have (Daly and Farley 2004). Governments must be supported in their efforts to protect public welfare against narrow and short-term economic interests. Publics are most likely to support governments when they are legitimate and have highly transparent decision-making processes. And to complete the circle, publics that do not understand the links between hazard processes, risk, and land use management may be less likely to view government efforts to manage risk as legitimate exercises of authority.

The concept of acceptable risk, while useful in an engineering context, becomes problematic at larger scales, because the number of people affected by a decision increases exponentially as we progress from a single building to a neighborhood that is protected (or not) by a levee, or to a city that is subject to health risks from chemical hazards present in industrial installations (consider the Bhopal tragedy). In other words, who decides what level of risk is acceptable to whom? This is essentially a political issue, and should not be left to purely technocratic decision-makers or to those with no exposure to the downside (May 2001). As Cerdán, de Benegas and Cad state, “land use management implies making continuous value judgments that orient activities toward determined definitions, strategies and policies” (p. 116), one of which should be risk reduction.

It is encouraging to see “economic progress” rather than “economic growth” put forth as one of the objectives of land use management (Cerdán, de Benegas and Cad,

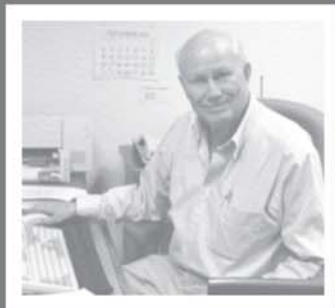
pp. 86 and 123). For too long, growth has been viewed as the savior of us all, with the capacity to rescue us from the consequences of unequal development and uneven distribution of wealth and income. We have now, in the early years of a new century, come face to face with the physical resource limits that have long threatened us. Basics such as food and water are increasingly scarce, and conflicts that have already erupted are likely to increase, as it becomes more and more difficult to grow ourselves out of trouble. Growth is not the same thing as development: a human being should continue to develop mental and physical capacities long after mere growth has ceased. We can and must continue to increase human well-being without destroying the physical bases of life.

Finally, I would suggest that use of the competition metaphor is outdated, and we need to think in terms of cooperation across sectoral and territorial boundaries to achieve the integration of risk into land use management. If territorial entities are limited to thinking in competitive terms, we face the prospect of continued shifting of risk from one place to another, as now occurs when hazardous wastes from wealthier nations are shipped to poorer ones for reprocessing and disposal. The NIMBY (not in my back yard) syndrome has gone unchecked for too long. There is no “away” left to receive the throwaway, undesired byproducts of our economic activities, nor any possibility of safe haven isolated from risks exacerbated by our lack of planning and foresight. It is time to collaborate with our neighbors, and to recognize that in truth, we are all neighbors.

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