

CHAPTER 2 ENVIRONMENTAL DEGRADATION, RISKS AND URBAN DISASTERS. ISSUES AND CONCEPTS: TOWARDS THE DEFINITION OF A RESEARCH AGENDA

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INTRODUCTION

The main objective of this document is to work towards the definition of a priority research agenda on the issue of risks and urban disasters; specifically, their relationship with the processes of environmental transformation, at times ambiguously referred to as *degradation*. Such a research agenda is of fundamental importance, not only because of an evident lack of "knowledge" of the dynamic processes that exist, but also because of the importance of searching for, promoting and implementing prevention and mitigation schemes within the practice of *Urban Environmental Management*.

Such a task inevitably requires the use of theoretical, conceptual and empirical analysis directed towards the identification of critical research issues. In order to perform this task, we intend to reach an initial systematization of certain elements that in themselves "reveal" essential research topics, based on the conceptual arguments expressed in some of the documents presented during the workshop that originated the present essay collection (Metzger and Herzer and Gurevich, in particular), as well as the contributions of other authors. A synthesis of these topics will be developed in the final section of this chapter.

THE PROBLEM AND THE CONTEXT

The Urbanization Process

Human settlements - villages, small and medium size cities, metropolis and megalopolis - are constructed and shaped through the modification or transformation of nature: the land, air, flora and fauna support these transformations and are in turn transformed by them. The product is a new constructed environment, a new *natural* environment that combines social and natural elements under patterns of high centralism and density. That is to say an urban environment. This environment constitutes the concrete and dynamic expression of the physical-spatial and eco-demographic units better known as *cities*.

From a demographic, economic, and social/cultural perspective, the city increasingly dominates the immediate setting of human existence. The urbanization process seems to be irreversible. In developing countries, today's urban economies generate between sixty and eighty percent of Gross National Product (Dossier, 1992). And, "whilst the rural population will tend to level off over the next twenty years, for the first time in human history the majority of the poor will live in the cities of developing countries" (Mougeot, 1993: 190; based on UNDP, 1991: 9, 19). In Latin America this trend will be even more evident. The urban population will reach 76.6% of the total population by the year 2000, and 84% by the year 2025 (UNCHS, 1995).

City, Risks, and Disasters

Globally, it is evident that the city is a scenario of risk and disaster, particularly in Latin America. The foundations of the colossal insurance industry were shook by the devastating human and economic impacts suffered over the past ten years as the result of the earthquakes in Northridge, California and in Kobe, Japan (over US\$100,000 million in economic losses); the impact of Hurricane Andrew in South Florida; the great floods of the Mississippi River; and the storms that devastated southern England and northern Europe towards the end of the past decade. At a regional scale, the urban seismic disasters of Huaraz, Perú (1970), Managua (1972), Guatemala (1976), Popayán (1983), México (1985), and San Salvador (1986); the alluvion that buried Armero (1985); the

great floods that affected Buenos Aires (1985); and the landslides in Rio de Janeiro (1988) inflicted high costs in terms of human life and of economy. These events remind us that an important number of the world's largest cities - without forgetting the smaller ones - are located in zones prone to a wide range of physical-natural hazards, whose impacts are amplified due to the dense concentration of population and infrastructure, and the prevailing levels of social vulnerability. Additionally, the urbanization process itself and the changes that it generates in surrounding regions, increasingly modify and transform the existing physical-natural elements, creating new hazards or amplifying the intensity and frequency of the existing ones.

But hazards of a physical-natural origin constitute only one component of the risk factors that prevail in urban (and rural) settings. The spatial concentration of population and economic infrastructure, the complexity and interconnection of the elements of the urban structure, the synergic effects produced by the city, and the prevalent lack of control and legislation referring to citizen safety, create new risk factors. As in the case of physical-natural hazards, numerous examples of urban explosions and fires, technological accidents, spills of toxic material, accumulation of solid waste, collapse of buildings, pollution of air, water, and soil, drought, and *urban* epidemics, among others, are well documented. The hazards associated with terrorism or urban violence are far from being eradicated from societies where extreme social conflicts or contradictions still prevail (the World Trade Center in New York, the Federal Building in Oklahoma City, the toxic gases in Tokyo, the civil disturbances in Los Angeles, and the bombings in Paris and in London).

The "traditional" hazards are well known and, whether sufficient or not, a certain level of understanding has been reached with respect to their causes and possible activities for preventing them. However, the dynamics of society, particularly urban society, constantly poses challenges, creating new or modified hazards and vulnerabilities and new urban disaster scenarios that defy existing precedents, levels of knowledge, and prevailing management measures. James Mitchell, one of the most sharp and imaginative researchers of the problem, has argued that, "few explanations give sufficient attention to unprecedented impelling actions, related to contemporary changes in society and the environment. It is probable that such changes are essentially modifying the nature of

disasters, management systems, and their context. A result of this may well be the erosion of the value of a good part of the scientific understanding of disasters and of adequate responses to them" (Mitchell, 1994: 1).

The agents of change identified by Mitchell include: the rapid growth of megacities; changes in their functions, internal structures and in the composition of their population; new types of hazards that result from global environmental changes; new combinations of natural and technological hazards; the potential occurrence of complex disasters resulting from the introduction of new technologies in unfamiliar environments. A consequence of one or more of these changes is that it becomes "harder and harder to separate natural hazards from other types of human and environmental risks" (op. cit., p. 14). This synergy produces new hazards and potential impacts. The responses to the problem must become increasingly heterogeneous. They require a profound knowledge of place and context. According to Mitchell, a "postmodern embryonic discourse on hazards and disasters" has begun to emerge (op. cit., p. 16).

From Vesuvius and Pompeii and the earthquakes in Lima (1746) and Lisbon (1755) in ancient times through to Kobe, Los Angeles, Miami, and Mexico City during the past decade, literature has paid a good deal of attention to the duos: city and disaster and city and risk. However, for a large number of disasters the tendency is to pay more attention to the triggering physical events and to their impacts and responses, particularly in terms of the structural or physical vulnerability of buildings, rather than to the specific context of the disaster and the historic processes that have generated the existing conditions of risk and vulnerability of the cities affected. The explanation of disaster has been related to the high levels of investment consolidated in a determined space and the degree of population and economic concentration, rather than particular processes of urbanization, and the shaping of the city's internal space. The impact of Andrew in South Florida, of the Northridge earthquake in Los Angeles and Kobe in Japan, finally drew the attention of many to the fact that even in highly developed societies, *disasters* are socially constructed and their impacts conditioned by existing social and spatial segregation. It is evident that American Sociology has given excessive attention to the organizational response to disasters instead of focusing on "the Sociology of the development of risk conditions."

One of the topics or foci of analysis that has received little attention, both conceptually and empirically, is the relationship between the so-called Environmental Degradation and the generation of conditions of risk and eventual disaster in urban contexts. Few efforts have been done to better understand the relationship between urban (and urban-regional) environmental degradation and the social construction of conditions of risk. This area should be of concern, in general, to Urban Environmental Management practice and practitioners.

The State of the Art: Knowledge, Discussion and Research on the Issue

In her contribution to this volume, Metzger reviews multiple concepts and categories of relevance to the urban issue, the urban environment, the ecosystem, degradation and risk and urban management. It is not intended to repeat these aspects, but rather to put some recent trends and literature on the topic in perspective in order to illustrate the need to develop new or modified perspectives for the study (and prescription) of the relationships between Degradation, Environment, Risk, and Urban Disaster. The cornerstone of this discussion will be the ideas developed by Metzger and Herzer and Guverich in this volume, in the sense that the issue of city and disaster has received greater emphasis to date than the issue of environmental degradation, risk, and urban disaster as such.

The need to address the environmental issue and the debate on Sustainable Development, received an initial and resolute impulse in 1972, with the World Conference on the Environment and Development, and afterwards with the publication of the Reports of the World Commission on the Environment and Development in 1987, and of the Rio de Janeiro Conference in 1992. However, the concept of Environmental Management in an urban context remained aside in the agenda. The issue of disasters was not even directly incorporated into the agenda of Rio de Janeiro. Environmental Management and Sustainable Development have been basically interpreted as issues relating to natural resources and to the ecosystem. The environmentalist movement, in its radical expression, is partly responsible for this situation.

It is not until 1992 that the subject of the urban environment decidedly enters the international debate, with the publication of "Environ-

mental Management and Urban Vulnerability," a compendium edited by Alcira Kreimer and Mohan Munasinghe, and the result of a conference sponsored by the World Bank. This edition surprised the institution that promoted it by introducing an almost forgotten issue into the international agenda. Throughout the 1980s, the World Bank had been the target of growing criticism because of its *anti-environmental* policies and the promotion of investments that radically modified the natural habitat.

Despite its impact and, undoubtedly, its positive aspects and elements, the World Bank document is essentially conservative and technocratic in its approach reflecting the dominant disaster paradigm that ten years previously, Hewitt (1983) had nimbly and eloquently unmasked. Varley (1994) points out the technocratic nature of an important part of the publication. She concludes that the solutions there proposed essentially aim to promote technology transfer, institutional modernization, and a reduction of the physical vulnerability of the city. An essential similarity between the old and the new preoccupations and priorities of the World Bank could be perceived. The concept of vulnerability was greatly restricted to the physical environment and buildings, ignoring the more global, comprehensive and social contributions on the topic made by authors such as Hewitt (1983), Anderson and Woodrow (1989), Wilches Chaux (1989) and Cannon (1994). As Varley argues, the risk faced by the population is considered to be a problem of ignorance or of being outside of the "information circuit." Essentially, the multiple components of social vulnerability were evaded as explanatory components. The Marxist "origins" of the concept of vulnerability, combined with the uncomfortable recognition that vulnerability is a product of the models of development promoted (and therefore, a political problem), could help explain its absence as a fundamental component of the analysis in the World Bank sponsored document (Varley, *op.cit.*).

Varley's arguments are validated by an IDRC-Canada, publication edited by Mougeot and Massé in 1993. This publication, "Urban Environmental Management: Developing a Global Research Agenda," was the result of an exhaustive review of the existing literature and prevailing perspectives on the issue. And also, the product of exhaustive interviews with Latin American, African, and Asian specialists.

From our perspective the document, which offers a distinct perspective to that included in the World Bank publication, presents important

parameters for research and practice in the field of Urban Environmental Management. It is worthy of being extensively cited, not only because of its content but also due to the relevance of the conclusions it draws, based on a comprehensive review of the existing literature. In the base line document of Mougeot's publication (1993:22-24, Spanish version in Lavell, 1994), the following principle is established: "Donor agencies, research institutions and publishing houses have been slow in financing, implementing and disseminating research on the environmental problems faced by Third World cities. During the 1980s, the volume of urban research decreased abruptly, 'just when many questions regarding urban policies gained importance' (COHEN, 1991:12)" (Mougeot, 1993:22)

It further establishes that "few donors' agendas face the issue of prevention and mitigation of urban environmental degradation, and those which do usually direct their attention towards improving governmental capabilities through technology transfers" (*op.cit.* 25, Lavell's emphasis). Referring to the World Bank, UNDP and OECD, the document concludes that technological solutions are channeled through governments, and are mainly concerned with mechanisms of economic instrumentation and legal regulations. According to the author, these measures "will probably not be sufficient to mobilize the public and introduce significant changes in their behavior" (*op.cit.*26).

Regarding Urban Environmental Management and the research on the topic, the main problems identified in the IDRC document include water management, disaster prevention and mitigation, solid waste management, and urban agriculture, all of which are of significant conjunctural and future importance. However, the final version of the research agenda that would be financed by the IDRC during future years, left out disaster prevention and mitigation as a discrete topic. From our perspective this was a mistake of unforeseeable consequences made by the institutional "decision-makers." It mirrored, on the one hand, a partial conceptualization of urban reality and of the different components of urban environmental risk. On the other hand, it reflected a mistaken conceptualization of the components and process of disaster itself. This issue will be addressed further on.

Establishing a clear difference with some existing perspectives (including those of the World Bank and, unfortunately, to a certain extent,

the IDRC), any conceptualization of Urban Environmental Management and of the research that currently supports it must be holistic and integral. The complexity of the city, its dynamics and the synergy that it generates signify that particular problems are an integral part of a holistic and dynamic relationship. For example, it is impossible to separate water issues from solid (or liquid) waste management problems, or from risk and disaster contexts (what is urban drought, if not a harbinger of disaster). In the same way, for example, it is unwise to separate the problem of urban agriculture from those of solid waste disposal, water availability and once again, the prevention of urban disasters.

The lack of a global or holistic vision and the emphasis on partial aspects is an approach as mistaken as are technocratic solutions themselves. Future research must be based on the totality, reflecting urban reality itself. After all, why solve the water and solid waste problems if the elements that sustain these solutions (population, communities, urban infrastructure, etc.) are at risk of being mutilated or destroyed? The mitigation of future damages must be as important in the promotion of future schemes as the solution of individual problems, given that no activity should be promoted without incorporating the component of risk assessment. The issue of disasters must be an intrinsic component of development schemes, including those relating to water, waste, and urban agriculture. Disaster management must not be considered to be a discreet and separate set of measures, but rather a line of analysis and concern that intersects every type of human activity.

In Latin America, the literature and research promoted on the issue of Environmental Degradation and Urban Risks is almost non-existent. In general terms, there are neither research centers nor institutions committed to the issue (see Mougeot and Massé, 1993, for reviews of research in the fields of water, solid waste, urban agriculture and disasters). The challenge is enormous. If the next millennium is to find us ready to face the "society of risk" that Luhmann (1991) analyzes and predicts, it is imperative that research be guided by the search for solutions, and formulated from an integral and holistic perspective (for other considerations on risks see also Beck, 1993; Giddens, 1990; Blaikie et al, 1995; and Hewitt, 1997). By definition, such research must be multidisciplinary. Proposals or analyses carried out from a strongly dis-

ciplinary perspective will be rendered insufficient due to the very complexity of the problems, and the economic, social, political, cultural, scientific, and technological context in which they arise. *Risk* is a complex category. Manifestations of risk result from the interplay of multiple, highly dynamic and mutable elements (hazards, complex hazards, vulnerabilities, etc.). The prognosis or monitoring of new risks must also play an important role in the continuously transforming urban societies as a result of the new economic world order and the impacts that affect the urban environment of developing countries.

A POINT OF DEPARTURE. THE MACRO- CONCEPTS: ENVIRONMENTAL DEGRADATION, RISKS AND DISASTERS

Environmental Degradation

Herzer and Güverich in their contribution to the present volume, define degradation as "a reduction in degree or to a lesser rank," or as "changes in the homeostasis of a system" which results in a loss of productivity."¹ With respect to the *environment* or the *urban environment*, we do not refer only to the elements of *nature*, the natural environment or the ecosystem, but rather to the final product of a complex relationship. And also we refer to particular modes of relating to the elements of support offered by *nature* (land, water, air, etc.), and to the socially constructed environment (the city and its physical structures, social and cultural patterns, etc.). In this case, degradation then refers to the environment as a whole: its natural, physical, and social components.

Such an approach to conceptualizing degradation and the environment is clearly far removed from the restricted ways of analyzing the problem that pure environmentalists-ecologists use. For them, degradation relates exclusively to the natural environment or natural ecosystems. It is, however, more useful to see human beings and their actions as intrinsic components of the environment, rather than disassociate or divorce them as if they comprise an external disturbing element.

From this perspective and apart from being an eminently social and historical concept (see Herzer and Gurevich in the present volume), degradation implies, as a process, the examination of social impact on soci-

ety itself, of the social conditioning of human impacts on the natural world, and of the impact of modified nature on society.

Such a vision of urban (or rural) environmental degradation explicitly brings to the forefront the problem of sustainable development and the sustainability of the city. Additionally, as is examined further on, it suggests a conceptualization of degradation, risks, and disasters formulated from a human-ecological standpoint, thus establishing significant differences with the existing, and as yet dominant, "physicist," "social" or "sociological" currents of thought (see Hewitt, 1997). Degradation is equivalent to an increase in society's vulnerability and, it affects the physical, ecological, and social components discussed by Wilches Chau (1993) in a classic Latin American formulation of the idea of global vulnerability. The degraded environment is the "expression that summarizes environmental vulnerability to disasters" (see Herzer and Guverich, in the present volume).

Despite the apparently clear understanding of the meaning of degradation, it is in fact not easy to find operational parameters, criteria and policies regarding "acceptable" levels of degradation.

From a purist or absolute perspective, if we look at the natural environment, any modification or transformation of the elements of nature could be interpreted as degradation. Nowadays, it would be difficult to identify many ecosystems that have not been affected directly or indirectly by human activity. In view of the imperative need to achieve human welfare, it is obvious that the transformation and degradation of nature is unavoidable. The decision of how much transformation should be allowed requires the establishment of criteria with which we can identify which type of degradation is convenient or not. Issues such as the transformation of highly productive agricultural land into urban property have already been object of extended debates in various contexts. A similar situation occurs with the damming of rivers to generate electricity, the underground channeling of *urban* rivers, the transformation of the tropics into cattle raising "prairies," or the more difficult issue of the use of endangered flora for medical purposes (for cancer treatment, for example).

In regards to the natural environment, several criteria may be used in the decision making process:

i) that the transformation does not endanger a community's economy or lifestyle surpassing the benefits received from the transformation itself; ii) that it does not significantly change the functioning of a highly productive natural ecosystem; iii) that it leads to a sustainable and highly productive activity in the long run; iv) that it does not affect or reduce the prevailing biodiversity and ecological complexity; v) and, that short term in situ degradation of natural resources (i.e. tree logging for the construction industry) is compensated by their medium and long term reproduction. Obviously, in a context dominated by short term economic or survival interests, the most important challenge for Urban Environmental Management is to make effective these "rational" criteria.

Other questions exist, however, regarding the transformation (degradation) of the urban environment seen as a socially and constructed reality. Thus, it is fairly easy to establish with certain precision the idea that already existing collective goods and new ones should not suffer a reduction in quality and coverage. However, it is not that easy to introduce criteria that provides guidelines for new patterns of urban development (i.e., housing, the location of industrial zones and transformations or changes in urban land use patterns). The complex interaction between the functional and spatial elements of the city suggests that urban expansion and changes in, or densification of land use, etc., can generate harmful impacts in settlements and areas different from those where transformation (or degradation) takes place. Examples include proliferation of housing on hillsides to satisfy existing urban demands, with its unavoidable repercussions in terms of pluvial runoff and urban river regimes. Other example is the decentralization of the middle class housing towards urban periphery, which produces negative impacts on the levels of atmospheric pollution as the number of vehicles increases; and finally, the "forced" construction of housing units in marginal areas or close to hazardous infrastructure (chemical factories, petrochemical plants, etc.).

Risk

The concept of risk, in its simpler definition, refers to the probability that something harmful or injurious will occur to a settlement (population, physical structures, productive systems, etc.) or to a segment of them.

For a risk to exist, there must be both a hazard and a social element vulnerable to its impacts. *Vulnerability* can be simply defined as the propensity of a component of the social (or natural) structure to suffer damage. Consequently, risk is a "latent" or "potential" condition whose magnitude depends on the probable intensity of the hazard and the prevailing levels of vulnerability. To this effect, vulnerability is a manifestation of the lack of equilibrium or adjustment between the social structure (in its broad conception) and the physical-built and natural environment that supports it, and constitutes its immediate locus or milieu. Thus, vulnerability can never have an absolute value, always depending on the type and intensity of the hazard and the level of vulnerability existing at a particular time. From our perspective, hazard and risk should never be treated as synonyms, as some authors do. The level of risk is always a function of the magnitude, type and probable recurrence of the hazard, and existing vulnerability levels. It is therefore a dynamic, changing and theoretically controllable condition. Finally, it is obvious that risk is a relational concept: hazards cannot exist without vulnerability and vice versa.

Hazards

Hazards are a risk factor and are classified by many authors as *natural* or *technological*. In this document, we propose a rather more segregated classification of hazards which, in our opinion, is heuristically and conceptually more useful than the normally proposed macro-divisions. The proposed classification acknowledges that the function of any classification or typology goes beyond simple description. It should provide elements to guide our thought and actions and to help establish causalities and responsibilities. Moreover, it constitutes a starting point for conceptualization and theory building.

The typology we propose recognizes four basic categories of hazards: *natural*, *socio-natural*, *anthropogenic-pollutant*, and *anthropogenic-technological*. Each of these categories includes important subcategories that will be discussed in the development of our argument. (Excellent discussions of hazards can be found in Smith, 1996 and in Bolin and Montz, 1977)

Natural Hazards

Terrestrial and atmospheric dynamics produce certain physical manifestations that are characterized by different levels of intensity and violence. These are normal, totally natural and part of the history of the earth's formation and are the result of geological, geomorphological, meteorological, and oceanic processes. These manifestations are part of the natural environment of human beings, which neither exercise an influence (in a significant manner) in their materialization nor are able to intervene (with certain exceptions) such as to impede their occurrence. They are, according to some, the real acts of God or of the gods.

This type of hazard, which affects both city and countryside, can be classified into four types:

- a) Of geotectonic origin, which includes earthquakes, volcanic activity, vertical and horizontal land movements, and tsunamis or tidal waves;
- b) Of geomorphic origin (geodynamic), which includes phenomena such as landslides and avalanches, sinkholes and land and coastal erosion;
- c) Of meteorological or climatic origin, which includes hurricanes, tropical storms, tornadoes, water spouts, hailstorms, droughts, snowstorms, strong breaking waves and spontaneous fires;
- d) Of hydrologic origin, which include floods, water stagnation and aquifer depletion.

Clearly, this set of hazards is interrelated in the sense that one of them may have or has a relationship with others (i.e., earthquakes and landslides; hurricanes and floods; drought and aquifer depletion).

There is no possible direct or significant human intervention able to eliminate or modify these types of phenomena. The management of natural hazards can only be exercised through the reduction of their impacts on the population (mitigation) or, in some cases, such as floods and volcanic lahars, by impeding their impacts on populated zones (prevention).

Socio-natural Hazards

Some characteristic phenomena of natural hazards are socially induced. That is to say, they are produced by determined types of human intervention but are often confused with natural events. From the perspective of Risk Management, they present a peculiar problem because of the diverse interpretations that population or authorities may formulate with respect to their origins, the responsibilities for their occurrence

and available controls. They are easily interpreted as acts of nature or acts of God, thus notably reducing the possibilities to promote adequate, preventive management schemes. A lack of understanding of causalities and responsibilities may result in the absence of adequate schemes for reducing the hazard, and a concentration on the mitigation of their effects (that is, the reduction of existing vulnerability), which is far from being an easy and lasting "solution" in present social and political contexts.

Socio-natural hazards are commonly materialized as floods, landslides, sinkholes, droughts (and desertification), coastal erosion, rural fires, and the exhaustion of aquifers. In these cases, deforestation and degradation of river basins, the destabilization of slopes through mining operations, underground mining, the disposal of industrial, agricultural and domestic solid waste in river channels, the overexploitation of the land, the destruction of mangroves, among others, constitute explicative variables for some of these phenomena.

Floods, landslides, sinkholes, and droughts (resulting from aquifer exhaustion, the lack of economic options for exploiting more distant water sources and losses due to damage in the distribution channels) are undoubtedly serious and growing problems within the Latin American urban context. Besides, the most important causes of urban floods today are the impact of factors such as deforestation, the very process of urbanization, the location of buildings and asphalt in areas of natural pluvial infiltration, and the lack of sufficient and adequate pluvial drainage systems (see Herzer and Guverich, in the present volume).

It is foreseeable that in the future, existing socio-natural hazards will possibly be intensified and new ones will appear related to the climatic changes induced by atmospheric pollution, the depletion of the ozone layer, and the deepening of the *greenhouse effect*. Scientists repeatedly predict phenomena such as changes in sea level, noteworthy increases in the intensity and recurrence of hurricanes, rainfall increases and droughts.

From the perspective of Urban Environmental Management (or Risk and Disaster Management), the existence of socio-natural hazards automatically leads us to a series of conceptual considerations, issues and research questions.

Firstly, socio-natural hazards clearly illustrate that *hazards* and *vulnerabilities* are not simply categories on two sides of an equation that, when combined in an unstable way (as in the case of natural hazards and vulnerabilities), may result in disaster or catastrophe. Socio-natural hazards result from the impact of determined social practices. Some of these derive from the search for economic gain (commercial deforestation, changes of agricultural patterns in zones of ecological fragility, urban commercial construction on marginal lands, etc.). Others derive from survival strategies among the poor (i.e. the cutting of mangroves or forests for firewood); from the fiscal crisis of the State or municipal governments (i.e. the inability to create or maintain pluvial drainage infrastructure where rapid processes of urban growth and land use densification are occurring); and, from harmful practices sometimes associated with the lack of adequate public services (garbage disposal in river courses causing artificial dams, or on the streets, blocking the drainage inlets). All of these practices constitute expressions of vulnerability (ecological, social, economic, institutional, or cultural; see Wilches Chaux, 1994). As a consequence, Urban Environmental Management is not limited to the management of natural components, but also consists of the management of social and socio-natural components.

Secondly, socio-natural hazards imply the need to consider and assign responsibilities to determined social agents (not to God or to Nature). As Herzer and Guverich point out, the social agents at fault are not necessarily those who suffer the hazard impacts. From this perspective, Urban Environmental Management is essentially an economic and political issue. Meanwhile, the combination of hazard with vulnerability reaffirms Metzger's argument (in the present volume) that environmental degradation constitutes a "hidden" or "insidious" risk.

Thirdly, socio-natural hazards clearly indicate the role that should be played by education and consciousness raising in establishing the fundamental pillars of Environmental Management. In the social construction of a problem (see Stallings, 1991) there is an important difference between assigning the responsibility to an untouchable God or innocent Nature on the one hand, and on the other, assigning the responsibility to concrete social agents. Raising of awareness constitutes the first step in empowering communities, and is also the first step in transforming the *environmental* problem into a scenario of social and political struggle. It

represents the difference between resignation and conscious action. Moreover, it highlights the fundamental importance that should be given to the *perceptions* and *social representations* of hazards and risks, as objects of research and action.

Fourth and lastly, although in many cases there may be an important correlation between what can be called the *territory of causality* of socio-natural hazards and the *territory of impact*, in other cases this is not so. For example, the deforestation of upstream basins may increase pluvial runoff and contribute to the generation of floods. Deforestation may occur at a great distance from the area impacted by the floods. A similar situation occurs with the exhaustion of aquifers in zones surrounding cities, and with impacts in terms of urban droughts. These scenarios create two problems, or are useful in identifying two challenges for Urban Environmental Management.

In the first place, the problem of the perceptions or knowledge that the population or the authorities might have with respect to causalities is seen to be extremely relevant. The relationship between certain construction patterns within the city and an increase in the frequency and violence of floods may be fairly easy to perceive due to geographical proximity to the problem and its causal factors. This may not be the case, however, when the causal elements are distant from the zones and populations affected by flooding, as is the case with some deforestation processes and dam failures. In the second place, the notion of an Urban Environmental Management system or institutional organization that is territorially bounded to the city is itself challenged. Both from the investigative and the political-administrative and organizational perspectives, an adequate approach demands the incorporation of the urban region as a unit of analysis, planning, and action (see Herzer and Guverich), with complex methods of interaction and inter-institutional coordination. It requires a governmental approach to the urban region and not only to the city itself. The tendency to fragment and particularize solutions is contradictory to the integral and complex processes that characterize urban development and risk (see Lungo and Baires, in the present volume).

The issue of the *territory of causality* and the *territory of impact* has long been recognized when discussing problems related to shared resources and fluid environmental systems (i.e. the transportation of pollutant material through rivers affect downstream communities). This is-

sue, which will be examined further in the following sections, constitutes a very important Management consideration when dealing with socio-natural hazards. The issues related to socio-natural hazards constitute one of the central elements of Urban Environmental Management, capturing the essence of the dynamic relationship between hazards and vulnerabilities, and consequently, risks and potential urban disasters.

Anthropogenic Pollutant Hazards

Accepting the risks implied in the use of any typological system, we will identify a third group of hazards: the anthropogenic-pollutant. These, despite the similarities with socio-natural and technological hazards (given the presence of human intervention in their materialization), differ from them in an essential way. Here, we refer to a series of hazards that are materialized in the form of "transformed" elements of nature (air, water and land). These hazards are founded and constructed on elements of nature, but are not part of nature itself. However, because of the importance of natural resources for human existence, their transformation presents an important challenge for the survival and daily livelihood of important sectors of the local, regional, national and even international population.

In regards to Environmental Management, these hazards mainly relate to pollution processes derived from spills, leakage, or emissions of toxic substances into the air, earth and water. This is the case with oil, pesticides, toxic gases derived from combustion, chlorofluorocarbons and nuclear waste. In general terms, these hazards are either the product of negligence, the lack of legal controls or of diverse types of "accidents." They result from the lack of control over modern production, distribution and consumption processes.

Another subgroup of anthropogenic-pollutant hazards is that related to the disposal of untreated domestic, liquid or solid waste. The result, in terms of the biotic pollution of air and water, presents serious health problems to the population, leading at times to epidemics. These hazards are generally the product of poverty, lack of adequate disposal options as a result of unsatisfactory infrastructure and urban services, or from negligence.

Natural and socio-natural hazards present an "external" danger to the population, whilst anthropogenic-pollutant hazards have internal

physiological impacts that destroy the backbone of the biological existence and health of the population. Additionally, in terms of their relationship with interconnected diffuse and fluid mediums, potential impacts are not restricted to limited areas (although at times, large) or places, but are, rather, widely spread throughout the local, regional, national or international ambits. This characteristic provides them with a specific peculiarity and presents an extraordinary challenge for Environmental Management and for its organizational and institutional schemes. As in the case of socio-natural and anthropogenic-technological hazards, man-made-pollutant hazards encompass a dynamic relationship between hazards and vulnerabilities and, consequently, the demand planning and coordination at an inter-institutional, inter-sectorial, territorial and community level (see Herzer and Guverich).

Anthropogenic-Technological Hazards

Modern processes of industrial production and distribution, mainly concentrated in urban centers or close to them, and the provision of urban infrastructure, especially for energy distribution and consumption, imply the use of an important number of potentially dangerous processes. These present a problem for public safety. Due to negligence or to the lack of proper controls and foresight of science, possible failures of these processes generate a series of hazards whose materialization (even when affecting limited territorial extensions) may affect large numbers of settlers due to the population density in areas surrounding the source of the hazard.

In terms of a potential disaster, the importance of these hazards derives from the human settlements that surround them. In many cases this is the result of poverty (lack of options for alternative location of housing) and the lack of implementation of land use zoning controls (urban planning). The majority of these hazards are materialized through "accidents" that, depending on their impact, could become real disasters. Many of these give rise to "secondary" hazards, of a pollutant nature (see above).

Among the better known examples of this type of events are the cases of Chernobyl and Three Mile Islands (nuclear plants); Bhopal (chemical plant); and the explosion and fires in the PEMEX Mexico City gas plant in 1984 and in Guadalajara, Mexico, in 1992. Many other smaller scale cases occur annually in different cities of the world, including urban

conflagrations that result in many cases from failures in electrical systems.

The management of man-made technological hazards (and of other accidents) is obviously not distinct from that employed in facing natural events. The causes are found entirely within the social realm and require foresight, controls, and regulations to modify the practices of the social agents involved in the creation of these hazards. However, man-made technological hazards may materialize as the result of the occurrence or impact of natural or socio-natural events. This highlights the importance of "complex" or "concatenated" hazards, an aspect reflected in the idea of "primary," "secondary" and "concatenated" impacts of determined hazards.

These complex hazard categories help us to understand that although the typology we suggest is useful for heuristic and classificatory purposes, as it denotes different social actors and challenges according to the type of hazard, reality is much more complex than the schemes that attempt to systematize it. The eventual impact of concatenated hazards makes it indispensable to resort to complex and permanent monitoring and observation schemes, constant anticipation, and integral planning mechanisms. The incidence of this type of situation is probably greater in urban areas than in rural ones. Examples include the case of a tsunami that destroys a warehouse of chemical-toxic material, scattering the contents into the sea, land, and potable water systems. And, the case of an earthquake that prompts explosions and fire in a petrochemical plant, causing the leakage of toxic materials into the environment.

Vulnerabilities

Discussion, classification, and typologies of *social vulnerabilities* and their relationship with risk and disaster have been widely disseminated in academic and research circles. This is the product of a growing body of literature on the topic, developed over the last fifteen years. Numerous theoretical and empirical documents on this topic (i.e. Hewitt, 1997; Blakie et al., 1994; Cannon, 1994; Kreimer and Munasinghe, 1992; Lavell, 1994; Maskrey, 1993 and 1993(a); Varley et al., 1994; Wijkman and Timberlake, 1985; Wilchez Chaux, 1989; Anderson and Woodrow, 1989) appeared after the pioneer works of Hewitt (1983 essay collec-

tion), and after the innovative perspective included in *Desastres naturales y sociedad* (Natural Disasters and Society), edited by Caputo, Hardoy, and Herzer in 1985 and published by the Latin American Commission for the Social Sciences.

These efforts are a categorical response of the social sciences to the need to "socialize" the problem of risk and disaster, and reduce the influence of the dominant physicist or technocratic paradigm so elegantly debunked by Hewitt and his collaborators 15 years ago (Hewitt, 1983). This involves an erosion of the technocratic conception of disasters, which places the emphasis on the physical triggering events and promotes technical and technological solutions that mirror a conception of *vulnerability*, that is essentially limited to a consideration of physical structures (buildings, infrastructure, housing, etc.).

The arguments developed by these authors have increasingly been reflected in the discussions of many national and international disaster management organizations committed to the issue. However, the scenario changes when we consider the levels of implementation of the lessons derived from comprehensive analyses on vulnerability. Such analyses clearly show the relationships between vulnerability and the prevailing characteristics of many of the *development* models promoted, poverty levels, income distribution, among others. Facing the "discomfort" that these analyses cause, the trend has been to revert to nature the physical vulnerability, the lack of information, human irrationality, and the lack of education in order to justify a good part of the national and international initiatives taken in the field of Disaster Management (scientific and technological research, prediction, forecasting, and monitoring, early alert systems, technology transfers, the modernization of the State, geographic information systems, organized relief systems, etc.).

These emphases can be clearly perceived in the programs promoted by, and the composition of many National IDNDR Committees, the high level IDNDR Technical Committee, and the original propositions included in the Decade's work plan (see Mitchell, 1994; Varley, 1994; Blaikie et al., 1994; and Hewitt, 1997).

Prevention and mitigation are essential components of future and more effective Risk, Disaster and Environmental Management practices, as well as indispensable for reducing disasters. However, they continue to be left aside in the decade. Their role is postponed, given the impera-

tive need for effective and efficient preparedness and response to disasters, a never-ending task given the current trends.

The support of prevention and mitigation activities is the reduction of society's vulnerabilities derived from, and is intimately related to, the contents of development projects and plans. They are essential in conceptualizing and implementing Sustainable Development schemes. They are the essence of the efforts in favor of reducing environmental degradation. However, despite the growing attention received in academic circles, and recent activities prompted by international agencies and organizations, disaster prevention and mitigation have yet to surpass a very low threshold of concern in most Latin American (or African and Asian) countries.

It is clear that any significant reduction of historically accumulated vulnerability can be extremely costly, in both economic and political terms. The mobilization of key social and political actors in favor of risk reduction has yet to be achieved. Disaster Management continues to be dominated by actors linked to the traditional activities of preparedness and response, scientific forecasting and monitoring, and structural engineering. Relevant social actors associated with economic, urban and spatial development planning and the assigning of financial and budgetary priorities have yet to become thoroughly acquainted with the topic. It is likely that these social actors will continue to use anachronistic concepts of disaster. Naturalist conceptions that characterize disasters as *unavoidable* and *unmanageable* (see Hewitt, 1983) continue to dominate the scene. These conceptions are of interest of those sectors responsible for the immediate response; that is, humanitarian aid, logistic and mobilization sectors.

The "anachronism" of many of the institutions involved and the maintenance of the existing status quo do not help to alleviate this situation. Response activities are slowly improved (at times with international assistance). However, each disaster scenario breaks the rules in many ways, presenting new and unknown challenges. Institutions do not change rapidly enough to face existing and future social and environmental transformations. On the other hand, looking to the future, it is clear that a scheme of environmental management that favors disaster reduction has not been able to convincingly introduce disaster reduction and sustainable development into the discourse and practice of development plan-

ning. Professionals and politicians associated with these activities, the environmental movement, and other political "caucuses" that are fundamental for prevention and mitigation, have not grasped nor taken the message to heart. Disasters are still someone else's business (that of emergency technicians), and that someone else has neither the knowledge nor the methods, the resources, or the political understanding needed to reduce *vulnerabilities*.

As discussed in the previous section, hazards have eventually become more socially conditioned. Although hazards are still mainly the target of natural and basic sciences, they receive little recognition in relation to the fact that they are the product of diverse types of human *vulnerability* and of determined hazardous social practices (for a more comprehensive elaboration of these ideas, see Lavell 1996 and 1996a; Maskrey, 1996).

The previous arguments have been presented in certain detail, distracting us from the central point of our analysis. This is, the understanding that the scientific and academic community has a tremendous responsibility in changing conceptions, in "marketing" ideas, in instilling pragmatism and persuasion in their arguments, in being timely and political in order to promote a more adequate and current state of knowledge and action in society as regards risk reduction. And this has yet to be achieved. The messages are diffuse; the arguments are presented in unattractive attire and rarely made in the right place, fall on deaf ears, or are preached to the converted. Scientific production and cultural dissemination mechanisms must be more incisive and direct, offering feasible alternatives for change, and ways of influencing fundamental political decisions. Research must help translate the problem of risk and disaster into a significant social and political problem.

Returning to the central point under consideration, it is not our intention to extensively discuss the concept of *vulnerability* or to closely examine the typologies proposed by different authors. The existing literature offers sufficient elements on these issues, and it is relatively readily accessible to the reader. (See Blaikie et al, 1994 and Hewitt, 1997 for recent comprehensive treatments of vulnerability). However, it is important to conclude this section by pointing out the need for a continuously more comprehensive vision with respect to vulnerability and its relation-

ship with disasters. This relationship has been popularly expressed by the widely used lineal equation

Hazard + Vulnerability = Risk or Risk of Disaster. This idea has well served its educational purpose during past years.

Our earlier analysis of hazards shows however that the formula should perhaps be widened to include the following options:

1. Hazard + Vulnerability = Risk/Risk of Disaster
and/or
2. Natural Hazard + Vulnerability = Socio-natural Hazard or
Antropogenic Hazard @ Vulnerability = Risk / Risk of Disaster

It is established that the analysis derived from social sciences is as relevant to the study of hazards as it is to the study of vulnerabilities. Both studies have been conceived in relation to disasters, as we have previously stated, and it goes beyond the traditional perception of hazards.

Such an affirmation adds a further argument to the multidisciplinary work, and induces a greater degree of collaboration between the social and the basic and natural sciences, both in research and in the search for feasible solutions. It also introduces an interesting complexity in the analysis of hazards. The materialization of hazards via human intervention may result in the reduction of social vulnerability for those groups that promote them, in regards to either their general lifestyle vulnerability or hazards in particular.

How to Interpret Disasters

The definition and conceptualization of disaster has absorbed much research time and many pages in books and journals. It is not our intention to summarize this debate, much less to propose a solution of the conflicting opinions that can be found. Probably, this is an impossible task. Rather, our objective is to develop a series of ideas that are fundamental for correctly placing the research problem in context. This unavoidably requires some synthesis of the "state of the art."

The disagreement in terms of the definition or conception of disaster refers to its particular object of study. Disasters are seen, on the one

hand, as a product, fact or consummated reality (this is, materialized, evident, visible, and measurable disasters). On the other hand, disasters are seen as a "process" in which the emphasis is mainly placed on the objective, historically constructed conditions that allow the eventual appearance of an occurrence defined as *disaster* (or catastrophe, emergency, accident, etc.).

The conception of *disaster* as a concrete and consummate object of study typifies the operational definitions of national Disaster Management organizations (reflected in the declarations of a State of Emergency, Disaster or Public Calamity); of many international organizations dedicated to the problem; and of natural and basic sciences (the International Federation of Red Cross and the Red Crescent Moon Societies, OFDA-USAID, PAHO, and DHA, for example). It, also, typifies the conceptions of the main proponents of the Sociology of Disasters from the United States, Europe, Australia, and of some geographers, sociologists and scholars of Public Administration.

The definitions of international and national response organization will not be examined here, as their logic is obvious. They are the products of the need to define clear quantitative or operational parameters for deciding about their intervention in specific cases. The weight of these organizations and their presence in disaster scenarios makes them enormously influential. Sometimes, their definitions have had a harmful impact in terms of the development and complexity of Disaster Management in the modern context (i.e. their over-concentration and presence in the humanitarian stages of disaster relief, their concern for *large scale disasters* rather than for the *process of disaster*; their limitations in mobilizing fundamental social actors in a disaster scenario - communities, different sectors of the population, etc.).

Among the better known literature on this subject, the definitions derived from American Sociology and authors such as Fritz, Quarantelli, Kreps, Wenger, Miletto, Drabek, and Dynes have been the most widely disseminated. These contributions have mainly circulated through the international journal of *Mass Emergencies and Disasters*, published by the Disaster Research Committee of the International Sociology Association. "Obsessed" with definition, taxonomy, and classification of disaster, these authors have promoted and contributed to an important and stimulating debate on the topic.

However, their devotion in pursuit a disciplinary rigor has left their debates incomplete and with reduced options for further development. The definition of disaster should not allude in any way to *hazards* or to *nature*, we insist. It should, rather, be formulated in purely social terms, they promote a view of disasters limited to the "product," in which the essence of the research promoted has been on the analysis of social responses (organizational, individual, community-based) displayed in the period immediately prior to or following the event. Their contributions in this area have been meaningful, and have helped to correct mistaken conceptualizations about social and institutional behavior under disaster conditions. In addition, it has made an important contribution to the establishment of the principle of Integral or Comprehensive Disaster Management Systems, based on the idea that impacts or responses to physical events might be considered in generic terms rather than as specific events.

A syncretism of the classic contributions of Fritz (1961), Kreps (1984) and Quarantelli (1987) leads us to the following sociological definition of disaster:

Moments of crisis or social stress, observable in time and space, in which societies or their components (communities, regions, etc.) suffer physical damages or losses and alterations in their daily functioning to a degree that exceeds their own capacity for self-recovery, thus requiring external intervention or cooperation. Both the causes and the consequences of disasters are the result of the social processes that operate within the affected society.

This is a valuable definition in terms of the emphasis placed on the alteration of daily life functions, on the difficulty of self-recovery, and on disasters as the product of existing social processes. However, the practice of sociological research has almost completely left out a consideration of the processes behind the social construction of risk and disaster. As introduction to this type of research, arguments such as those of Pelanda (1981:1), in the sense that "an understanding of what goes on at the intersection between an extreme physical phenomenon and the social system, require examining the relationship between the context of 'normality' and the process of disaster." Another argument to be considered is that of Clausen et al. (1978), in the sense that "disasters are a normal (and usually highly relevant) component of the social system," serve as

an introduction to this type of research. However, the dominant line of research continues to emphasize the response phase (or preparedness). Prevention and mitigation are relegated to the interest of very few (see Tierney, 1989, Alesch and Petak, 1986, Olson, 1985, for some exceptions to this rule).

Vulnerability and the social construction of hazards receive ephemeral attention. The "Sociology of Development" applied to disasters does not find many adepts, maybe because of the emphasis placed on research on the developed societies of the North. Or, because of some hidden supposition that the American society does not experience differential social vulnerabilities in or between regions and cities. In some way it reflects a continuum from the origin of disaster sociology. That is to say, the analysis of the possible responses to a nuclear war on society. Whatever the reason maybe, nobody has persistently suggested that in the context of the United States, disasters are a "non-resolved development problem."²

The Latin American context requires a different starting point. One that puts the complex nature of the phenomenon of *disaster*, its historic and social nature, its relationship with hazards, vulnerability, and risks, and the imperative need for support for prevention and mitigation in perspective. One that encourages and demands multidisciplinary researches and facilitates the communication among disciplines. Such a starting point will not come from physicist definitions (i.e., earthquake = disaster), nor from purely sociological definitions (without denying the right to propose definitions that are useful in delimiting disciplinary areas of research on the topic).

In our opinion, only a definition derived from a human-ecological perspective can satisfy the needs of research on disaster, risk, hazard and vulnerability, and of their relationships with the process of environmental degradation. A definition that withdraws from the restrictive idea of disaster seen as a "product" (see Hewitt, 1997) is required.

What do we propose?

Firstly, although a disaster can be seen as "product" (described in terms of disruption, destruction, or death at community, zonal, city, regional, or national levels), its real significance in terms of process is that it represents a progressive rupture, lack of equilibrium, and instability in

the "normal" relationships between human beings, their economic, and social structures (housing, infrastructure, institutions, etc.) and the environment that supports their existence. Disasters are the "culminating point of risk, its revelation, its materialization" (see Metzger, in the present volume). In other terms, it represents a consummation of the degree of risk that prevails in a given society. It is the manifestation of a false equilibrium between society and its environment. Thus, the lack of a real equilibrium, expressed in the continuity of daily life apparently "adjusted" to its medium, is uncovered by the disaster. This is triggered by an external, physical, disturbing agent, but determined finally by the conditions of human existence, population location, structure, and organization. Thus, we do not face an optimal or balanced condition of society, but rather an institutionalized condition of existence marked by multiple social contradictions and inequalities, and that is perceived as "normal." In this sense, a disaster constitutes an "abnormal" condition in which its characteristics are determined by an existing "normalcy."

Secondly, as a consequence of the previous argument, a disaster is both a process and a product. The process can be seen in the historical creation of risk, which is in itself, the result of the dynamics of hazards and social vulnerabilities. Therefore, the condition of disaster is neither unforeseeable nor uncontrollable, at least in theory. Whether sudden or slow and continuous, the materialization of the existing risk in the form of a disaster has normally been preceded by smaller ruptures or lack of equilibrium. That is to say, small and medium scale disasters, which are, in general, given little attention by the authorities and elicit limited response from the population. Low impact seismic activity, highly frequent floods, minor landslides, controlled epidemics, small-scale pollution episodes, etc., form part of the every day life of many communities, and are in many cases preambles to larger *disasters* events.

Thirdly, disasters are the most evident expression of what Wilches Chaux (1993) calls Ecological Vulnerability. They represent the most radical expression of our distancing from the laws of nature. They are the most conclusive expression of a process of environmental expropriation that has led society to exceed the capacity of natural resources, to the breakdown of our balanced relations with the environment (whether natural or constructed). Disasters are the antithesis of Sustainable De-

velopment, and at the same time, they are one of the possible pitfalls to achieving future patterns of Sustainability.

What are the implications of a human-ecological vision of disasters for research on the issue of Degradation, Risks, and Urban (or rural) Disaster in Latin America? Four are very clear.

Firstly, research cannot prioritize disaster as a product. This does not mean that the study of disasters as products and the study of the problems of response, rehabilitation and reconstruction do not deserve attention, but rather, that they should be studied within a dynamic perspective that considers process. Priority should be placed on researching the processes, on generating risk conditions, hazards and vulnerabilities. This must be undertaken from a historic perspective, and at the same time a profoundly prospective one.

Secondly, we must reiterate once more that disaster research should be preferably multidisciplinary, attracting practitioners from disciplines that have generally not been involved in the study of disaster in Latin America. Among these, ecology, cybernetics, law, political science, urban planning, crisis management, etc.

Thirdly, research must be as integral as possible given the complex nature of hazards and vulnerability. Synergy and complexity are attributes inherent to "modern" risk.

Fourthly, disaster research must consider the postulates of conflict theory and the idea of the existence of fundamental social contradictions in society. Risk is the result of contradictions between the interests of individuals or particular groups and the safety of others or of the collectivity as a whole. Solutions will come as the result of social mobilization and political struggle, the empowerment of disadvantaged, affected groups. Although a certain level of social consensus may be reached as regards disaster response, the generation of risk is the product of a failure of consensus and the result of a conflict of interest between groups in society (private vs. private, private vs. public, or public vs. public). Raising awareness and the creation of political 'caucuses' are essential elements in the proposition of social research on the topic. It is clear that disasters are an optimum indicator of *environmental degradation*, and "*degradation* is the result of the materialization of private interests, but it may affect the city as a whole, or particular groups within it" (see Herzer and Guverich in this volume).

INTERMEDIATE CATEGORIES:

ACCEPTABLE RISK, COMMON AND COLLECTIVE GOODS AND THE CITY AS A PUBLIC GOOD

There are series of intermediate categories that must be taken into consideration when researching the relationship between Environmental Degradation, Risks and Urban Disasters. Herzer and Guverich refer to these in the present volume. These concepts have been extensively studied in the context of natural resource management (perception and common goods) and of urban development (collective goods and the city as a public good). Undoubtedly, they are relevant to our discussion. Their content and importance for research will be further explored in this section.

The Perception of Risks (and of Hazards)

During the 1960s and the 1970s, studies on the perception of hazards gained impulse as a result of the work of North American social geographers such as Gilbert White, R. Burton and Robert Kates. Subsequently, sociologists, anthropologists, and some economists further developed their research. The results of these studies are headed towards the diverse ways in which individuals, families, communities or organizations rationalize, organize, and systematize, both objectively and subjectively, their knowledge of hazards and risks, in a way that influences their decisions on location, production diversification, and self protection techniques (structures, behavior, safety, etc.).

These studies are intimately related to the issue of the *social representation* of diverse problems (in this case, hazards, risks and disasters). On the one hand, their main objective is to explain behavior and, on the other, to identify the factors that hinder processes of self-protection and social (political) organization in favor of changing public policy.³

From this point of view, these studies are an important element in the identification of educational or training challenges directed towards changing the false parameters (ideology, ignorance, etc.) that condition some of these perceptions. Secondly, the study of social organizations and their perceptions is important in identifying the factors that hinder the "social construction of a problem" and, consequently, the decision to

intervene in the problem (see Stallings, 1991). (For an excellent review of perception studies, see Tobin and Montz, 1997)

The factors that may influence perceptions are varied, including those related to class, ethnic groups, race, gender, age, educational levels, religious beliefs, previous experience and organizational participation, among others.

Several lines of questioning seem to be important in terms of our central line of enquiry. These derive from a consideration of previously discussed ideas with respect to hazards and risks and include:

- * The perceptions of settlers, local organizations, etc. on hazards and complex hazards, and particularly regarding causal factors such as human intervention in the construction of hazards and the issue of the distinction between *causal* and *impact* territories.
- * Perceptions of settlers as to their own vulnerability and their ability to dealing with problems, the role of local, regional or national governments, non-governmental organizations, etc.
- * Perceptions of governmental authorities, the private sector, and other decision making groups on the issue of hazard, risks and disasters, their relevance, determining factors and possible solutions; and, perceptions on legislation, institutional organization and feasibility of intervention.

Acceptable Risk

Cardona (1993:93) defines *acceptable risk* as "a probability measure of social, economic or environmental consequences that, according to the authorities that regulate this type of decisions, is considered to be low enough as to permit its use in planning, in formulating the quality requirements of the elements exposed, or in establishing complementary social, economic and environmental public policy."

This definition, which emphasizes the subjects of "authority," assumes a fundamental importance in the scope of action of public and private organizations. It becomes the harbinger of deciding whether to prevent or mitigate, considering the costs implied and the degree of *acceptable risk*. The aspects derived from this concept refer, for example, to decisions as to the levels of protection to be established in seismic codes, the degree of tolerable environmental pollution and the levels of protection against flooding, considering probable intensities and frequencies.

Although it encompasses only a part of the universe to which the idea of *acceptable risk* could be applied, the emphasis on "authorities" and on organizations illustrates one essential aspect of the problem. Thus, studies made in the United States (see Tierney, 1989; Clarke, 1985; 1988; 1989) show that many decisions, taken with respect to risks, are made by organizations. "A great number of the risks imposed on others are those defined as acceptable for organizations, based on organizational priorities" (Tierney op.cit). Drabek (1986) observes "whether households in high seismic risk areas obtain or not earthquake insurance, probably depends more on the decisions that are taken within the insurance industry and the governmental sector than on the decisions made by the household" (Tierney, op.cit: 383). A conclusion from this is that there is a need to study "the way in which hierarchies assign resources in favor or against risks" (Clarke, 1988: 25).

The ability of individuals or local organizations to mitigate levels of *unacceptable risk* is still quite limited. In Third World countries, large segments of poor population do not have real options to mitigate risks, even when they are conscious of the existing levels of risk. The problem of the lack of options available to large sectors of the population requires assuming the concept of *acceptable risk* as relative. Thus, there are multiple cases (if not the majority) in which the risks could be *unacceptable* in absolute terms, but *acceptable* in relative terms. For example, those settlers who, after receiving the option of resettlement (through governmental programs, etc.) refuse or reject such possibility since it may produce a rupture in their daily living, cultural ties, or sources of employment. This case illustrates the problem of the way settlers "read" risk scenarios within the context of their daily life needs. (see Maskrey, 1994).

One problem with the concept of *acceptable risk* is that it can generally be applied only in the case of decision on new development and infrastructures. Particularly, those promoted by financially private and public sector interests. In those cases where risks already exist and a decision has to be taken as to the introduction of prevention and mitigation procedures it is highly probable that the concept of *unacceptable risk* is far more important as criteria for decision making.

When does a certain level of existing risk become unacceptable so that it elicits public or private intervention? Where are the probable eco-

conomic, social and political consequences of future loss unsustainable or unacceptable? These are significant questions, which may inspire decision-makers to take remedial action. The lack of remedial action of existing risk scenarios in developing countries is certainly no indicator of acceptable or accepted risk. Rather it is an indication that given a prevailing economic, social and political constraint, there is no real incentive to take remedial action. Risk levels have not reached, in terms of policies, a socially and politically unacceptable level.

Finally, it is necessary to recognize that even in large organizations, the mitigation of *unacceptable risks* is not simply a question of perceptions, of possible economic or political implications of not mitigating, or traditional cost-benefit calculations. The option of mitigating is usually seen in the light of the cost of opportunity of the required investment (what other use of investment could be made that would bring greater short term economic and social benefits?). This option could also be seen in the context of the political conflicts or pressures that could arise with the introduction of mitigation rules or measures (Lavell, 1994). In a context in which risks are the result of private and public interests and actions, but in themselves affect a wide collectivity, risks will always be the object of conflicting interests (see Herzer and Guverich).

Common Goods, Collective Goods, and the City as a Public Good

The concept of common goods refers to natural resources (air, water, earth, landscape and others) that exist without a process of social production, that are indispensable for human existence, and that in principle do not have an owner - although society appropriates them for its own use. This concept has been widely discussed in relation to Resource and Environmental Management.

Today, due to existing levels of degradation or destruction of common goods (the result of economic and social processes associated with modern, industrial, urban and rural societies), and because of the increasing emphasis on Sustainable Development, the environmental issue has become increasingly critical. The degradation of common goods has a substantial impact on the productivity and the living standards of the population. Effective controls, regulations and legislation on their use

(consumption) and on their degradation have become imperative. However, this implies new policies that challenge private interests, many of which are economically and politically powerful. The concept of "green accounting" has been introduced together with the idea of a price that must be paid for the use and degradation of common goods (see Wilches Chaux, 1993).

In the urban context, the issue of the appropriation and use of water, air, and soil leading to degradation and, consequently, to risk, comprise three spatial levels of analysis: *rural* processes and their impact on the urban area (i.e. use of fertilizers, pesticides, etc., and river and aquifer pollution); urban processes and their impact on the neighboring regions (atmospheric pollution and acid rain, use of polluted water for agriculture, etc.); and, urban processes that have an impact on urban areas (atmospheric pollution, blocking of urban river channels, hillside destabilization, etc.).

As opposed to the concept of common goods, *collective goods* refer to a set of urban infrastructures whose production cannot in general be individualized but provided by the State. Some examples include urban roads, sewerage systems, street lighting, low-income housing, public urban parks, and storm water drainage systems. The production and maintenance of these goods require State (local, regional and national) investment, which depends on the fiscal solvency, and policy orientations of the organizations involved.

As these goods comprise the material or infrastructure pillars of the city, on which production, circulation, and consumption are based, their degradation has a deep implication for public welfare and the creation of *risks*. The lack of maintenance, the inadequate supply of infrastructure with respect to the demands of the city, and, nowadays, the processes in favor of the privatization of collective goods, may originate a series of hazards for public health and safety.

The city, conceived and constructed as a public good (see Herzer and Guverich), faces a tendency towards privatization, the implementation of partial solutions to its growing problems and a growing lack of governability. This is partially the result of the financial crisis that most large cities of Latin America face today.

The management of common and collective goods is the principal concern in urban environmental and risk management Globalization.

Privatization, financial crisis, and lack of governability of the city constitute conditions that probably favor the increase of urban risk.

TOWARDS A PRIORITY RESEARCH AGENDA.

The analysis, conceptual debate, and discussion of the environmental issue, as presented in previous pages, *reveal* significant topics for research. Particularly, research that contributes in transforming reality through a raising process of awareness and the production of knowledge, both among the so-called guardians of the *public welfare*, as well as the affected population itself.

Three main subjects/objects of research are obvious from the outset.

First, the set of social actors, private and public, individual and organizational, that promotes or contributes to urban environmental degradation and the construction of risk. The research on this set of actors (or subset or sectors of it) should elucidate responsibilities, changes, trends, conflicts, and consensus, among social groups. The *space of risk causation* should be clarified, whether local, urban, regional, etc., and equally, *the space of the impacts*. Based on concrete experiences, successful changes in *policy* and the practice of actors with respect to degradation, motivation, conjunctures, and precise contexts should be documented. The relationships of specific agents with governmental authorities and the ways of evading the existing rules and regulations should be examined and corrected.

Second, the set of public actors, authorities, norms and legislation that deals with the issues of hazards, vulnerability and risks; in other words, those in charge of assuring that the city is a secure *public good*. This includes a wide range of institutions and legislation. A characteristic of risk or disaster management is that it should intersect multiple areas of institutional activity. At one time or another, it relates to the management of natural resources, to urban, regional, and sector planning, to citizen safety, and to sustainable development, among others. It is precisely this diversity of *specialized* entities that gives a highly complicated hue to risk management. The achievement of consensual harmony, coordination, compatibility and inter-sector integration, is one of the key aspects for successful management implementation. This is a

complex task that involves the economic, political, social and cultural spheres. Within this context, research must favor:

- Inter-sector analyses, the study of mechanisms which bring together the actors involved in the decisionmaking process on mitigation, the contexts by which risks are proscribed as unacceptable and prompt a response from the State and, on the other hand, the contexts in which risks are *accepted*.
- The relationship between urban public management and risks, including decisions on land use, on the densification of land plots, and on investments, modernization and maintenance of infrastructure.

From our perspective, research on public policy and management should be developed in a framework that considers:

- The process of globalization / internationalization of the economy;
- The financial crisis of the city and the impact of privatization processes; and,
- The role of local authorities.

Third, the set of social sectors (settlers, communities, economic sectors, etc.) affected by degradation and risk. Here, research must privilege action, which, following the parameters established by the IDRC in its document "Urban Environmental Management," (Mougeot and Massé, 1993) searches to:

- Actively incorporate those social groups that endure risks and seek their reduction (settlers, communities, etc.).
- Share and disseminate information among these groups; and,
- Profile and discriminate participatory solutions, adjusted to the economic, social, and cultural realities of the human collectivities affected.

The establishment of these three subjects of research does not mean that research be circumscribed to one of them, excluding considerations with respect to the others. Holistic research that attempts to discern the relationships among leading agents of degradation, public policy, and management, and those affected by a particular problem, or set of problems, would clearly yield interesting results. On the other hand, research must consider diverse scales and time frames. Metropolitan areas, large, medium and small cities should be incorporated. Diachronic and synchronic, conjectural and historic studies would offer different lessons. In short, there is much to be done. The lack of systematic research on the topic provides a multidimensional challenge for researchers in Latin America.

NOTAS

- 1 Two points related to the loss of productivity must be stressed. Firstly, this refers to the system as a whole, accepting that as a result of degradation, some individual actors, activities, sectors, etc. might increase their productivity, defined as economic performance. Secondly, the productivity that is referred to must be conceived in global and not only in economic terms. That is to say, the conceptualization must include a notion of social, cultural, and environmental productivity. Translating into practice, this constitutes a challenge that must be faced sooner or later.
- 2 parent contradiction, given that risk is also seen to be a product of prevailing development models, and their consequences in terms of poverty, inequality, social exclusion, income distribution etc. (see Blaikie et al. 1994). The contradiction is resolved if i) we take the position that most so-called development models are primarily economic growth models; or ii) we do not assume that is using the term nonresolved development problems we are referring to forgotten components of prevailing models, but rather, to some more general idea of aspects, should be considered in development planning.
- 3 By saying this, we are not suggesting that we have solved the problem by changing perceptions. Clearly structural problems (poverty, inequality, etc.) exist and impede communities or individuals from solving risk problems even though they are fully cognizant of its objective characteristics.

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