

**UNPACKING THE SOCIAL CONSTRUCTION OF 'NATURAL' DISASTER THROUGH
POLICY DISCOURSES AND INSTITUTIONAL RESPONSES IN MEXICO: THE CASE OF
CHALCO VALLEY'S FLOODS, STATE OF MEXICO**

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I, Fernando Aragón-Durand, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Fernando Aragón-Durand

*PARA SER GRANDE, sê inteiro: nada
Teu exagera ou exclui.
Sê todo em cada coisa. Põe quanto és
No mínimo que fazes.
Assim em cada lago a lua toda
Brilha, porque alta vive
Ricardo Reis
14.2.1933*

I dedicate this thesis to my dearest parents Patricia and Rodolfo

To the memory of my friend Martín Durán

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ABBREVIATIONS AND ACRONYMS

CAO	Oficina de Cultura de Valle de Chalco: Cultural Affairs Office of Valley of Chalco Municipality
CARITAS	Caritas Emergencia: Caritas Emergency
CAEM	Comisión de Aguas del Estado de México: Water Commission of the State of Mexico
CENAPRED	Centro Nacional de Prevención de Desastres: National Centre for Disaster Prevention
CFE	Comisión Federal de Electricidad: Federal Commission of Electricity
CNA	Comisión Nacional del Agua: National Commission of Water
CNR	Comisión Nacional de Reconstrucción: National Commission for Reconstruction
CPI	Oficina de Protección Civil de Ixtapaluca: Civil Protection Office of Ixtapaluca Municipality
CPPEM	Programa de Protección Civil del Estado de México 1999-2005: Civil Protection Programme of the State of Mexico 1999-2005
CPSM	Dirección de Protección Civil del Estado de México: Civil Protection of the State of Mexico
DIF	Desarrollo Integral de la Familia: National Agency for the Integral Development of the Family
GDCPEM	Dirección General de Protección Civil del Estado de México: General Direction of Civil Protection of the State of Mexico
DRP	Programa Especial de Prevención de Riesgo de Desastres y Mitigación 2001-2006: Special Programme of Disaster Risk Prevention and Mitigation 2001-2006
ECLA	Comisión Económica para América Latina: Economic Commission for Latin America
FONDEN	Fondo de Desastres Naturales: Fund for Natural Disaster
FOPREDEN	Fondo de Prevención de Desastres Naturales: Fund for Natural Disaster Prevention
GCP	Dirección General de Protección Civil de la SEGOB: General Direction

	of Civil Protection OF SEGOB
GC-SEGOB	Coordinación General de Protección Civil de la SEGOB: General Coordination of Civil Protection of SEGOB
GRAVAMEX	Gerencia Regional del Valle de México de la CNA: Regional Administration Unit of Mexico Valley of CNA
INFONAVIT	Instituto Nacional de Fomento a la Vivienda de los Trabajadores del Estado: Institute of the Housing National Fund for the State Workers
ISDR	Secretariado Internacional para la Reducción de Desastres de la ONU: United Nations International Secretariat for Disaster Reduction
LCC	EL Canal de La Compañía: La Compañía Canal
ODAPAS	Organismos Descentralizado de Aguas y Saneamiento de Valley de Chalco: Decentralised Body of Drinking Water, Sewage and Sanitation of Valley of Chalco
PEMEX	Petróleos Mexicanos: Mexican Oil Company
PND	Programa Nacional de Desarrollo: National Development Plan
PRD	Partido de la Revolución Democrática: Democratic Revolution Party
PRI	Partido Revolucionario Institucional: Institutional Revolutionary Party
PNPC	Programa Nacional de Protección Civil: National Programme of Civil Protection
PRONASOL	Programa Nacional de Solidaridad: National Programme of Solidarity
RPSP	Unidad De Programas Rurales y Participación Social de la CNA: Unit of Rural Programmes and Social Participation of the National Commission of Water
SINAPROC	Sistema Nacional de Protección Civil: National System of Civil Protection
SEGOB	Secretaría de Gobernación: Ministry of Internal Affairs
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales: Ministry of Environment and Natural Resources
SEDESOL	Secretaría de Desarrollo Social: Ministry of Social Development
SEP	Secretaría de Educación Pública: Ministry of Public Education
UNAM	Universidad Nacional Autónoma de México: National Autonomous University of Mexico

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ABSTRACT

This research analyses 'natural' disaster policies for Mexico. The objective is to demonstrate that 'natural' disaster and the policies oriented to prevent them are socially constructed. It adopts a constructionist perspective because it is concerned with the understanding of collective social constructions of meaning and knowledge that are determined by political and social processes. This study focuses on the relation between the discourses of disaster causality, policy problem construction and policy responses in Mexico. The central argument is that in Mexico when disaster is conceived as a 'natural' phenomenon the exposure of vulnerable people to disaster risk is concealed therefore inhibiting the emergence of socially sensitive responses at policy level.

Two analytical inter-related frameworks were elaborated. The first framework was set up to examine the discursive construction of floods causality as a policy problem and the second one to unpack the argumentative construction of policy responses. The research chooses the case of Chalco Valley's floods that took place in June 2000 in the State of Mexico, Mexico and the institutional responses deployed before, during and after the floods as the empirical ground on which the central argument is examined.

Four different disaster discourses were found at policy level, namely inadvertence by 'ignorance', inadvertence by 'carelessness', accidental and structural. These were shaped by how causal ideas of disaster were assembled and made persuasive. In turn, these four different discourses construct four different floods policy problems and therefore imply four types of policy responses even though important connections were found amongst them. These connections represent relevant policy coalitions upon which policy change can be sought. It was found that people's vulnerability to floods is a component in only one discourse, namely structural causality discourse, and therefore in one group of policy responses.

The research approach and the findings suggest areas to improve policy making and research in the disaster field in Mexico. The outcome of the research contributes to a better understanding of the how scientists, policy makers and people affected by disaster assign meanings and beliefs, construct knowledge and use evidence to support and legitimise disaster causality claims in different ways. These epistemological differences have to be acknowledged for improving policy formulation and implementation aimed at reducing disaster risk of vulnerable people.

INTRODUCTION

This thesis analyses 'natural' disaster policies for Mexico. It is concerned with knowledge production of 'natural' disaster at the policy level and how it shapes institutional responses. It focuses on the relation between discourses of disaster causality and policy responses with the intention to examine the manner in which knowledge claims and evidence are constructed and used to portray flooding of the Chalco Valley as a 'natural' disaster. Moreover, the thesis explains how different disaster discourses imply different policy problems and therefore different responses. It focuses on city, national and state level administrative actors and is methodologically focused on an analysis of surface discourses of the dominant bureaucracy.

The research provides a detailed analysis of the dominant bureaucratic discourses but does not intend to examine in depth the role that power asymmetries and cultural contexts play in shaping surface and hidden discourses and their relation to policy, resistance and material action, as such an analysis would fall outside the scope of the primary information collected for this study. The focus is on dominant bureaucratic discourses, as a means to understand the argumentative and discursive dimension of 'natural' disaster in the policy-making process because this can allow an explanation of how and why disaster is framed as a 'natural' phenomenon and the implication of this on policy implementation.

The world is facing disasters on an unprecedented scale. Between 1994 and 2003, on average, more than 255 million people were affected by 'natural' disaster globally. During the same period, these disasters claimed an average of 58,000 lives annually. In the year 2003, 1 in 25 people worldwide was affected by 'natural' disaster. Over the past decade disasters caused damage amounting to an average estimated US\$67 billion per year, with a maximum of \$230 and a minimum of US\$28 billion. The economic cost associated with 'natural' disasters has increased 14-fold since the 1950s. (Guha-Sapir, Hargit, Hoyois, 2004)

Mexico is one of the most diverse countries in the world in terms of ecology, geography, and climate. It is susceptible to a wide range of 'natural' disasters such as floods, droughts, volcanic eruptions, earthquakes, fires and tropical cyclones. 'Natural' disasters cause enormous economic, financial, and human losses each year. In Mexico, disasters occurred at an average of three times annually during 1980–1998. Since 1980, direct damage from 'natural' disaster totalled some US\$ 11.1 billion, and some 8,000 individuals have lost their lives. Hydro-meteorological events accounted for 30 percent of property damage,

geological events for approximately 40 percent, and forest fires for 35 percent. (Barhma, Ahyres and Kreimer, 2001)

According to the SEGOB (Ministry of Internal Affairs, the ministerial office that coordinates the National System of Civil Protection in Mexico, SINAPROC), between 1980 and 1999, 75 disasters caused the loss of more than 10,000 lives in Mexico; hundreds of thousands of victims and material losses and damages amounted to some US\$9.6 billion (SEGOB, 2001 a) More recently, from 2005–2007 hydro-meteorological hazards affected 3.5 million people, and damages amounted to US\$ 11.2 billion (CENAPRED, 2006, 2007, 2008)

In addition to the direct losses, disaster disrupts the development process because the need for emergency and reconstruction financing diverts budgetary resources from their originally intended uses, disrupting priority investment programs. For example, in recent years, an estimated 30 percent of funding for World Bank-assisted water projects in Mexico was re-channeled for response to emergencies. The need to respond to ‘natural’ disasters may also undermine financial planning and budgeting as an instrument of economic and social development (Barhma, Ahyres and Kreimer, 2001)

In Mexico, as in other developing countries, the poor are disproportionately affected by ‘natural’ disasters. According to assessments by the National Centre for Disaster Prevention (CENAPRED), 68 percent of people affected by ‘natural’ disasters are the poor and the extremely poor: many lower-income families live in substandard housing that is less able to withstand natural forces than that of those with greater economic solvency. Some reside near cities in high-density settlements built on steep slopes, which are vulnerable to landslides. Others live in low-lying areas and are at risk of flooding (Barhma, Ahyres and Kreimer, 2001; CENAPRED, 2000, 2001, 2002,)

The Mexican government has taken important steps to reduce the impact of ‘natural’ disasters. In 1986, it established the National System of Civil Protection (SINAPROC), which is the main policy mechanism for inter-agency coordination of disaster preparedness and response; in 1990, it established CENAPRED as a centre for research on and communication of ‘natural’ hazards forecasting and monitoring, and mitigation technologies. CENAPRED was conceived of to bridge the gap between scientific knowledge and policy making. In 1996, SEGOB created the Fund for Natural Disaster (FONDEN) as a source of federal financing for reconstruction of public infrastructure, emergency response, and disaster relief and more recently, in 2003, established the Fund for Natural Disaster

Prevention (FOPREDEN) to promote disaster risk reduction actions at state and community levels.

It can be said that Mexico, as a disaster risk prone country, is rather well equipped with institutions, government offices, laws, and norms to protect its inhabitants from natural hazards and to prevent disaster as compared with other countries of a similar development level. However, the impact of disaster on the economy and population remains very high. For instance, the great socio-economic and environmental impact provoked by the floods of 2007 in the State of Tabasco (62 percent of the state of Tabasco was flooded, more than 1.2 million people were affected, and material and infrastructural damages amounted to \$US3.1 billion) revealed, among other things, that the Mexico government's approach to 'natural' disaster remains far from being a preventive approach because it is focused on disaster preparedness and mitigation. It is, rather, a reactive approach.

In some manner, the reactive approach indicates the way 'natural' disaster have been historically conceptualised, understood, and tackled. 'Natural' disaster policies in Mexico address the physical causes of disaster and attempt to promote change in people's behaviour to avoid their being affected by 'natural' hazards. This can be conceived of as a rational approach that relies upon 'objective' knowledge of 'natural' hazards. As Garvin remarks (2001:448), "[a] rational approach to policy abstracts knowledge from context and argues for public policy that bypasses spatial, temporal, and cultural differences and becomes universally applicable. It is programmatic in nature and trusts in the ability of science and technology to manage and control potential problems". Thus, 'natural' disaster policies do not in fact engage in social processes that place people at risk and, therefore, are not designed in reality to prevent disaster.

'Natural' disaster policies form part of the SINAPROC and are guided by the reactive approach, which encompasses 'natural' hazards forecasting and monitoring, emergency aid, mitigation, and restoration activities. For example, in this regard, FONDEN and FOPREDEN were created as policy tools to complement and advance reactive actions and to initiate and promote preventive actions, respectively.

FONDEN and FOPREDEN are the two public financial schemes that have been providing resources to mitigate and prevent disaster in Mexico since 1996 and 2004, respectively. At present, it is nearly impossible to consider SINAPROC without referring to

these Funds¹. This is due, in part, to the socio-economic benefits that these Funds have produced in terms of resources allocation to affected and vulnerable communities throughout the Mexican Republic. For instance, in the 2005–2008 period, FONDEN channelled a total amount of \$US3,667 million to 2,058 municipalities affected by meteorological hazards such as hurricanes, extreme rainfalls, floods, and droughts in the states of Veracruz, Puebla, Chiapas, Quintana Roo, Yucatán, Oaxaca, Hidalgo and Campeche. (Aragón-Durand, 2009)

In general, it may be stated that these resources contributed to temporary alleviation of the suffering of many during mainly emergency episodes. To obtain access to FONDEN funds, State governments are required to submit projects to the General Coordination of Civil Protection of the SINAPROC (GC-SEGOB), this justified by that these projects aim to protect people from the ‘natural’ phenomena that eventually cause ‘natural’ disaster.

Evaluations of the implementation of FONDEN (Graizbord, 2007, 2006, 2005) indicate that the majority of submitted and approved projects fall into the following categories: 1) attention to affected people; 2) monitoring and forecasting ‘natural’ hazards of a meteorological nature, such as hurricanes, floods, and extreme rainfalls; 3) construction of protection works to counter the impact of ‘natural’ hazards, and 4) reinforcement of buildings and infrastructure to withstand potential ‘natural’ hazards impacts and to mitigate ‘natural’ disaster.

The ‘natural’ in ‘natural’ disaster comprises an essential ingredient for framing disaster and for projects formulation and implementation. Justification of the project relies upon the assumption that the causal agent responsible for the disaster is, ultimately, a ‘natural’ hazard. In FONDEN’s operation regulations, one of the decisive criteria that determines project approval or rejection is the occurrence and impact of ‘natural’ hazards such as extreme hydro-meteorological threats, heavy rainfalls, hurricanes, tropical cyclones, and floods, and geological hazards such as landslides, to mention a few. ‘Naturalness’ in disaster has acquired such importance in Mexican policies that emergency aid and allocation of financial resources is implemented to address ‘natural’ hazards and to tackle their impact on the population.

The adjective ‘natural’ is commonly found in disaster policy jargon in Mexico when one refers to disaster causes, and is employed as a very valuable linguistic resource by state

¹ FONDEN has achieved such fame worldwide that in the most recent United Nations Climate Change Conference (UNCCC) held at Poznań, Poland (2008), several mentions were made referring to the importance of having a special Fund to assist affected people in the light of climate-change scenarios.

governors to 'naturalise' disaster (*i.e.*, to define disaster as 'natural' phenomena), to neglect or undermine human intervention or blame, and even to ask for FONDEN and FOPREDEN funds to be better prepared for future potentially disastrous events. These examples clearly indicate that the idea of 'naturalness' when ascribed to disaster is deeply engrained in the policy realm in Mexico. This has had relevant implications not only on the way scientists, policy makers, and even lay people conceive of disaster, but also in the type of policy responses adopted, as the case of FONDEN demonstrates. Two of the most important implications of 'naturalising' disaster are the following:

a) By 'naturalising' disaster, the focus of attention is placed on the 'natural' factors, which entail technological actions created to either control or regulate these 'natural' causes; this has driven research and policy focus on tackling the physical forces of nature. It has been noted that no control over 'natural' hazards is possible or desirable. Pelling (2001:171) remarked that "technological responses that address physical causes alone can prolong, and even increase, the losses incurred when disaster strike".

b) By 'naturalising' disaster, discourses of disaster causality tend to ignore or conceal the socio-economic processes that place vulnerable populations at risk and consequently, such processes are not regarded as policy issues because 'natural' hazards become *the* policy problem to solve. Discourses of disaster causality tend to favour explanations that rely on the features of extreme 'natural' hazards or the human capabilities for avoiding them. In fact, these two implications can be identified as essential traits of the dominant paradigm of disaster, the Behavioural Paradigm (BP).

BP is rooted in the assumption that 'natural' disaster is a 'natural' phenomena, and that the consequences associated with this can be prevented with better monitoring of the sources of danger and improvement of organisational systems for evacuation, response, and relief. Researchers in the 'hard' sciences have exerted a great influence on conceptualising disaster by labelling these according to their triggers, *i.e.*, the natural hazards, in other words, a technocratic view of disaster. For instance, at the SINAPROC, the typology of disaster is elaborated according to the type of 'disturbing agent'. A hydro-meteorological disaster is named after a hydro-meteorological 'disturbing agent'; a geologic disaster is named after a geologic agent, etc. To Hewitt (1995:118), the mainstream technocratic view of 'natural' hazards "[...]is indifferent to social and ecological contexts, to the resources of vulnerability that are largely social, and the relation with 'development' ".

Criticisms of this technocratic view and the BP in general assert that disaster is both a natural and social phenomenon. In this respect, a relationship between human development and disaster can be identified. Patterns become evident in disaster-related deaths and losses. They exert a negative impact on both human and economic development. Such patterns set up a clear relationship between the Human Development Index (HDI) and the likelihood of the occurrence of disaster. International Red Cross data compare the impacts of extreme natural events on countries with high, medium, and low scores on the HDI². The International Red Cross contemplated data for 2,557 disaster triggered by natural events that occurred from 1991–2000. One-half of these disasters took place in countries with medium HDI scores, but two-thirds of deaths occurred in nations achieving low HDI results. Only 2 percent of deaths were recorded in countries reflecting a high HDI outcome (Aragón and Wisner, 2002). According to this contesting view, disaster should be regarded as a social process whose origins are to be examined within society-nature relations in the context of development and should not be depicted solely or mainly as a ‘natural’ phenomenon. This view is, in fact, embedded in the Structural Paradigm (SP) that emerged in the 1980’s in the academic world and that is more recently permeating the world of policy.

In contrast to the BP, which approaches disaster either emphasising the natural processes of causation (hazards analysis) or community behaviour and social responses (social disruption analyses), SP explains disaster in terms of vulnerability. Contemporary views ascribed to SP suggest that disaster is never ‘natural’, but always involve *both* natural and social processes. For instance, the vulnerability perspective on disaster analysis led by Blaikie and colleagues (1994, 2003) states that to understand disaster, it is necessary to focus on social processes such as vulnerability rather than exclusively on the natural hazards.

In order to understand how disaster is framed and tackled at the policy level in Mexico, this thesis proposes that conception of disaster as ‘natural’ is, in itself, not ‘natural’, but a socially constructed frame rather than one that occurs naturally in the world. On following this constructionist statement, one can argue that prevailing ‘natural’ disaster policies are, in fact, social products in terms of their discursive construction. Moreover, the concepts of ‘natural’ disaster and ‘natural’ hazards that form the underpinning of such policies can be examined as ‘social natures’ (Castree and Braun, 2001).

² For the Human Development Reports (1990–2001), see <http://www.undp.org/hdro/>.

To understand the construction of ‘social natures’, one can look at the role that public institutions, policy makers, and scientists play in the discourse of ‘natural’ disaster because public policies can be perceived as sites where causal agents of disaster, their images, and meanings are constantly ‘re-constructed’ and contested by diverse social actors and institutions. Focusing on the case of the Chalco Valley floods, the central argument of this thesis is that policies, programmes, and institutional responses aimed at preventing ‘natural’ disaster have overlooked the vulnerability of populations to floods because, among other reasons, the knowledge upon these are based emphasises the scientific and technical side of ‘natural’ causes.

i. The focus of the research.

This study focuses on the relation between ‘natural’ disaster causality discourses, policy problem construction, and policy responses in Mexico. The objective of this research is to demonstrate that ‘natural’ disaster and the policies oriented toward preventing the former are socially constructed. It intends to show how ‘images’ and representations of disaster causal agents, their interactions, and consequences are constructed. It argues that the different disaster discourses found at the policy level are shaped by the manner in which causal ideas of disaster are assembled and rendered persuasive in three social domains of disaster and risk: international science and disaster management; disaster governance, and local coping strategies.

This thesis claims that

“In Mexico when disaster is framed as a natural phenomenon, the exposure of vulnerable people to disaster risk is concealed, therefore inhibiting the emergence of socially sensitive responses at the policy level”.

Socially sensitive policy responses are those that acknowledge the existence of people who are vulnerable to floods, and that therefore are formulated and implemented to reduce floods risk.

The central questions considered throughout the thesis are as follows:

1. How and why are certain processes of environmental change framed as a 'natural' disaster in the decision-making sphere?
2. How do these framings shape and condition the emergence and nature of responses at the policy level?
3. How are people vulnerable to floods framed in both disaster discourses and policy responses?

This thesis adopts the social constructionist approach (Gergen and Gergen, 1991; Schwandt, 1994; Hannigan, 1995; Denzin, 2000) that concerns the world of inter-subjectively shared, collective social constructions of meaning and knowledge that are determined by political, social, and cultural processes. According to this approach, 'reality' is created by social interaction that involves history, language, and action.

This thesis contributes to the understanding of 'natural' disaster as policy problems. Social constructionist comprises the approach and methodology employed to unpack the social construction of 'natural' disaster through policy discourses and institutional responses in Mexico. It is important to understand the argumentative and discursive dimension of 'natural' disaster within the confines of the policy-making process because this can permit explanation of how and why disaster are framed as 'natural' phenomena and of the implication of this on policy implementation.

To explore the central hypothesis, this research focuses on the SINAPROC and considers as a case study the Chalco Valley floods (in the south-eastern periphery of Mexico City) that took place in June 2000. The basic units of analysis are the arguments and discourses of scientists, policy makers, and implementers, and the institutional responses deployed to tackle the inundations and to assist the affected people. Five bodies of knowledge are important for this research. The first body of knowledge concerns the theoretical bases of natural disaster policies. Review of the literature allowed for explanation of how the concepts of natural hazard, vulnerability, disaster, and risk shape the core theoretical clusters of the disaster field. The analysis concludes that explanations of disaster causality are shifting from natural to social factors.

The second body of knowledge relates to constructionist epistemology and its application to nature and to 'natural' disaster. *Epistemology* is the branch of philosophy that deals with the theory of knowledge. It attempts to provide answers to the question, 'How, and

what, can we know?' This involves thinking about the nature of knowledge itself, about its scope, and about the validity and reliability of claims to knowledge. Social constructionism draws attention to the fact that human experience, including perception, is mediated historically, culturally, and linguistically, that is, what we perceive and experience is never a direct reflection of environmental conditions, but must be understood as a specific reading of these conditions. This does not imply that we can never really know anything; rather, it suggests that there are 'knowledges' rather than 'knowledge'. Language is an important aspect of socially constructed knowledge. The intention here is to discuss how the knowledge production of disaster and risk can take place in the three different social domains referred previously.

One strand of this second body of knowledge is the application of constructionist epistemology to the policy process and it clusters around the argumentative and discursive perspective of policy. It emphasises the value-laden nature of the policy process by recognising how values, meanings, and beliefs are embodied in each subject's interpretations of the 'facts' in the claim-making process, which itself to some degree is shaped by the position the subject holds on the institution and his/her professional and personal experience.

The third body of knowledge is drawn from the sociology of social problems, which is also of a constructionist nature. Social problems, according to Spector and Kitsuse (1973: 146), "are not static conditions but rather 'sequences of events' that develop on the basis of collective definitions. Social problems are 'the activities of groups making assertions of grievances and claims to organizations, agencies, and institutions about some putative conditions'". Thus, understanding 'social problems' as collective and institutional³ accomplishments allows explaining the contested construction of the 'natural' disaster problem at the policy level.

The fourth body of knowledge makes use of the sociology of the environment, which is the result of the application of constructionist epistemology and the sociology of social problems to the environment. It is asserted that environmental problems are similar to other social problems, the outcome of a claim-making process, and the struggle of the meanings of

³According to Fischer and Hajer (1999), institutions and actors determine the political meaning and implications of the environmental 'problematic' by framing the issues, determining the language of the debate, and pre-defining the solutions to problems. In the 1960s, Berger and Luckmann pointed out that, "institutions by the very fact of their existence, control human conduct by setting up predefined patterns of conduct, which channel it in one direction as against the many other directions that would theoretically be possible" (1967: 58).

certain social conditions. Hannigan (1995: 2) notes that “environmental problems do not materialised by themselves; rather, they must be ‘constructed’ by individuals or organizations who define pollution or another objective condition as worrisome and seek to do something about it”. Finally, the fifth body of knowledge derives from the political theories of causal stories. To analyse disaster causality as a policy problem, one is able to draw from the theories of causality developed in political science proposed by Stone (1989). The author provides a practical typology of causal theories based on a matrix resulting from related actions (unguided and purposeful) with consequences (intended and unintended). According to Stone (1989), difficult conditions become policy problems when individuals come to regard these as amenable to human action.

This thesis intends to make a contribution to the existing knowledge and debate on disaster policies in the following way. It contributes to the epistemological analysis of ‘natural’ disaster by specifying the manner in which knowledge claims of disaster causality are constructed. It relates knowledge to its social producers and users which reflects the interest and culture of the disaster policy-relevant actors that conform the SINAPROC in Mexico. It also contributes to the growing body of knowledge of the interpretive policy analysis because it intends to establish concrete ways to develop a methodology that can be used to focus on meanings, beliefs and metaphors of policy arguments of causal events which are typical in the policy and politics arenas. This thesis is a contribution to the understanding and analysis of ‘natural’ disaster as social process in terms of their argumentative and discourse construction because it provides a methodology, and in particular two frameworks, to study a disaster not as a fixed event but as social construct that is liable to change according to institutional structure. The need to do research from this angle has been pointed out by several disaster experts at the international level (Alexander, 2005; Quarantelli, 1993, 2005; Perry, 2005)

ii. The research case study

The Chalco Valley floods that took place in June 2000 and the disaster prevention policy system in Mexico were chosen as a case study. On June 1, 2000, 80 hectares of Chalco Valley territory were inundated with wastewaters. Floods were caused by the rupture and discharge of La Compañía Canal (LCC), an open-air sewage canal that collects domestic

water from two municipalities in the State of Mexico: Chalco Valley-Solidarity, and Chalco. The members of more than 6,700 households were affected with gastrointestinal, skin, and water-borne diseases, in addition to electricity and piped water suspension and the lack of food supplies.

The five most severely affected *colonias*⁴ were Avándaro, El Triunfo, San Isidro, Unión de Guadalupe, and El Molino. A segment of the Mexico-Puebla highway between kilometres 26 and 28 was submerged, and many passenger buses, trucks, and automobiles became stranded. Transportation of goods and services from Mexico City to Veracruz was interrupted. Chalco Valley inhabitants, mainly low-income families, were severely affected and unable to cope with the disaster. Emergency aid and assistance were rapidly provided by the army, the Red Cross, and the fire departments of both local and neighbouring municipalities.

Rapid assessment of the canal walls was undertaken, and a prompt response was provided to prevent the water from flowing out of the canal. On the third day of the aftermath, former President Ernesto Zedillo declared the area a *disaster zone*. The Ministry of Social Development and the Ministry of Public Health joined forces and provided food, clothing, and other basic goods and implemented a sanitary programme to avoid epidemics and outbreaks of contagious diseases.

Explanations concerning what occurred were broadcast on radio and television, and appeared in newspapers. But at the time, no one was certain about what caused the canal to collapse. A few hours after the tragedy, the National Water Commission (CNA) carried out an investigation to ascertain what had happened. The official evaluation soon established that the canal rupture was due to the impact of heavy rains on the canal walls; in effect, nature was blamed for the tragedy. However, according to some of the affected inhabitants that I interviewed, the Chalco Valley ‘environmental disaster’ was human-induced. Some said that canal-wall fissures posed a risk for many years, but authorities paid insufficient attention to complaints. Local inhabitants previously voiced warnings of the potential tragedy, and in their view, authorities did not act to prevent this.

The case study is analysed within the context of the SINAPROC in Mexico, because SINAPROC is the national system that formulates and implements policies regarding disaster

⁴ In Mexico, the Spanish word *colonia* means neighbourhood and is the smallest administrative unit within a city.

prevention. Therefore, the study of SINAPROC's view of the Chalco Valley floods and responses to these provides relevant knowledge for enquiring into the politics of 'natural' disaster discourses. It is important to highlight that the focus is placed not only on civil protection agencies, but also on the prevention system, this is in order to cover all the institutional dimensions I propose to address in this research.

This case study possesses both an instrumental and an intrinsic value. To Stake (1995), quoted in Creswell (1998), an instrumental case study focuses on a specific issue rather than on the case itself, which becomes a vehicle to understand the issue to a greater degree. An intrinsic case study concentrates on the case because it holds intrinsic or unusual interest. This case study can be considered an instrumental case study because it can provide insights on the discursive construction of 'natural' disaster causality within policies. But it also has intrinsic value because it seeks a better understanding of floods vulnerability within the context of late urbanisation in the eastern periphery of Mexico City and of the manner in which Mexican policies address these questions.

iii. The research methodology.

The objective of the fieldwork was to obtain primary and secondary information on the policy system with regard to 'natural' disaster prevention and civil protection in Mexico, in particular concerning the inundations in the Chalco Valley and the interpretations and claims of the affected people. The fieldwork took place in two stages: the exploratory fieldwork—between November and December 2001— which helped me to design the methodology for the final fieldwork, while the final fieldwork was carried out from January to May 2003— for a total of seven months in the field. The final fieldwork methodology comprised several interviews applied to policy-relevant actors and to affected residents of El Triunfo, San Isidro, Avándaro, and Unión de Guadalupe. The main purposes of the preliminary fieldwork were the following: to refine the main argument; to test the methodology; to gain a better understanding of the relevant institutions dealing with various aspects of disaster prevention and civil protection in Mexico; to acquire additional knowledge on the case selected for study, and to explore the experience and views of local people.

With regard to local people's views of floods, four unstructured interviews were conducted with residents of the municipality of Valle de Chalco-Solidarity. Preliminary

findings indicated that the local population was aware of floods hazards, foresaw the canal fracture, and addressed their claims to the relevant municipal authorities prior to the occurrence of the inundations. According to local people interviewed, authorities did little to prevent the canal breakage. These local people directed blame on the water and on the sanitation operators for the ‘tragedy’.

Institutional analysis was conducted by means of semi-structured interviews to policy makers and government officials, and to local operators in Mexico City and in the Naucalpan municipality, where some Ministries of the State of Mexico government are located. Interviews revealed that, in general terms, policy makers frame ‘natural’ disaster in terms of the physical features of the threats. Within SINAPROC and CENAPRED, scientific and technical knowledge is employed to measure the magnitude and frequency of such ‘natural’ hazards, and the information is intended to make populations aware of the characteristics of natural phenomena in order for them to act ‘adequately’. I ascertained that in the view of CENAPRED, communication of scientific knowledge is the means by which to educate people to prevent disaster; technical solutions and government central tasks comprise forecasting hazards and assisting victims after the occurrence of disaster. ‘Good’ engineering can decrease infrastructure vulnerability and the risk to which populations are exposed.

During the final fieldwork, I conducted several interviews at policy and local levels to people affected by the floods. The general purpose of the interviews was to investigate the discursive dimension of ‘natural’ disaster causality within policies. It was essential to obtain primary and secondary data in order to refine the main argument. The first and second parts of the main argument were addressed by conducting semi-structured interviews to policy and decision-makers, while semi-structured interviews to people affected by floods in the Chalco Valley covered the second part. Gathering secondary information on the plans and programmes for disaster and civil protection issues, water management and sanitation, and urbanisation and land use was central to examine the first and second parts of the main argument. These interviews provided rich primary information for the development of an in-depth analysis employing argumentative and discourse analysis of disaster causality and policy responses. Interviews were intended to include all of the different policy actors, such as policy makers, implementers, and operators, and other policy-relevant subjects such as scientists, who are directly related with the topic and specifically with the type of disaster relevant to this study.

Interviewees from SINAPROC included personnel from the sectors of disaster prevention, civil protection, environment and natural resources, water and sanitation issues, and urban planning. The interviewees selected were those who could provide detailed accounts on the issue. This is because within the policy system, these are the individuals who make policies, design programmes, and coordinate responses concerning inundations prevention and mitigation, water provision and sanitation, and emergencies attention. Therefore, this situation permitted me to explore the positions of a number of subjects within the SINAPROC regarding the causality of the Chalco Valley floods and the meanings and beliefs that these people attributed to the floods. At the local level, I applied semi-structured interviews to residents living in the *colonias* that were most affected by the Chalco Valley wastewater floods: *Avándaro, San Isidro, El Triunfo, and Unión de Guadalupe*. A characterisation of the individuals affected is provided in Chapter Three.

In order to draw a more detailed picture of the case study and to complete the analytical framework, secondary information and relevant literature on the theoretical issues on disaster, risk, and policy were researched and analysed. Documents and newspaper accounts were also obtained to complete the elaboration of the contextual Chapter Four on the case study of the Chalco Valley floods and of Chapter Five on the disaster policy context in Mexico. Analysis of content was performed to identify the main issues that arose as a result of the inundations, such as socio-environmental change and urbanisation in the Chalco Valley region.

iv. The structure and content of the thesis.

The thesis is divided into eight chapters. Chapter One analyses the theoretical bases of ‘natural’ disaster policies and explains how the concepts of natural hazard, vulnerability, disaster, and risk form the core theoretical clusters of the disaster field. It argues that in practice, the meanings of these concepts reflect the particular views of the relationship between nature and society. This chapter is made up of three sections. In the first section, the behavioural (BP) and structural paradigms (SP) are reviewed to characterise the different interpretations of nature-society relations. Focusing on these two paradigms allows for an understanding of how interpretations of ‘disaster causality’ shift from nature to society. In addition, these paradigms offer a variety of ways to conceive of human action within the

context of disaster. This is a necessary first step toward later explanation of why the core concepts of the disaster field, namely ‘natural’ disaster, ‘hazards’, and ‘vulnerability’, can have different connotations.

The second section focuses on risk, because analysis of the contested social construction of disaster risk can provide valuable information for understanding how different agents are claimed to be causal factors of inundations. This section compares, in epistemological terms, the naturalist and the constructionist perspectives of risk analysis, which is necessary to explain how knowledge production of disaster risk is carried out with regard to the two previously mentioned paradigms. The ultimate intent of this section is to link the interpretations of risk found in the literature on disaster with the broader discussion of two epistemologies of risk. These comparisons will arguably permit me to make clear the existence of different disaster policy implications and responses. The third section explains how the application of a social constructionist perspective to the analysis of disaster policies contributes to the disaster field. There is a social construction process at the institutional level that determines the manner in which disaster are defined and framed, and that there are several social subjects and conceptions of nature and social actors underpinning the policy process.

Building upon the previous chapter, Chapter Two establishes the relation between disaster causality, policy problem construction, and institutional responses. For this purpose, this chapter develops two inter-related frameworks: the first framework analyses the discursive construction of disaster causality as a policy problem, and the second framework explains the argumentative construction of a public remedy, known in the research as the ‘policy response’. Chapter Two comprises of three sections. In section one, the theoretical underpinnings and the epistemological implications of social constructionism are reviewed. This is with the intention of exhibiting its analytical scope for this research by delimiting the ‘object’ of analysis and the components of the process that construct ‘natural’ disaster. This section explains how the ‘social nature’ debate can contribute to the constructionist analysis of ‘natural’ disaster within policies.

Section two provides an explanation of how knowledge production occurs within the social domains of disaster. This is included to examine how knowledge claims may be similar or different amongst disaster-relevant subjects, that is, scientists, disaster managers, policy makers, implementers, and local operators, as well as local people. And in section

three, the two analytical frameworks are developed. These will be used to perform the analysis in Chapters Six and Seven.

Chapter Three details the qualitative methodology and is divided into eight short sections: the approach; the hypothesis and research questions; methods; justification of the case study; study populations and interviewees selection; policy institutions according to the social domains of risk and disaster; the time scale and research sites, and study limitations and issues of bias. The social constructionist approach is adopted because, as stated in reference to Chapter Two and as presented in the methodology section of this introduction, this thesis researches the collective constructions of the meaning and knowledge of ‘natural’ disaster causality.

Chapter Four presents the case study of the Chalco Valley floods of 2000 and is divided into three sections. The first gives an account of the floods that took place in the Chalco Valley in June 2000 and highlights the policy responses deployed during and after the ‘disaster’ and the interpretations of the affected individuals. The second section explains in detail the relationship between the parallel evolution of urbanisation trends, former policies, and floods risk in Chalco Valley. The aim is to provide an explanation of how the progression of vulnerability unfolded between the XIX and XX Centuries. In the third section, an explanation of the relationship of current hazards, people’s vulnerability, and current policy responses is discussed in order to emphasise the unsafe conditions under which the local people currently live. This information is necessary for explaining that vulnerability to floods is a chronic social condition that must be integrated into the disaster prevention policy-making process.

Chapter Five provides an overview of the disaster policy context in Mexico. It is made up of three sections. Section one presents a brief historical background and discusses the conceptual origins and foundational framework of the SINAPROC. This section is relevant because it explains the reasons why the prevailing model (‘Fundamental Paradigm of Disaster’) has permeated the SINAPROC since its inception. The second section characterises the SINAPROC by specifying its public institutions at the federal level and the institutional structure of the entire SINAPROC. And last, section three describes the National Programme of Civil Protection 2000–2006 and the Civil Protection Programme of the State of Mexico 1999–2005, which are part of SINAPROC. Descriptions of these

programmes are important because they are analysed later in Chapter Seven as rhetorical tools that convey policy meanings and beliefs.

Chapter Six analyses the discursive construction of the Chalco Valley floods as a disaster policy problem. The analytical framework developed in Chapter Two is employed in Chapter Six to examine ‘natural’ disaster causality as a policy problem. This chapter explains how disaster causality in Mexico is framed by policy-relevant subjects and made persuasive to the interviewer. It examines the language mechanisms and type of discourses utilised to portray Chalco Valley flooding as a ‘natural’ disaster. It argues that the tendency to define and explain disaster as ‘natural’ has several policy implications, notably that of disregarding the vulnerability of the inhabitants. This examination allows clarifying how and why arguments that give accounts of the same phenomenon vary— depending on the source, the nature of the evidence, and the warrants employed to support the claim and the intended objective of the claim. The ultimate intention of this chapter is two-fold: to explain and highlight the rhetorical and discursive power of disaster causal stories in constructing the reality of the Chalco Valley floods, and to understand inundations causality as a contested policy problem.

Chapter Six is structured in three sections. After setting forth the conceptual and methodological considerations, the chapter examines in detailed fashion, in section two, four types of disaster causality discourses, namely, discourse of inadvertent causality by ignorance, by carelessness, discourse of accidental causality, and discourse of structural causality. It is argued that the different disaster discourses found at the policy level are shaped by how causal ideas of disaster are assembled and made persuasive in the three social domains of disaster and risk. The four discourses differ in the way the system of statements and meanings are utilised to characterise the images of the entire Chalco Valley inundations scenario. From this characterisation, four different constructions of the Chalco Valley floods problem were identified. Thus, in section three, the four floods problem constructions are unpacked and five rhetorical elements are taken into consideration: type of knowledge evidence; appeals and warrants; images of Chalco Valley inhabitants; the image of the Government, and the image of hazards.

Chapter Seven unpacks the argumentative construction of policy responses oriented toward addressing and solving the four Chalco Valley floods problem constructions. The second framework elaborated in Chapter Two is employed in this chapter to conduct the

analysis and as such takes into consideration the following four policy-analytic elements: 1) policy objectives; 2) type of intervention; 3) policy instrument, and 4) implementation. The main goal of this chapter is to understand how discourses and floods problem constructions at the policy level shape institutional responses. In particular, this chapter aims at demonstrating that the vulnerability of the population is not a relevant policy objective for consideration within the entire range of disaster policy responses in Mexico because their vulnerability was not constructed as ‘a problem’ within disaster causality discourses.

Chapter Seven is structured in four sections that correspond to the analysis of the policy elements of each of the four problems constructions analysed in Chapter Six, namely 1) Ignorance of hazards and unsafe conditions, 2) Failure of infrastructure and inadequate monitoring of risk object, 3) Accidents of nature and of man-made systems that disrupt ‘normal’ social functioning, and 4) Exposure of vulnerable people to hazards as a consequence of socio-economic inequalities. Chapter Eight presents the thesis conclusions and recommendations for further research. The research concludes with the importance of including values, meanings, and beliefs in the study of the policy process.

CHAPTER ONE. THEORETICAL BASES OF NATURAL DISASTER POLICIES

Introduction

This chapter analyses the theoretical bases of natural disaster policies. It aims to define and explain how the concepts of disaster, natural hazard, vulnerability, and risk form the core theoretical clusters of the ‘disaster field’. Most importantly, this chapter will argue that in practice, the meanings of these concepts reflect particular views of the relation between nature and society. Indeed, the ‘disaster field’ is as ‘social’ as it is ‘scientific’ and ‘technical’. This means that social knowledge of disaster has to be taken into consideration as a central issue to understand disasters causalities. What is more, variations in the interpretations of the relation between nature and society ultimately underpin specific policy responses, from organisational to technical measures

This chapter is made up of three sections. The first section looks at the behavioural and structural paradigms that characterise the different interpretations of nature-society relations. Focusing on these two paradigms allows for an understanding of how interpretations of ‘disaster causality’ shift from nature to society and the type of knowledge observed as ‘adequate’ to understand disaster. Moreover, they offer a variety of ways of conceiving human action within the context of disaster. This is a necessary first step toward the explanation further ahead of why the core concepts of the disaster field, namely ‘natural’ disaster, ‘hazards’, and ‘vulnerability’ can have different connotations. Section one, therefore, I will review the two basic conceptual paradigms of the ‘disaster field’ and will show how and why ‘disaster causality’ differs from one paradigm to the other.

The second section focuses on risk. It compares, in epistemological terms, the naturalist and the constructionist perspectives of risk analysis, which is necessary to explain how knowledge production of disaster risk is done with regard to the two paradigms. The ultimate intention of this section is to link the interpretations of risk found in the disaster literature with the broader discussion of two epistemologies of risk, namely the naturalist and the constructionist. These comparisons will arguably allow me to make clear the existence of different disaster policy implications and responses. And the third section reviews previous

constructionist ‘readings’ of disaster and justifies the need to develop a social constructionist framework for analysing ‘natural’ disaster at the policy level. At the end of this chapter, conclusions are presented.

1. The conceptual bases of the disaster field

It is generally admitted that two competing epistemological perspectives have dominated the disaster field, the so-called ‘behavioural’ and ‘structural’ paradigms (Smith, 1999, 1996; Oliver-Smith, 1996; Quarantelli, 1978, 1998; Hilhorst, 2004). Oliver-Smith (1996), Quarantelli (2005), and Calderón (2001) noted that the behavioural paradigm (BP) dominated disaster studies during the 1950s and continues to exert its influence on research and policymaking. The main assumption of BP is that scientific knowledge and information on natural hazards can make people and decision-making systems aware of the severity of ‘real risk’, therefore furthering rational decisions to change people’s behaviour in order to avoid disaster. Under BP, the origin of ‘disaster causality’ can be sought in the intrinsic characteristics of the natural hazard, namely, wind speed in hurricanes, Richter grades in seismic activity, pluvial intensity, and frequency of heavy rainfalls and floods, to mention some. Disaster impact is measured in terms of human and material losses, affected people, and damages to infrastructure and lifelines.

Between the 1950s and the 1970s, the BP field focused on the geophysical processes underlying disaster on the assumption that people and institutions had to be taught how to anticipate these and, notably, on people’s and institutions’ reactions and responses to them. Within BP two specific approaches can be identified: the ‘hazard-based’ approach, and the ‘disaster-based’ approach. The ‘hazard-based’ approach, as Smith (1999) remarks, relies on the notion of mitigating losses by adding various human adjustments, such as better hazard perception and land use planning for physical control structures. The ‘disaster-based’ approach, as Quarantelli (1998) mentions, emphasises the importance of understanding the role of collective human behaviour at times of community crisis and the need to improve preparedness for mass emergencies. Consequently, since that time disaster policies have been mainly based on early warning mechanisms, disaster preparedness schemes, and relief operations. This has had relevant policy implications, as discussed later.

By the mid-1980s signs of failure concerning the implementation of disaster policy measures and interventions in the field were observed because disaster continued to increase and, as it was argued, disaster root causes were not addressed. A report elaborated in 1984 by the Swedish Red Cross entitled *Prevention Better than Cure* pointed to the need to address basic causes rather than the symptoms of disaster. In this sense, desertification, soil erosion, and deforestation in Asia, Africa, and Latin America should be seen along with poverty as the root processes of disaster. With regard to this, Prince Aga Khan, who wrote the prologue to Wijkman and Timberlake's book, stated that:

“...we can only tackle root causes if disaster prevention and response are designed as to incorporate both developmental and environmental strategies”.

(Quoted in Wijkman and Timberlake, 1984: 9)

In their book *Natural Disaster: Acts of God or Acts of Man?*, Wijkman and Timberlake noted (1984) that relief organisations such as the Red Cross realised that traditional relief operations were not sufficient to alleviate the suffering of the affected people even though many efforts (financial and human resources) were invested. A declaration of Henrik Beer, who served during the 1980s as Secretary General of both the Swedish Red Cross and of the International Federation of the Red Cross and Red Crescent Societies –and who up to that time had signed more disaster relief appeals than any other human being– illustrates this fact:

“I have felt a growing frustration over the fact that what has been done has had, in many cases, only superficial effects, more cosmetic than profound”.

(Henrik Beer, quoted in Wijkman and Timberlake, 1984: 16)

Four reasons can explain the prevalence of BP in the research and policy realms to the early 1980s. First, the definition of disaster coined in 1961 by Fritz can be seen as the conceptual ‘force’ of BP.

“A disaster is an *event* concentrated in time and space, in which a society or one of its subdivisions undergoes physical harm and social disruption, such that all or some essential functions of the society or subdivision are impaired”.

(Fritz quoted in Kreps, 1998: 32)

The conceptual simplicity of this interpretation may explain its popularity and uptake. Fritz's definition is, in fact, a simple expression that reduces the complexity of the phenomenon to social impacts; thus, it was easy for all to understand. This definition frames the disaster as an event that involves physical harm and social disruption and emphasises aspects of impact on social functions in a broad sense, and, notably, no reference is made to other components such as causal or triggering factors.

Second, according to Gilbert (1995), the theoretical underpinnings of BP that conceives of external agents as the disaster's causes have similarities with war models. The strategic bombing studies of World War II and peacetime studies undertaken by the National Opinion Research Centre and other institutions in U.S. influenced the development of disaster studies. Therefore, it can be said there was a clear parallelism between disaster's impact and the fatal consequences of air raid attacks, and that made disaster easy to explain even to lay people. It can be understood that a population damaged by air bombs during war is affected to the same extent as by floods, hurricanes, and earthquakes. The population is seen as 'victims' of these air attacks, which may explain bureaucratic intervention as an administrator of war. Calderón (2001) noted that this context strongly conditioned this disaster conceptualisation.

Third, as Wijkman and Timberlake (1984) acknowledged, this paradigm successfully permeated the disaster field for so many years because research was mainly channelled to understanding the physical aspects of disaster and the majority of funds was invested in studying climatological and geological triggers. Thus, governments were lured into placing their trust in grand physical prevention and mitigation measures such as dams, early warning systems, and satellite monitoring. Fourth, Hewitt (1983) asserted that the strength of such a 'dominant view' and one that has resisted attacks over the years, depended less upon its logic and internal sophistications than on its being a convenient productive worldview for certain dominant institutions and academic spokesmen. It is argued that groups of power such as international organisations, governments, scientists, technicians, and bureaucrats adhere to this 'dominant view' because on the one hand, it is the view exposed from the top of the 'scientific pedestal', and on the other, because it is in the name of scientific knowledge that these groups intervene in and benefit from disaster situations because they are able to act in behalf of their own interests.

This 'dominant view' holds that as long as science advances as the result of the application of scientific-technical devices such as satellites and monitoring apparatus, knowledge of natural phenomena will increase and improve to the extent that phenomena will be accurately and completely understood and controlled, therefore diminishing the impact and consequences of natural phenomena on society (Calderón, 2001).

Moreover, under this 'dominant view' disaster is isolated in 'quarantine' both in thought and in practice. In order to intervene, when a disaster takes place a wall is built to encircle the impacted area with army personnel and public civil servants who isolate the area from daily life. To Hewitt (1983), these considerations promote the encapsulation of the problem whereby parameters, properties, data, solutions, and options are constructed in a technical monologue in which abnormal situations are confined and disconnected from their context.

Radical criticisms of BP began to consolidate in the early 1980s with the setting up of a different research and policy agenda that eventually would conform to a new paradigm: the Structural Paradigm (SP). But it is important to mention here that SP had its origins back in the mid-1940s with Gilbert White's works (1945, 1974) on natural hazards and human adjustments. The human geographer Gilbert White questioned the view that hazards are isolated geophysical events that can be controlled with engineering works such as dams and levees, by asserting that river control schemes were not necessarily the best nor the only option to tackle flood problems in the U.S. White introduced a social perspective that casts natural hazards into a human ecology framework operating at the interface of both natural and human systems, which allowed for other solutions than the 'structural' schemes then currently being implemented by civil engineers (Smith, 2001).

White's analysis in 1945 of technological responses to control floods that were put into place in the U.S. during 10 years concluded that damage provoked by floods had in fact increased despite huge amounts of money invested by the U.S. government to tackle them; this led White to shift the focus into human adjustments for flooding, namely, assessment of human settlements with regard to natural extreme events, evaluation of people's perception of extreme events and disaster, examination of choices to reduce losses and damages, and analysis of implementation of policy changes *vis à vis* disaster (Calderón, 2001).

The book edited in 1983 by Kenneth Hewitt, *Interpretations of Calamity*, constituted perhaps the most important radical interpretation that challenged BP. This radical

interpretation conceives natural phenomena solely as ‘the triggers’ of disaster (and not the disaster’ causes) within concrete social contexts. Hewitt argued that research and policies in BP had exhibited limits in tackling and preventing the ‘real’ disaster’ causes, namely, the social, economic, and political factors, as discussed previously.

At this time, Hewitt (1983: 13) had expressed that natural disaster research had become “the single greatest impediment to improvement in both understanding of natural calamities and the strategies to alleviate them”, because “...in practice, then, natural hazards have been carefully roped off from the rest of man-environment relations...” so, “there is no place for any sort of grass roots input; no way for any but the experts to break into the technical monologue”. In other words, what Hewitt emphasised with regard to BP was the following: 1) the strong influence of scientific and technical knowledge on disaster framing voided disaster of their social content, and 2) that the scientific framing of ‘natural’ hazards as ‘isolated’ entities hindered other possible interpretations of disaster. Westgate and O’Keefe (1976), Hewitt et al. (1983), Wijkman and Timberlake (1984), Blaikie, Cannon, Davis, and Wisner (1994), and Comfort et al. (1999) became champion advocates of SP. The common basic idea they proposed is that disaster, everyday life, and development are all linked. Thus, in a few words to understand disaster, one must look at the interaction between extreme natural phenomena and vulnerable human groups.

In Latin America, the group of LA RED endorsed this view (Lavell, 1993, 1994, 1996; Maskrey, 1989, 1993, 1994; Macías Medrano, 1993, 1999; García Acosta, 1993, 1994, 1996; Cardona, 1993; Wilches-Chaux, 1993, 1998; Mansilla, 1996, 2000; Herzer 1993, among others). LA RED was founded in 1992 to promote and strengthen the social analysis of risk and disaster within the Latin America context. Some of the basic ideas that spurred SP in the Latin American context were that:

- Disaster is not natural, which means that there is a “...intrinsic relation between risk, development, and environment (that) underpins disaster”. Processes that generate socio-economic inequalities are closely linked to the social distribution of risk;
- Small- and medium-sized disasters are very important to address because they occur more often than the great disasters and have provoked many human and material losses, and

- Risk management should begin at the local level because it is at the local level that new emerging social actors such as Non-Governmental Organizations (NGOs) and private agents are increasingly concerned with reducing vulnerability.

Therefore, LA RED continued to challenge the dominance of the natural sciences and engineering approaches and the implementation of aid-oriented emergency interventions that were put into place in a centralised manner at the national level to tackle ‘grand disaster’ in Latin America.⁵ Under SP, disaster is not the outcome of just geographical processes, but rather of structural social factors such as poverty, marginality, and lack of political power, to mention some important aspects. Therefore, SP was innovative and groundbreaking in that disaster were understood as the result of a more complex interaction between nature and the economic, social, and political processes that make people vulnerable to specific hazards. Therefore, ‘disaster causality’ is embedded in the socio-economic processes.

As I will argue in greater depth further on, differences between the two paradigms have radical implications in terms of policy making. Framing disaster in specific ways determines policy choices. When disaster is conceptualised as the result of a ‘natural’ phenomenon, measures to address disaster are mainly based on so-called ‘scientific’ and ‘technical’ knowledge. ‘The hazard’, ‘the disaster event’, and their consequences are therefore, the target of policies. Under BP, policy implementation for disaster’ prevention means the forecasting of threats, physical works for containing hazards and human organizational strategies for avoiding fatal losses and providing humanitarian aid to the affected people. Disaster risk is conceived of in terms of exposure to natural hazards; thus, reducing disaster risk means minimising or avoiding exposure to threats.

In contrast, within SP, the design and implementation of policies that integrate vulnerability as the central concern turn the attention to political, social, and economic factors. Disaster causality is sought in the interface of natural and social processes. Particular emphasis is placed on how these factors put people at risk in varying ways and to varying degrees, and in their relation to potential hazards. Under SP, and compared with BP, disaster policies are more a socio-political endeavour than a technical task. For SP, the recognition of people’s capacities and vulnerabilities in the face of potential natural threats is relevant to disaster framing and prevention. Society is regarded as varying social groups that possess

⁵ <http://www.desenredando.org/lared/antecedentes.html> accessed in March 2006.

inherent properties and differences depending on class, race, ethnic origin, and gender composition. Thus, policy responses must be oriented toward tackling the vulnerability root causes of social groups. In other words, under SP, disaster risk reduction means vulnerability reduction. The difference between risk and vulnerability is discussed ahead in section 1.2.

Having reviewed the main characteristics of these two competing paradigms and their differences, the following examination of the core concepts of the disaster field will highlight the relevance of the differing conceptualisations of nature and society embedded in them and their implication in policy making. The focus of the discussion now shifts to the conceptualisation of disaster, because the explanation of disaster causality is a central issue for this thesis and because the concepts of natural hazards and vulnerability have different weights according to the various disaster definitions embedded either in BP or in SP. In Chapters 6 and 7, I will explain how and why differing disaster causalities are taken for granted at the policy level in Mexico, as *the disaster per se becomes* the focus, which in turn determines the policy responses adopted.

1.1 Disaster

This section presents the origins of the disaster concept and the conceptual structure of the prevailing definition and its influencing character on the development of the disaster field. It identifies the object of study by focusing on ‘disaster causality’ factors. A distinction between disaster and disaster risk is also made with the aid of the notion of time. Disaster policies are aimed at addressing the causal factors and impacts and take into consideration past processes and events, while disaster risk policies concern something that could be planned to be done in the future considering current situations and expected and unforeseeable changes.

The ‘disaster’ concept has provoked much contested debate and disagreement since its inception at the beginning of the XX Century. It has been used by experts, policy makers, and lay people to characterise different kinds of situations: sometimes to label conflicts such as ethnic clashes; at other times to refer to sudden situations provoked either by ‘natural’ or ‘anthropogenic’ causes, and moreover, to invoke chronic long-term happenings such as droughts. It has been the object of study of various disciplines, from physical geography to sociology depending on the dimensions emphasized, whether natural or social. It is a

contested concept because it involves disputes of its use, different meanings, interpretations, and the complexity of the processes of causation coupled with it.

Sociology has been one of the first disciplines concerned with the understanding of disaster. According to Scanlon (1998), the sociology of disaster originated with Samuel Prince's research in 1920 on the Halifax, Nova Scotia, Harbour shipwreck explosion in 1917 that resulted in massive detonations of TNT. This is generally considered as the first social science study of disaster. Prince's work, a doctoral thesis, concerns social change⁶ at the community level derived from the impact of the catastrophe. The catastrophe is understood as a precipitating agent for social change. The thesis' focus was placed on "a community as it reacts under the stimulus [sic] of catastrophe and proceeds to adjust itself to the circumstantial pressure of new conditions" (Prince, 1920:141).

For Prince, a catastrophe is a determinant force that could either halt or further progress. A disaster to be considered as such must meet two conditions: a) it had to be an event that triggered social change, and 2) that these changes, whether minor or major, could deter or further the socio-economic progress of the community or the nation. A few years after the catastrophe, Prince witnessed social amelioration in Halifax that, to him, resulted from the catastrophe and in turn promoted unexpected progress in such a specific socio-historical context of growing industrialisation and trade at the beginning of the XX Century in Canada.

Systematic research on disaster dates back to the 1950s. According to Quarantelli (1982, 1998), since that time there has been a "move from the use of a label with a referent to primarily a physical agent to one which mostly emphasized social features of the occasion". As discussed previously, in fact, the disaster concept has evolved between the hazards-centred approach and the vulnerability approach. From the sociological perspective, two books edited by Quarantelli (1998, and more recently, 2005) are of paramount importance to understand how disaster framing has been evolving. These publications gathered relevant

⁶ For Prince, social change represented the main focus of the emerging field of disaster analysis and the *flux* (italics mine) as the driving force. He was interested in explaining the social consequences of the explosion of a ship in Halifax, Canada. He constructed social indicators to measure the positive and negative repercussions at different levels: "In Halifax, the shock resulted in the disintegration of social institutions, the dislocation of the usual methods of social control and the dissolution of the customary; that through the catastrophe the community was thrown into the state of flux which, as was suggested in the introduction, is the logical and natural prerequisite for social change; and finally that the shock was of a character such as 'to affect all individuals alike at the same time', and to induce that degree of fluidity most favourable to social change" (Prince, 1920:34).

contributions to explaining the changing field of disaster and to seek common features and differences when defining *the* (italics mine) disaster object and the scope of study. Perry (1998, 2005: 313) notes that the common characteristics shared by the books' contributors comprised three issues: "the definition of disasters as social events, acknowledgment that disasters are disruptive to social intercourse, and that disaster should be understood in a context of social change/human and institutional adaptability)".

However, Perry also points out the existing differences amongst the experts (Dynes, Stallings, Rosenthal, Oliver-Smith, Kroll-Smith, and Gunter, as well as Gilbert, Dombrowsky, Kreps, Profiriev, and Hewitt) and concludes that some differences rested on "1) the view of the context of the phenomena as disasters or hazards, 2) questions of *whose perspective* (author's italics) is used as a definitional referent; 3) the public, the victim, researchers, policy makers, and the definer's vision of social science, and 4) issues that should be addressed in terms of taxonomy and classification.

Despite the progress of the disaster field, Quarantelli states that no practical definition for social research purposes has been elaborated and that there is no conceptual clarity. To this author, there is an urgent need to formulate a basic definition, to obtain a minimum consensus, and to agree on the "defining features of the basic concept of the field" (1998: 4). He remarks that this situation has implications on data-gathering and analysis. Quarantelli asserts, for instance, "that the disagreement on the mental health effects of disaster stems from the different conceptions of 'disaster' that several parties of the argument take" (2005: 332). Nevertheless, unlike Quarantelli's claim, some specialists and policy makers have continuously, over the past three decades, adopted and quoted Fritz's influential definition coined in 1961:

"A disaster is an *event* concentrated in time and space, in which a society or one of its subdivisions undergoes physical harm and social disruption, such that all or some essential functions of the society or subdivision are impaired".

(Fritz quoted in Kreps, 1998: 32)

In Barton's view, Fritz's definition—grounded in the strategic bombing studies of World War II and in peacetime disaster studies undertaken by the National Opinion Research Centre and other institutions in the U.S. — continues to be the prevailing view that, in fact, illustrates the behaviour paradigm. Here, the object of study is the event labelled as disaster, the fatal consequences, and not the trigger, as in the case of natural hazards-based approach.

Since that time, similar definitions have been proposed, like that of Smith (2001:7), who states that disaster is:

“... an event, concentrated in time and space, in which a community experiences severe danger and disruption of its essential functions, accompanied by widespread human, material or environmental losses, which often exceed the ability of the community to cope without external assistance”.

Smith (2001:7)

From the 1990s, the notion of disaster became associated with its probability of occurrence; thus, the concept of *disaster risk* was coined (Blaikie et al., 1994; Cardona et al., 2003). Such probability is related to the several risk factors that are intrinsic to society's development as previously mentioned, in particular to vulnerability to hazards. For Cardona et al. (2003), development and disaster risk are inter-linked; however, it is important to distinguish between disaster⁷ and disaster risk in terms of policy-making. The former is a given situation, tangible, and one that can be measured, whereas the latter does not exist, but rather implies its future probability of occurrence. In this respect, to Stallings (1997) the social meaning of time is pivotal in the distinction between disaster and disaster risk and to the understanding of risk itself. Disaster is concerned with past, whereas risk pertains to the future, to the threat that is yet to come. Moreover, there are substantial differences when one acquires knowledge of these. When one studies disaster, one inquires of people what they did, whereas when one examines risk, one requests from people what they are doing at present with regard to an uncertain future.

Risk– and in extension, disaster risk– can only be inferred from past events and projected onto the future by considering current contextual factors, such as those embedded in the society-State relationship, in people's perception of the State's role in providing protection, the trust they have in the government, and the type of information available. The probability of disaster risk is determined by the community's vulnerability to natural, technological, or anthropogenic phenomena. Under this view, on the one hand, disaster demands assistance and recovering actions; on the other, disaster risk implies a community's

⁷ To Cardona et al. (2003:4), “disaster is a social process, triggered by hazards, which on interaction with a vulnerable medium causes intense alterations in the normal functioning of the community. These alterations may be expressed, amongst other things, as loss of life, serious health problems, damage or destruction of individual and collective goods, or severe damage to the environment. For that reason, rapid response is required by the authorities and the population in order to restore the well-being of affected persons and to re-establish adequate levels of normalcy”.

common perception of current and future dangers and of society's capacity to modify these risk factors, which are part of the society's characteristics. In this regard, it is argued that risk can be managed by intervening upon physical and social processes, *e.g.*, by restoring ecologically degraded areas and by transforming people's perceptions and the structural conditions that make some populations potentially more vulnerable and exposed to disaster than others.

Cardona et al. (2003) assume that collective action cannot be stimulated unless 'sufficient and common' perception of danger is achieved within the entire community. Thus, within this context it can be assumed that there may be shared common meanings of risk according to the social and cultural values of the human groups in triggering responses. This latter statement lies at the centre of this research and it will be discussed in Chapter Two. This means that the social and cultural differences of the groups entail different ways of constructing and interpreting risk. In fact, this idea is linked to the concept of vulnerability. By observing disaster from the vulnerability point of view, causal factors are transferred from nature to society. In terms of policy making, tackling vulnerability root causes and dynamic pressures would be an adequate response to reduce risk and prevent disaster.

In sum, according to this view of disaster, understanding and tackling people's vulnerability in terms of research and policy making have become important to achieving true disaster risk reduction goals. This definition of a disaster, in fact, focuses on the internal dynamics of people's livelihoods and their ability to develop coping and protection strategies in the light of interaction with hazards. Research oriented toward understanding this social framework may provide knowledge of the socio-historical, ideological and political factors that over the time have rendered certain groups vulnerable. Research that unpacks and examines the structural factors explaining the vulnerability of groups would consequently improve policy decisions.

1.2 Natural hazard

Hazards, natural hazards, and environmental hazards are three terms frequently found in the disaster terminology. They usually refer to a diverse set of 'natural' threats to humans, to natural and man-made resources that sustain human reproduction and well-being, such as hurricanes, heavy rainfalls, volcanic eruptions, earthquakes, droughts, etc. The terms hazard

and natural hazard are often used as synonyms, even if— as I will argue throughout this thesis— hazards are not always (necessarily or entirely) natural, even when they may appear to be. What is a natural hazard, then? What are —according to the literature— the necessary components for a hazard to qualify as natural?

Chapman (1999: 3) defines a natural hazard as ‘the *interaction* between a human community with a certain level of vulnerability and an extreme natural phenomenon, which may be geophysical, atmospheric, or biological in origin, resulting in major human hardship with significant material damage to infrastructure and/or loss of life or disease’. Similarly, for Alexander (2000) a natural hazard is an extreme geophysical event, originating in the biosphere, lithosphere, hydrosphere, or atmosphere, which is capable of causing disaster to humans.

In general, a natural hazard is defined in relation to its potential danger to humans. When arguing about natural hazards, three main components are customarily identified: 1) the origin of the phenomenon; 2) its ‘extremeness’, and 3) the damage it can wreak, above all upon human populations. Regarding the first component, ‘nature’ is contemplated as the main causal agent of the disaster because it originally generates the impact. For Alexander (2000), nature is outside of society, whereas for Chapman, it is the interaction between nature and society that determines the origin and the character of the hazard. Under the former definition, the origin of the natural agent is independent from human action, although it is widely acknowledged that global hazards such as climate change and ozone layer depletion result from the combination of meteorological dynamics and ecological change driven by human activities.

Regarding the second component, not all natural phenomena are hazards, but only those defined as ‘extreme’. But what is the meaning of ‘extreme’? Extremeness involves two aspects. First, it is related with the ‘intrinsic’ physical characteristics of the phenomenon in terms of magnitude and frequency, which are defined in relation to thresholds. Once a phenomenon exceeds thresholds, it becomes a hazard. Second, it is associated with its potential impact on society, which in turn can be moderated depending on the society’s coping capacity, either individually or collectively. With regard to natural disaster, Chapman (1999) defines the interaction between humans and nature in terms of the society’s capacity to cope with ‘extreme’ natural phenomena. Populations unable to cope with such phenomena are defined as vulnerable. Vulnerability is thus defined with respect to society’s abilities to

cope with natural hazards, and considers, among other factors, the following: a) possession of information of the likely magnitudes of hazard events and their potential impact, and b) willingness and ability of people to act upon that information. It is expected that human actors react rationally to avoid exposure to hazards and thus reduce their vulnerability.

In Chapman's view (1999), scientific information and knowledge are determinant in defining the hazard, the 'natural' disaster, the severity, extent, and impact in terms of lives lost and property damaged. It is assumed that scientific-technical information is sufficient to frame the hazard. The hazard is constructed as an 'extreme' event. Extreme events are those that fall outside of the control of the society. Society is regarded as either capable or incapable in relation to its capacity to respond to the natural phenomenon. Under this view, what appears to be important is to know the physical characteristics that qualify a phenomenon as extreme; thereafter, the capacity of a society can be measured or qualified as compared to this. Specifically, what Chapman points out is the importance of producing and communicating scientific and technical knowledge of the hazard to vulnerable people for them to be able to respond; for instance, by evacuating the site that would be affected by the hazard.

According to Alexander, the word 'extreme' signifies a substantial departure from a mean or trend, and the fundamental determinants of hazards comprise location, timing, magnitude, and frequency. He also defines 'extreme' in relation to the idea of threshold. Threshold is determined by the combination of the lowest limit at which physical forces can cause a disaster and people's vulnerability. To Chapman and Alexander, the concept of natural hazard is logical only in reference to a social and geographic context. It is noteworthy that in the Alexander and Chapman definitions, that which initially triggers the environmental change and the likely damage is the so-called, *natural* phenomenon. In short, the sense of causality shifts from nature to society; for this reason, the measures developed to prevent the disaster address 'the causes', namely, natural hazards. 'Experts' are capable of diagnosing and communicating the hazardousness of natural phenomenon to lay people who have to be 'taught' about the hazard's characteristics and its impact.

This conceptual shift from nature to society while examining hazard origins that may lead to a disaster can be identified in Smith's book (2001), *Environmental Hazards*. He rejects the idea of truly 'natural' hazards, and emphasizes that all disaster arise from a combination of physical exposure and human vulnerability. To the author, hazards are *hybrid*

events (italics are the author's) resulting from an overlap of natural (geophysical), technological (man-made), and social (human behaviour) processes. Thus, Smith prefers to label these as 'environmental hazards'.

For Smith, the human ecology perspective on natural hazards highlights the central role that human populations play in constructing hazards by transforming ecosystems and climate. The same natural event can be regarded as a resource or as a hazard depending upon human location, needs, and perceptions. Humans utilise nature and can transform geophysical conditions to the extent that the latter become hazards; once hazards, these can come to be extreme events. Extreme changes in the magnitude and frequency of these extreme events beyond damage thresholds may lead to disaster. *Human vulnerability* (italics are the author's) is defined in terms of the breadth of social and economic tolerance of hazards (Smith, 2001).

In Smith's view, disaster causality is not as accidental as proposed by Chapman and Alexander; it is framed as a type of inadvertent causality in which well-intended uses of nature and policies may cause unforeseen negative consequences. Once again, extremeness is a main feature of the hazard. Therefore, for Smith, the environmental hazard is mainly restricted to rapid-onset events that directly threaten human life and property on a community scale. For Smith, environmental hazards are:

"Extreme geophysical events, biological processes and major technological accidents, characterised by concentrated releases of energy or materials, which pose a largely unexpected threat to human life and can cause significant damage to goods and the environment".

(2001: 17)

One can say that the difference between Smith's and the previous authors' conceptualisations is the *influence* exerted by humans on the transformation of nature and on the weight placed on different causal factors, *i.e.*, the *interrelationship* between nature and society, whether it be of accidental or inadvertent causality. However, in all cases, what determines the occurrence of the disaster is the natural hazard in varying degrees, and human vulnerability is conditioned by natural phenomena and is not conceived of as a centred political and socio-economic process. This issue is discussed at great length ahead in the section on vulnerability.

Up to this point, I have addressed hazards, with debate focused either on natural causal agents or on their impact. It is now worth mentioning that from a constructionist view, one can state that it is humans –through knowledge and policy making– who construct the very idea of hazard and its qualities such as ‘extremeness’, and who assign the causal explanation of disaster to hazards or to the combination of the actions of humans and of natural forces. In brief, ‘the natural’ is conceived of as an external source of danger and as a geophysical extreme event or force that provokes disaster.

1.3 Vulnerability

A major conceptual shift emerged with the idea that disaster is more a function of vulnerability than natural hazards (Wisner et.al, 2004; Quarantelli, 1998; White, Kates and Burton, 2001). In fact, this shift represents the central distinction between the two main paradigms of disaster studies discussed in section one: the behavioural and the structural paradigms (Smith, 1999, 1996; Oliver-Smith, 1996, quoted in Hilhorst, 2004). The former, as explained previously, coupled a hazard-centred interest in the geophysical process underlying the disaster with the conviction that society must improve its means for prediction. For BP, (human) vulnerability is mainly conditioned by the hazard and is reduced to a minor component, whereas SP frames disaster not as an outcome of geographical processes, but rather of structural factors such as poverty, which is one of the social conditions that result in vulnerability; under this view, vulnerability is placed in the centre of the disaster’ causal explanation.

Hewitt (1997), one of the pioneer defenders of the structural paradigm, states that the majorities of hazards studies, which have constituted the hazard perspective (BP), treat hazards as objective conditions or agents in our environment or as thresholds, and construct risk in terms of their attributes of danger. He notes that although physical objective agents are necessary, other on-going societal conditions of risk are involved, *i.e.*, vulnerability.

“Whereas hazards perspective tends to explain risk and disaster in terms of external agents and their impact, vulnerability looks to the internal state of a society and what governs that”.

(Hewitt, 1997: 28)

The recognition of people and institutions as active players conditions the vulnerability perspective and its development. Hewitt speaks about *differential vulnerabilities* (italics are the author's) within and among societies. In his work *Regions of Risk*, vulnerabilities are defined in terms of people's lives and history and in relation to environmental and social change. In this author's view, a time dimension is connected with the present and past and not only the future, as proposed by the hazards perspective (Hewitt, 1997).

Within the structural paradigm, Blaikie and colleagues (1994) further extend the scope of the vulnerability perspective. They argue that to understand the causes of 'natural' disaster, one is required to examine the social, economic, and political processes that place people at risk and make them vulnerable, instead of focusing such great attention on natural hazards. Here, risk is a function of the combination of natural hazards and vulnerability. As in Hewitt's work, Blaikie et al. (1994) propose that disaster's main causes are to be examined within the society, and to do so, the concept of vulnerability becomes theoretically and analytically relevant. This meaning of the vulnerability that underpins the structural paradigm permeates disaster literature⁸ to the extent that at present, vulnerability analysis and models have gained more and more acceptance in the academic and policy spheres, in NGOs, and in international sectors of donors. It has been regarded as an alternative and a more radical way to address disaster causes, and also as a critique of the failure of the hazard-based approach in designing and implementing disaster prevention policies.

To Wisner et al. (2004), the origins of the vulnerability perspective can be traced to the 1970s when authors began to question the 'naturalness' of natural disaster. Additional vulnerability conceptualisations contributed to the structural paradigm by considering people's attributes, capacities, and responses to hazards (Smith, 2001; Hewitt, 1997; World Disaster Report, 1998) and their connection with a much wider and diverse set of socio-economic, political, and institutional influences (Twigg, 2001). Specifically, Smith relates vulnerability to the concept of human resilience and reliability. The former is a measure of

⁸ For instance, the World Disaster Report (1998) adopts the Blaikie et al. definition of vulnerability in terms of the capacities possessed by households and communities to cope with and recover from disaster consequences. "People can be vulnerable by living in places at risk,; by being more affected by the hazards (older people are less able to move when flood happens); more affected by the lack of rapid response from, say, slow or ineffective emergency services; and being less able to cope with the consequences, such as losing all capital assets. Usually vulnerability is linked to people's income level in the light of potential hazards. Such distinctions show why low-income households are generally the most affected by disasters" (p. 4)

the rate of recovery from the occurrence of a hazardous event, while the latter reflects the frequency with which protective devices against hazards fail.

According to Hewitt (1997), vulnerability is a potential situation and is connected with people's everyday lives and involves their capacities to avoid, resist, and recover from harm. For Hewitt, vulnerability in modern societies mainly concerns the legal, political, and moral frameworks. For instance, people can be labelled as vulnerable because they are not considered as the target populations of policy for, among other reasons, they are portrayed as negative and undeserving groups. Politicians and policy makers often neglect vulnerable people's interpretations and demands despite the fact that empirical evidence states otherwise; this is partly because vulnerable people very often lack the political power to make their demands heard and their needs met.

It is not unjustifiable to say that it is Wisner⁹ et al (1994) who brought vulnerability analysis into the centre of the disaster debate and research because their contribution effected a significant change in the conceptualisation of risk as a function of vulnerability by placing emphasis on structural causes. According to these authors, first, risk depends not only on the occurrence of natural hazards, but also on the internal processes that render specific groups in society more vulnerable than others to specific hazards. And second, because vulnerability is a social product, disaster risk and disaster are also.

This has important consequences for the very notions of causes, time, and space dimensions; it additionally has other implications in the policy sphere. Unlike the technocratic view linked to the behavioural paradigm, disaster risk associated with the structural paradigm is deeply ingrained in everyday life, and to explain it, one must look back to the socio-historical root causes and dynamic pressures that place people at risk. In this view, the time dimension expands back to the past, whereas in the hazards approach, causality is projected into the future, as discussed earlier. In terms of space dimension, vulnerability analysis is sensitive to the differing risk geographies of disadvantaged social groups.

For Wisner et al. (1994), vulnerability is

“... the characteristics of a person, or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard.

⁹ In the first edition of *At Risk* (1994), the author order is Blaikie, Cannon, Davis, and Wisner; while in the second edition (2004), this is Wisner, Blaikie, Cannon, and Davis.

It involves the combination of factors that determine the degree to which someone's life and livelihood¹⁰ is put at risk by a discrete and identifiable event in nature or in society".

(Wisner, 2004: 9)

Thus, vulnerability is a changing process because it entails:

- The degree to which certain groups in society are more prone than others to damage, loss, and suffering within the context of differing hazards.
- A time dimension, because it is damage to livelihood, and not just life and property, which is at issue (Wisner et al., 2004).

Thus, this particular conceptualisation of vulnerability has radical policy implications. In order to reduce risk and prevent disaster, vulnerability must be reduced; attention to hazards ranks in second place and is subordinated to human preparedness and emergency responses. Vulnerability reduction has, then, to be the policies' main goal, but always taking into consideration the likelihood of natural hazards occurrence in specific social and cultural settings. Moreover, class relations and social structures need to be addressed in order to explain the manner in which vulnerable people might become affected people. For instance, lower-class people are marginalised from policy makers' priorities when they set policy objectives and delimit criteria for defining target populations.

From this particular vulnerability perspective, Blaikie and colleagues propose two inter-related models for explaining natural disaster. The Pressure and Release Model (PAR) and the 'Access Model' (AM). PAR is intended to explain the progression of vulnerability, how its origins can be traced from unsafe conditions through economic and social dynamic pressures to the root causes. AM explains how the different components such as household budget, income opportunities, class relations, and structures of domination change in different ways over time after the disaster.

"The basis for the PAR idea is that disaster is the intersection of two opposing forces: those processes generating vulnerability on one side, and the natural hazard event (or sometimes a slowly unfolding natural process) on the other".

(Wisner et al., 2004:50)

¹⁰ "Livelihood is the command an individual, family, or other social group has over an income and/or bundles of resources that can be used or exchanged to satisfy its needs. This may involve information, cultural knowledge, social networks, legal rights as well as tools, land or other physical resources" (Blaikie et al., 1994: 9).

The explanation of vulnerability¹¹— which is linked to the notion of environmental justice— has three sets of links: root causes; dynamic pressures, and unsafe conditions, whose connections are often difficult to disentangle. Root causes are the socio-economic, political, historical, and ideological processes ingrained in society, are connected with the function of the state, and reflect the exercise and distribution of power in a society. According to Wisner et al. (2004: 53) “people who are economically marginal (such as urban squatters) or who live in an environmentally ‘marginal’ ecosystem (flood-prone urban locations) are also of marginal importance to those who hold economic and political power”. For these populations, “this creates three often mutually reinforcing sources of vulnerability. First, if people only have access to livelihoods and resources that are insecure and unrewarding, their activities tend to generate higher levels of vulnerability. Second, these people are likely to be of low priority for government interventions intended to deal with hazard mitigation. And third, people who are economically and politically marginal are more likely to stop trusting their own methods for self-protection and to lose confidence in their local knowledge” (Wisner et al., 2004: 53).

Dynamic pressures are processes and activities that ‘translate’ the effects of root causes both temporally and spatially into unsafe conditions. These can be, for instance, structural adjustment policies implemented during a certain period, rapid urbanisation on the outskirts of cities, and rural-urban migration that arises in many developing countries in response to the economic and social inequalities inherent in root causes. These causes are present in the case study under investigation, as discussed in Chapter Four.

Unsafe conditions are the specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard. Examples include people having to live in hazardous locations, being unable to afford safe buildings, lacking effective protection by the state, or having entitlements that are prone to rapid and severe disruption. Also, unsafe

¹¹ For the Environmental Justice Movement (EJ), people’s vulnerability is not a random consequence, but a phenomenon rooted in the socio-economic structures of society and connected with ideological and political interests. Environmental justice advocates recognition that minorities and poor people are more exposed to environmental threats and hazards posed by modern technology, such as environmental pollution and resources depletion. Several analysts of the EJ in the U.S. (Shrader-Frechette, 2002; Cole and Foster, 2001; Camacho, 1998, White 1998, Pulido, 1996) have identified linkages between Black people and Latinos and fatal illness and severe health problems with the locations of toxic and domestic wastes landfills, other treatment facilities such as toxic wastes incinerators, and the application of dangerous agricultural techniques. Black and Latinos communities suffer environmental injustice because of their race, ethnicity, and social class. In this research, I will address a certain type of environmental injustice experienced by poor people who happened to belong to various indigenous groups that migrated to Chalco in the early stages of urbanisation at the end of the 1970s.

conditions are dependent upon the initial level of well-being of the people, the pattern of access to tangible (*e.g.*, cash, shelter, food stocks, agricultural equipment) and intangible resources (networks of support, knowledge on survival, and sources of assistance, morale, and the ability to function in a crisis). The majority of these individuals are vulnerable because they have inadequate livelihoods, which are not resilient in the face of shocks, and they are often poor. They are poor because they suffer from specific relations of exploitation, discrimination within the political economy, and there may also be historical reasons for why their homes and sources of livelihoods are located in resource-poor areas (Wisner et al., 2004). To examine specifically the interaction between hazards and vulnerability, these authors postulated the Access Model (AM). AM focuses on the process by which the natural event impacts upon people and their responses and is

“... designed to understand complex and varied sets of social and environmental events and longer-term processes that may be associated with a specific event that is called a disaster”.

(p. 88)

This view of vulnerability illustrates the radical criticism of the dominant paradigm that, as mentioned earlier, is the behavioural paradigm. According to Clarke Guarnizo (1991: 25) and Pelling (2001), the critical perspective links disaster with the ‘development of underdevelopment’ theory, and argues that the marginalisation process is what directly increases the vulnerability of human populations; marginalisation shapes who in society are vulnerable to risk and whether risk turns into disaster. As set forth by Pelling, this consideration raises important questions concerning the influence of social, economic, and political power and inequality on analyses of natural hazard. For Susman et al. (1983: 279-80) and Smith (2001: 51-52) quoted in Mitchell (2006), this ‘radical perspective’, aligned with what has been termed previously the structural paradigm, bases its criticisms on the following postulates:

1. The severity of disaster impact is related to a greater degree with the scale of human exploitation than with the stress imposed by nature.
2. In less developed countries, disaster will increase as socio-economic conditions and the physical environment deteriorate. Disaster regularly occurs in poor countries because preparedness and responses are hampered by lack of resources.

3. A 'misinformed risk perception' cannot be used to blame disaster-affected people for their own affliction. In many less developed countries, the poorest members of society have no option but to live in the most hazardous environments.
4. Given that disaster is part of the 'quotidian', mitigation of disaster depends on changing structures and institutions within the society.
5. The only way to reduce vulnerability is to concentrate disaster planning within development planning, and that "development planning must be, broadly speaking, socialist".

(Susman et al., 1983)

It can be said that one of the main theoretical contributions of this conception is the possibility of linking macro socio-economic processes, such as urbanisation, that lead to measurable social (unsafe) conditions with specific potential hazards. Differential vulnerabilities depend on root causes, several social factors such as gender, class, and ethnicity, among others, which in certain specific situations place vulnerable people at risk by their being exposed to particular extreme natural hazards. Therefore, prevention and preparedness could be better achieved if these interactions are taken into consideration; all of this would entail a socially sensitive policy. To this point, this thesis has analysed the concepts of 'disaster', 'natural hazards', and vulnerability in terms of disaster causal factors and their policy implications. It focused on discussing the different conceptualisations of disaster embedded in the two paradigms, the behavioural and the structural, and on explaining the extent to which disaster casual factors are attributed either to hazards or to vulnerability.

2. Risk

In this section, an epistemological and policy comparison between the naturalist and constructionist perspectives of risk is developed. This comparison is performed because one of the core concerns of this thesis is to analyse the importance of the knowledge production of risk at the policy level and to explain how prevailing notions of nature and 'natural' hazards promoted insightful connotations when framing disaster risk and implementing institutional responses. Thus, the intention here is to link the interpretations of risk found in

the disaster literature with the broader discussion of two epistemologies of risk: the naturalist, and the constructionist.

2.1 The naturalist perspective of risk

The naturalist perspective represents the most common and widely known way to address risk. It is also frequently known as the scientific-technical or technocratic perspective. As for disaster analyses belonging to the behaviour paradigm, risk is conceived as a singular, neutral, and objective entity. In ontological terms, risk is the real, quantifiable product of nature's impact on society; it is 'out there', disembedded from society and culture. Risk is a direct function of physical, natural, and technological hazards, which can become threats to society and its values. It is commonly gauged in terms of economic costs to human life and health.

As mentioned previously, several authors in the disaster debate defined risk as the probability of suffering damage. To Chapman (1999), risk is the probability of defined loss. Risk analysis specifies the probability of loss of any magnitude as a result of the specified hazard within a defined area. To Smith (2001: 6), "risk is the actual exposure of something of human value to a hazard and is often regarded as the product of probability and loss". And as stated by Short (1994), this paradigm of risk analysis is driven by hazards and risk associated with advances in science and technology.

Within the SP, Blaikie et al. (1994), Wisner (2002), and Wisner (2004) conceive of risk as the chance or probability that specific people will be exposed to a hazard. But in this case, risk is not solely defined by the occurrence of a hazard event such as an earthquake, flood, or storm— as framed in the behaviour paradigm; risk also depends upon there being 'elements at risk', which can be either people or man-made systems such as the infrastructure. Normally, this side of the risk equation is referred to as vulnerability— as previously discussed. Risk is a probability of damage that can be estimated and prevented if these elements at risk are managed, *i.e.*, these factors that are linked with the progression of vulnerability. Risk is expressed in the following equation:

$$\text{Risk} = \text{hazard} \times \text{vulnerability}$$

This naturalist interpretation of risk found in disaster literature and analysed here has linkages with the broader discussion on the impact of modern technology on society and on the policy debate. In the contemporary world, technological developments have brought benefits, but also dangers and risks. According to Fischer (2003b), the proponents of large-scale technological progress such as industrial development and corporate and government leaders, have been forced to regulate technological activities and their impacts due to the pressure exerted by environmentalist movements. In many countries, environmental regulation has become stricter, and technological developments are increasingly taking ecological restraints into consideration. But in parallel, another relevant phenomenon has occurred. The impact of technology on the policy debate has influenced the discourse. Fischer (2003b) discusses the several ways the defenders of technology have responded in terms of re-shaping their discourse as follows:

1. Attempts to shift the political discourse to the search for ‘acceptable risk’ (inverted commas are the author’s) Supporters of this idea argue that risk produces both danger and opportunity. They claim that:

“Risk taking must be seen as necessary for successful technological change and economic growth as well as the overall resilience and health of modern society”.

(Fischer, 2003b: 421)

2. Industrial and scientific leaders focused the risk debate on technical factors. The main assumption is that risk can be known and even *managed*. Risk assessment and management are the responsibility of scientific experts and government decision-makers.
3. The general public is ignorant and lacks information and scientific knowledge on technological risks. Therefore, lay people entertain irrational beliefs and exaggerate dangers.

“The answer is to supply the public with more objective (technical) information about the levels of risks themselves. That is, the ‘irrationality’ of contemporary political arguments must be countered with rationally demonstrable scientific data”.

(Fischer, 2003b: 421)

Therefore, the argument is that only trained individuals, ‘scientific experts’ with sufficient expertise and knowledge are socially entitled to define what risk *is* and what *is not*; and how it can be reduced. Risk professionals such as natural scientists, epidemiologists,

engineers, and economists form the group of specialists traditionally acknowledged by society to carry on 'objective' environmental risk assessments. In practical terms, quantitative, 'neutral', and 'objective' methodologies are employed to carry out risk analysis. Risk assessments are conducted as a combination of the probability and frequency of the occurrence of a defined hazard and the magnitude of the consequence of the occurrence. It is said that science and technology are sufficiently reliable to forecast the origin of harm and the occurrence of disaster, and to manage risk. Planning and policy making are important to regulate risk activities with the aid of the market and the administrative state. According to Fischer (2003b), the practice of risk assessment that first emerged to deal with geological risks and the probabilities of earthquakes and their damage is seriously criticised by social constructionists due to its failure in considering the social dimension. The author criticizes the technocratic framing of the risk problem and the utility of risk assessment as an appropriate methodology for decision-making.

In relation to the former, Fischer criticises the assumption that social factors are irrelevant, *i.e.*, the social context in which the methodology operates; people's subjective perceptions; large-scale technological systems as socio-institutional phenomena; the recognition that the sources of technological hazards and disaster have been the result of institutional failures. This set of issues is relevant for consideration in this research, as will be observed later in the analytical chapters. The analytical frameworks I develop for this research intend to unpack one of the social dimensions from which disaster can be analysed. I refer here to the importance of disaster discourses, arguments, and language mechanisms in constructing knowledge of 'reality' and policy responses.

Another issue of importance closely related to this is the conceptual frameworks within which experts and public opinions are formed. Due to its own nature, the technical approach to risk privileges these scientific framings and, consequently, focuses on natural hazards and the technical measures to control them and *reduce* risk. Conflicts between experts and the public may arise because they have different conceptual frameworks in which their opinions are formed. Trust is difficult to build and easy to destroy; it becomes of vital importance with respect to perceptions of environmental risk. According to this approach, science and technology will always be appropriate for addressing and solving environmental problems and therefore, to prevent disaster. Authors such as Hewitt (1983), Redclift and Benton (1994), Lash, Szerszynski and Wynne (1996), and Beck (1992) criticize

the dominant response (that is aligned with the naturalist perspective) to contemporary environmental risk for being a technical, functional, and positivistic endeavour to establish 'the status of current threats'. These previously mentioned considerations bring to the fore the question of the social definition and certification of risk, and also reveal the subjective and socially constructed character of the naturalist (scientific-technical) conception of risk and its theoretical and practical limitations for considering the social and institutional dimension of disaster framing and policy making.

2.2 The constructionist perspective of risk

2.2.1 Risk as a perceived reality

The first approach to risk labelled as constructionist is that concerned with the psychology of risk perceptions. It is linked mainly to the technological risks of modern societies. The field of risk perceptions is a response to the technological approach by means of demonstrating the relevance of integrating the social dimension as the site where risk 'enters' the daily lives of human groups. Over fifteen years have passed since Slovic, Kasperson, and colleagues published the first studies on risk perception and the individual's responses. According to Pidgeon et al. (2003), the field of risk perception and risk communication is not homogenous, but fragmented, and includes the psychometric paradigm and cultural theories of risk perception, embodying the following: postmodernist and discourse-centred approaches and behavioural studies; economic/utility maximization and economic-justice approaches, and communications and empowerment strategies for risk communications. The fundamental idea is that risk can only be grasped through perception, which is shaped by psychological and social factors.

“Risk perception researchers have investigated in depth how judgements about perceived risks and their acceptability arise, and how such judgements are related to risk ‘heuristics’ (*e.g.*, the memorability, representativeness, and affective qualities of risk events) and the qualitative characteristics of risk (*e.g.*, voluntariness or catastrophic potential)”.

(Pidgeon et al., 2003: 1)

For instance, according to Slovic (quoted in Burchell, 1998), the psychometric approach assumes that risk perception is largely based upon people's cognitive responses to the

characteristics of the risk itself. Behavioural researchers seek to determine how and why people attach social meaning to specific technologies. To Burchell (p. 42), Slovic's work "suggests that greater perception of risk is associated with risk characteristics such as low familiarity, low control, and high catastrophic potential, low voluntariness of exposure, high inequity and low perceived benefits". Burchell (1998) proposes the 'recent psychometric approach', and affirms that risk construction is mainly based upon demographic attributes, individualized cultural worldviews, and attitudinal factors.

Psychometric tools to measure individuals in relation to the four worldviews of cultural theory are incorporated. Population differences and characteristics that mediate environmental risk perception are related with the dynamics of socio-political factors, such as power, status, alienation, and trust. Perception of greatest risk is demonstrated to correlate with the lowest levels of trust in experts. Attitudinal concepts are associated with gender, race, and worldviews. Greatest perceptions of risk and lowest levels of trust are directly related to the least power and the lowest status that women and disadvantaged 'racial' groups possess in U.S. society.

The Social Amplification and Attenuation of Risk Framework (SARF) serves as the theoretical basis for research. It aims to examine how risk and risk events interact with psychological, social, institutional, and cultural processes in ways that amplify or attenuate risk perceptions and concerns, and thereby shape risk behaviour, influence institutional processes, and affect risk consequences (Pidgeon et al 2003). Ontologically, there is nothing such as "real risk or objective risk". The difference with the cultural and sociological approaches lies in that the emphasis is assigned to individual agency and psychological processes in risk construction. Psychometric questionnaires comprise some methods employed, as previously mentioned. Geographers, sociologists, and psychologists resort to this perspective. Although this approach acknowledges that risk cannot be objective, it also assumes that, based on the given risk characteristics, cultural context, and level of media coverage, risk perception will be to a greater or lesser extent a homogeneous phenomenon.

2.2.2 Risk as a cultural process

Douglas and Wildavsky (1983) are the defenders of the idea that risk is a cultural construct that shape the way people perceive risk. There is no a single perception of risk. Moreover, risk should be seen as a joint product of *knowledge* about the future and *consent* about the most desired prospects (author's italics). Perceptions of risk are collective constructs closely related to cultural worldviews and 'myths of human nature': the fatalist; the hierarchic; the individualist, and the egalitarian. In this way, according to Adams (1995), all four myths are anthropocentric; they represent beliefs not only about nature, but also on humankind's place *in* nature. In the fatalist view, nature is capricious and cannot be governed, one can only hope for the best; in the individualist view, nature is benign and provides supportive context for the individualist's enterprise; in the egalitarian view, nature is ephemeral and demands human caution, while in the hierarchic view, nature is perverse/tolerant and research is needed to identify the limits of nature's tolerance and regulation is required to ensure that the limits are not exceeded. These four distinctive worldviews form the bases of four different rationalities.

For Adams (1995), disagreements and disputes on risk arise because people argue from different premises, different paradigms, different worldviews— different myths of nature, both physical and human. These in turn frame the manner in which risk is defined. As mentioned within the risk perception paradigm and also according to this view, there is, ontologically, 'real' risk and 'objective' risk do not exist. Risk is a cultural construct. Following this argument, one can say that (disaster) risk is determined by social and cultural factors, not by nature, and that it possesses three characteristics: 1) its controversial character, 2) the fact that people differ in terms of the kind of risk about which to worry, and 3) that there is not always a direct link between knowledge of risks and the actions taken to cope with them.

Opposing worldviews and 'myths of nature' rooted in the culture influence debates over risk between risk professionals and the general public. Perceptions of risks are collective constructs. This approach has been criticised for being culturally deterministic and stereotyping and for stating that cultural bias is 'unavoidable'. Worldviews provide powerful lenses that magnify one danger and obscure another. Cultural anthropologists, political

scientists, and geographers who are representatives of this approach include Douglass, Wildavsky, and Adams.

2.2.3 Risk as a social process

Under this approach, nature and risk are both ontologically and epistemologically subjective; they are part of, interrelated with, and interdependent on society. They are the result of a social construction in which several actors are engaged in socio-political arenas in the definition of environmental problems, from local to global. A problem can be conceptualised and valorised in different ways depending on cultural contexts and power relations. Thus, social understanding and knowledge of risk are shaped and constructed by cultural, social, economic, and political factors.

Problems are not conceived of as given in the ‘real’ natural world, but constitute social accomplishments and are context-specific. This approach places emphasis on the historical and social contexts in which individual and institutional decisions on risk are made. It focuses on the processes by which issues are “assembled, presented, and contested as problems”. Risk is politically negotiated and constitutes an exercise of power. Political incentives are important to take positive action for successful risk construction. Lay rationality and knowledge are as important in policy making as the “expert’s” knowledge. For the lay public –as put forth by Adams, (1995)– it is concerned with *balancing* risk and rewards; thus, the lay public’s framework is based on personal and collective experiences, whereas for “experts”, the risk framework is constructed with scientific and technical information and is oriented toward reducing risk.

The processes of social construction in which several subjects (including social nature) are involved define and frame the environment and the natural disaster problem. A problem can be constructed and evaluated in different ways according to diverse cultural and discursive contexts; for example, the way in which it can be examined prior to and after the occurrence of a natural disaster. But it is noteworthy that, as mentioned by Burchell (1998), constructionists appear to acknowledge that risk is real and that one should better contemplate this issue as an ontological paradox, that is, risk is socially constructed within the human realm and also has empirical correlations with the real world.

In order to distinguish this perspective theoretically from the naturalist and to understand the social character of risk construction, the analysis of risk's conceptual structure is proposed. Hannigan (1997), based on the principles of the sociology of social problems proposed in the late 1970s by Best (1989) and Spector and Kitsuse (2001), posits the conceptual structure of the social definition of risk as follows: a) the object deemed to pose risk; b) putative harm, and c) a linkage alleging some causal relationship between the risk object and the potential harm. Hannigan affirms that much of the discourse on the social construction of risk takes place on the causal relationship.

The situation is complicated by the existence of multiple conflicting layers of proof, such as the legal, scientific, and moral. Hannigan (1997: 99,100) remarks that “the legal proof is more onerous, since it cannot leave any room for reasonable doubt, whereas scientific proof is easier to acquire, but is, nevertheless, a slave to statistical significance levels. Its authority remains until new disconfirming studies appear, and moral proofs are the most easily manufactured, but are heavily dependent upon the mobilization of public opinion to make an impact”. Political action, discourses, re-allocation of power; conflict resolution processes are key issues. For risk to be socially defined and accepted, it has to be negotiated. Societies have different ways of choosing and negotiating specific types of risk and exclude others according to their norms and values, which are embedded in specific socio-historical contexts and worldviews

3. Constructionist analyses of natural disaster

Drawing from the previous discussion, we now shift to recapitulating the arguments due to the need to elaborate a framework for analysing disaster from the constructionist perspective. A brief review of certain contextual, historic, and institutional factors aids in identifying potential and novel ways of researching disaster that take into account a social dimension that is meaningful to all social actors involved in disaster policies, *i.e.*, the social dimension that conceives of risk as a social product of discourses and language.

Some contributions can be considered as ‘constructionist readings’ of disaster. Fowles and Miller’s (1982) work on the famous catastrophe of the Love Canal in Niagara Falls, New York, is a precedent. The authors’ study focuses on factors related with the beliefs of both relocated and remaining residents concerning the risk posed by the Love Canal landfill and

residents' reactions to the management of the situation. A more recent study carried out by Homan (2003) on the perceptions and meanings of natural disaster in Cairo and in the U.K. reveals that environmental meaning remains culturally and ethnically constructed. The author argues that social constructionism has made an important contribution through fostering an acceptance of the validity of all forms of knowledge. Deep-rooted beliefs determine perception of the natural world. Bankoff (2001) assumes a more critical constructionist stance. He accepts the occurrence of disaster and their effects, but emphasises that disaster and hazards are cultural constructs and part of a historical discourse that is embedded within a distinctly Western construction of knowledge:

“‘Tropicality’, ‘development’, and ‘vulnerability’ form part of one and the same essentialising and generalising cultural discourse: one that denigrates large regions of world as dangerous– disease-ridden, poverty stricken and disaster-prone”.

(Bankoff, 2001: 29)

Other authors, such as Quarantelli (1998), Dombrowky (1998), Hewitt (1983, 1995), and Pelling (2001), acknowledge that disaster are, in the final analysis, socially constructed. But it is Hewitt who has attempted to scrutinise the dominant view– the techno-centric approach– from this sociological perspective. To this author, science, institutional practices, and power comprise the key elements (which are unpacked later) that determine knowledge production and the policy process.

The turning point in disaster and natural hazards research can be considered in the criticisms found in the book edited by Hewitt (1983) entitled *Interpretations of Calamity*, which is concerned with the understanding and applications of natural hazards research. The authors' contributions in this book showed that substantial changes of perspective and practice were needed in order to reduce world's damages caused by disaster. This could be done by looking at disaster as social processes that are determined by inherent factors of the structure of society, such as poverty, marginality, and the unequal distribution of power. While searching for explanations of calamities in rural settings, the authors advocated the importance of the role of socio-cultural conditions in shaping the form and severity of damages from natural processes. Hewitt and colleagues' main criticisms pointed out that:

“... a narrow focus upon ‘the hazard’ as an occasion of natural extremes, and upon the loss, crisis, relief, and rehabilitation in disaster, can mislead us as to the decisive human ingredients of natural hazards” and that “[...] we tend to disregard important

constraints upon effective social response to risks from nature that depend upon the ‘normal’ socio-economic order”.

(Hewitt, 1983: viii)

According to Hewitt, contemporary natural disaster research depends on dominant institutions and academic spokesmen and is developed within the dominant view, which impedes the improvement of the understanding of natural calamities. In the dominant view (the technocratic approach under the behaviour paradigm), disaster itself is attributed to nature (a sense of causality, direction of explanation ranges from the physical environment to its social impacts, as discussed previously) and conceives of risk in geographical terms according to the distribution of natural extremes. Public policy is backed by the most advanced geophysical, geo-technical, and managerial capabilities. Even hazards work by social scientists reinforces the ‘geo-physical’ and technological reductionism of the dominant view.

With regard to this issue, Wisner et al. (2004: 335) state that the goal of prevailing disaster responses “is to alleviate immediate suffering and bring things back to normal as before the disaster event [...] Disaster responses consist of a sequential series of actions to gain control over disaster, before, during, and after the emergency period (disaster cycle model) [...] People affected by disaster are helpless victims and passive recipients of external aid; stress is placed on emergency response, relief, and technological and scientific solutions to address physical vulnerability. Donors decide what victims need”. The dominant view constitutes a technocratic approach that subordinates other modes and bases of understanding or action to those utilising technical procedures. Hewitt’s main argument is:

“that the ‘natural science-technological fix’ approach to hazards is itself, essentially, a *socio-cultural construct* reflecting a distinct, institution-centred and ethnocentric view of man and nature”.

(Hewitt, 1983: 8)

In Hewitt’s interpretation, facts and reality are produced at the institutional level. Centrally-governed institutions are involved in channelling scientific research into distinctive approach to ‘facts’ and to deciding what reality should be. By analysing the language employed in the dominant view discourse, Hewitt notes that one can examine how:

- Within institutions, disaster complexity is reduced to a partial problem to be rendered manageable by the narrowing of the range of interpretation and acceptable evidence.

Disasters are dealt with as a separate problem, as discrete events, temporally and spatially limited. 'Reality' is constructed to be measured.

- The occurrence of 'rare', severe events directs people's attention and become symbolic of the entire scenario. By framing disasters as accidental and isolated events that are from their socio-historical context, policy makers, scientists, and the media tend to portray the impact of nature on society as *the* issue. Disaster is reified.
- Natural disasters are conceptualised as pertaining to society-environment relations; they are isolated events. They are materially 'translated' into actions and public works to isolate the problem (*e.g.*, dams for controlling floods).
- "Hazards are simulated with models that are *managerial devices* (italics are the author's). They are prescriptions for showing where academic and managerial categories fit together" (*Ibid*: 13).
- Mainstream hazards research has invented its problem to suit its convenience. It gathers data on people at risk, but may not engage in dialogue with them.

The contemporary reality of shrinking states and the role of non-state actors including the media and international actors in shaping discourse could be taken into consideration when assessing the role played by government in controlling discourse. However, this consideration is beyond the scope of this thesis because this study focuses on the central institutions that are currently in charge of designing and implementing policy and government actors that in fact shape ideas and actions for development planning which are in turn reflections of society. Hewitt concludes that the majority of natural disasters are characteristics of societies, and that risks are not accidents, but are rooted in 'ordinary life'. In a more recent contribution (Hewitt, 1998), the author reinforces his criticisms, underscoring the need to consider risk production shaped by social conditions within the context of development. Policy makers and experts are obliged to reveal hidden risks, risks that are not commonly integrated as relevant issues for the policy process, such as the consideration of the risk to which vulnerable people are exposed. Hewitt claims that 'expert' disaster research and management possess the same top-heavy structure of the military systems, and that the most sophisticated and effective technical work is socially constructed around institutions and viewpoints of power and its master geographies.

In this way and in relation to the economic power implications of the dominant view, Pelling (2001) recalls why the latter continues to be dominant. Key international and governmental agencies that continue to support a physical- and engineering-based orientation in disaster policy fit very well with the multibillion-dollar disaster industry. The majority of engineering companies that benefit from disaster are based in the North, whilst the majority of natural disasters occur in the South.

In relation to the conceptual models already presented, another aspect must be highlighted. Gilbert (1998) mentions that disaster theoretical productions have been strongly influenced by their institutional context and historical time. For instance, as discussed at the beginning of this chapter, hazards research adapted a model that was coined during the Second World War to explain how air raids struck communities, triggering conflict. In this approach, the causes of disaster are placed outside the community. Natural hazards resemble air attacks. To Gilbert, this paradigm has been widely accepted for many years because it is clear and simple and because it reflects the circumstances and the place it first emerged, in the U.S. at the height of the Cold War.

“The scientific approach to disaster is therefore a reflection of the nature of the *market* for which disaster became an institutional demand. Bombs fitted easily with the notion of an *external agent*, while people harmed by floods, hurricanes, or earthquakes bore an extraordinary resemblance to affected people of air raids”.

(Gilbert, 1998: 13)

In countries other than the U.S. aspects of institutional demand were also determinants in defining the conceptual structure of disaster. For instance, in France, Gilbert affirms, the institutional demand derives from the successors of civil defence or civil security agencies created during the two World Wars. In short, conceptualisation is linked to the institutional demand that is constrained or determined by institutions that provide funds for scientific research. Thus, it might appear that scientific research on ‘disaster’ has also responded to other purposes and interests beyond those that are ‘scientific’.

To Dombrowsky (1998), the problem of disaster’ conceptualisation involves the lack of epistemology (it can be inferred that the author calls for a common positivist epistemology), which causes difficulties in defining the object of study. This is reflected in the fact that many definitions of disaster are solely programmatic declarations. This means that those defining disaster declare what they intend to do with the social process

denominated disaster. Thus, the Red Cross defines disaster in terms of aid needed; the National Guard observes riots as disaster; the General Physician, epidemics, and the Special Forces and Bomb Squads, terrorism. As discussed by Dombrowsky, there is another important circumstance to consider. Disaster definitions are constructed according to the internal logic of organisations. Organisations define problems in relation to the solutions they have at hand, to their capabilities for handling them.¹² Therefore, root causes and affected people are unlikely to be taken into consideration when providing the assistance that is truly needed.

For Wisner et al. (2004), issues of knowledge production are of a different nature. They acknowledge that their vulnerability analysis has limits in identifying reliable evidence for causal connections among root causes, dynamic pressures, and unsafe conditions. These limits exist because there are *uncertainty and gaps in knowledge*. To these authors, this has had policy consequences. Policy makers and decision takers have failed to address the connections adequately and have, in the end, neglected the causes of disaster's social roots.

“Problems will recur again and again in different and increasingly costly forms unless underlying causes are tackled”.

(Wisner, 2004: 61)

According to this stance, once policy makers aware of the ‘real’ root causes, vulnerability will be addressed and eventually reduced. I argue, however, that this is not because of policy makers’ lack of knowledge for making appropriate decisions to tackle the ‘real’ root causes, but that we should take other issues into consideration when researching the relationship between knowledge production and policy making:

- The process of knowledge production within the policy sphere (that is governed by other factors, as it has been illustrated previously).
- The employment and consequences of the prevailing scientific-technical knowledge for voiding the social content of explanations of disaster’ causes.
- The use and consequences of other knowledge in disaster and disaster risk problem construction by all actors involved, including affected people.

¹² “The cases where warm clothing was sent to African famines, or thousands of tons of contraceptives or cough mixtures were sent to mass casualty situations are not only mistakes, but the logical outcome of the internal dynamics of self-preserving organizations” (Dombrowsky, 1998:22).

Conclusions: Disaster policies, risk, and knowledge.

As a matter of conclusion, disaster causality is a fundamental issue to be taken into consideration when proposing differing explanations of disaster and risk. The sense of causality and the weight placed either on nature or on society as the determining factors for explaining disaster have dominated the disaster debate over the years when it comes to conceptualising and designing policy responses. The behaviour paradigm that privileged natural hazards research and scientific knowledge frames disaster as the impact of natural phenomena on society. From this perspective, scientific knowledge of disaster can reveal the nature of the event, and the society is assigned the task of acting accordingly to cope with it.

On the other hand, the structural paradigm expressed in the vulnerability concept explains disaster as a result of social processes in relation to hazards. In this case, knowledge of disaster is knowledge of hazards vulnerability within society. However, in both paradigms and the prevailing definition of disaster coined by Fritz, nature is conceived of as being outside of society regardless of whether one is explaining disaster in terms of natural hazards or in those of vulnerability. This means that both paradigms share a naturalist perspective of risk.

Compared with the naturalist perspective that privileges scientific-technical knowledge and rationality when framing risk, the constructionist perspective also recognizes other knowledge in problem construction. Policy makers, bureaucrats, and lay people possess other rationalities; therefore, their consideration of public policy analysis is important from the proposed constructionist analysis. It is understood that current policies privileges scientific knowledge while undermining other knowledge. Thus, marginality can also be conceived of in terms of being negligible in knowledge production and the framing of disaster. Knowledge regarding disaster risk with regard to daily life and survival strategies is not taken into consideration in the dominant disaster policies.

This research adopts this view of risk because it is concerned with the understanding of collective social constructions of meanings and the knowledge that are determined by political and social processes. It focuses on the varying ways scientists, policy makers, and implementers make interpretations and discourses of floods causality and floods risk, how these construct policy issues as problems, and consequently, how all of this determines policy objectives, types of intervention, and implementation.

Thus, at the theoretical level, the purpose of this thesis is to contribute to the understanding of disaster, risk, and policies as social products. The two analytical frameworks presented in the following chapter elaborate on these issues. Key to this framework is the assumption that there is a social construction process at the institutional level that determines the manner in which disaster are defined and framed, and that there are various social subjects and conceptions of nature and social actors underpinning the policy process. In addition, knowledge and the framing of natural disaster conceal the social dimension, which is understood as the processes that generate the vulnerability of people to disaster.

CHAPTER TWO. DISCURSIVE CONSTRUCTION OF ‘NATURAL’ DISASTER AT POLICY LEVEL

Introduction

The objective of this chapter is to develop two interrelated frameworks to analyse a social construction of ‘natural’ disaster and risk at the policy level. In particular, the focus is placed on the relation among arguments and discourses of disaster causality, policy problem construction, and institutional responses. Therefore, the first framework is to analyse the discursive construction of disaster causality as a policy problem, and the second framework is to explain the argumentative construction of a public remedy, known in the research as ‘policy responses’.

The main theoretical sources of this chapter derive from various bodies of knowledge, including: social constructionism (Hacking, 2000; Sismondo, 1996; Berger and Luckmann, 1966); social construction of nature and the environment and social nature (Barry 1999; Demeritt, 1998; Castree and Braun, 2001; Braun and Castree, 1998; Cronon et al., 1995); the sociology of social problems applied to environmental and disaster policy analysis (Linder, 1995; Fischer, 2003,a ; Stallings, 1997); sociology of knowledge (Irwin, 2001; Garvin, 2001, Hilhorst, 2004); sociology of the environment (Hannigan, 1995), and political theories of causal stories (Stone, 1989)

In section one, I review the theoretical underpinnings and the epistemological implications of social constructionism. This is with the intention to show its analytical scope for this research by delimiting the ‘object’ of analysis and the components of the process that construct ‘natural’ disaster. I also suggest that the concept of ‘natural’ disaster should be conceived of as ‘social nature’ in the sense that ‘natural’ disaster is intrinsically social in terms of its discursive construction. To do this, I compare two epistemological traditions –the naturalist and the constructionist– in the understanding of nature, with the aim of applying the basic assumptions of social constructionism to ‘natural’ disaster. I explain how the ‘social nature’ debate can contribute to the constructionist analysis of ‘natural’ disaster within policies. The socially constructed character of the policy process does not occur in a vacuum; it emerges within a specific context in which individuals, institutions, groups, technology, and nature interact.

In section two, I explore and explain the specific ways knowledge is produced within the social domains of disaster and risk. This is to examine how knowledge claims may be similar or different among disaster-relevant subjects, namely scientists, disaster managers, policy makers, implementers, and local operators, as well as local people. And finally, in section three, I elaborate the two analytical frameworks that will be used later to develop the analysis in Chapters Six and Seven. One framework is to explain the discursive construction of disaster causality as a policy problem based on the argumentative structure of discourse, and the other is developed to examine policy responses from an argumentative approach. These two frameworks are related in the sense that floods causality discourses and the consequent problem constructions determine the manner in which specific policy responses are believed to be valid and adequate to solve inundations problems. In short, the floods policy problem determines the policy objective.

1. Social constructionism and ‘natural’ disaster

1.1 The nature and scope of social constructionism.

A necessary task to carry out while selecting the main aspects of a social constructionist analysis is that of identifying the ‘object’ or ‘process’ that are said to be socially constructed. From the outset, the latter is important to bear in mind for the development of this chapter because, as I discussed in Chapter One, natural disaster and risk are contingent sites in which causal factors of different kind are invoked when defining the ‘natural disaster problem’. This, in turn, has implied a number of interpretations and even differences regarding the type of knowledge employed when framing ‘natural’ disaster, their causal factors and consequences, and the policy implications.

In the book, “The Social Construction of What?” Hacking (2000) warns the reader concerning the fact that, before thinking about definitions and meanings, one is required to identify the object of analysis. Hacking inquires, *what* is to be socially constructed? And he replies: ideas, types of, and the matrix in which they are embedded constitute a guideline to ‘arrive at’ a constructionist approach of ‘the reality’ under study. The purpose of studying the social construction of ‘things’ is to reveal interactions that occur among concepts, language, discourses, practices, and institutions.

For Hacking, social constructionism¹³ includes:

“various sociological, historical, and philosophical projects that aim at displaying or analysing actual, historically situated, social interactions or casual routes that led to, or were involved in, the coming into being or establishing of some present entity or fact”.

(1999: 48)

The social constructionism perspective has been applied to various human affairs. According to Hacking (2000), this perspective has been utilised to analyse the social construction of objects, ideas, facts, *i.e.*, danger, emotions, gender, literacy, technological systems, female refugees, to mention a few. In some cases, as Hacking notes, social constructionist analyses have afforded important insights on historical events, social forces, and ideology, on precisely the factors that give rise to the constitution of the ‘objects’, ‘ideas’, ‘problems’, and ‘facts’. For Sismondo (1996), the metaphor of constructivism has been employed when implying a broad range of issues: construction of epistemologies; theories; social problems, and objects, or things. It can be an ontological programme with the focus on social objects or laboratory artefacts, or one with the focus on the natural world. It can also be primarily an epistemological programme, when the focus is on a particular social object, namely scientific knowledge.

During mid-Sixties the epistemological dimension of the social construction of ‘reality’ was systematically addressed by Berger and Luckmann. Berger and Luckmann’s (1966) seminal work “The Social Construction of Reality” broke the ground for analysing the way individuals and society produce knowledge on reality in their daily interaction and how institutions are formed and maintained through legitimisation and socialisation. It is at the interplay of subjects-institutions-society that knowledge of ‘reality’ is produced and validated. The theoretical underpinnings of Berger and Luckman’s book were in some fashion influenced by the work of Mannheim. For Mannheim (quoted in Delanty, 1997), the founder of sociology of knowledge, constructivism is one of the key methodological issues in social science. When constructing reality, the knowledge production process plays a fundamental role. The author relates knowledge to its social producers. Knowledge is always produced from a specific social and historical standpoint and reflects the interest and culture of the groups in question. Mannheim’s interest was in ideology as a form of knowledge that

¹³ According to Knorr-Cetina, 1993 and Sismondo, 1993 (quoted in Delanty, 1997), “constructivism has been the social scientific methodology of the 1980s and there is little sign of abating it”.

expresses the thought of a dominant group. In this regard, the policy analyst Frank Fischer (2003, a: 124) notes that social constructionism:

“...starts with the recognition of the theoretical ladenness of facts. The interpretivist position holds that social reality and empirical observations of it only exist in the context of a mental framework (a construct) for thinking about them. Social constructs are grounded in values that determine our perceptions of reality. The findings of an inquiry are, as such, not a report of that which is out there but rather part of a process that creates the particular version of reality”.

As Schwandt (1994) states, for constructivists, knowledge and truth are created, not discovered by mind. They argue that what we take to be self-evident kinds is actually the product of complicated discursive practices. At stake, then, are systems of representations, social and material practices, laws of discourses and ideological effects. In order to ground analytically the previously mentioned epistemological considerations of constructionism, I bring to the fore the following key assumptions of social constructionism, proposed by Burr (1995: 3–5), because these will be examined in the remainder of the chapter to inform my analytical frameworks:

1. *A critical stance toward the taken-for-granted knowledge.* There is no objective world; our observations of the world are not the world itself. The categories with which we apprehend the world do not necessarily refer to real divisions.
2. *The categories and concepts we use are history-and culture-specific.* All the ways of understanding are historically and culturally relative and are considered as products of this culture and history, and are dependent upon the particular social and economic arrangements prevailing in that culture at that time.
3. *Knowledge is sustained by social processes.* People construct knowledge among them through daily interactions in the course of social life. Social interactions of all kinds and particularly language are of interest. What we regard as ‘truth’ is a product not of the objective observation of the world, but of the social processes and interactions in which people are constantly engaged with each other.
4. *Knowledge and social action go together.* ‘Negotiated’ understandings could take a wide variety of different forms; thus, we can speak of the numerous possible ‘social constructions’ of the world. But each different social construction also is

accompanied by, or invites, a different of action from human beings. Descriptions of the world sustain some patterns of social action and exclude others.

All four assumptions relate in one manner or another to the ‘subjects’ and precisely to the ‘subjects’ abilities to perceive of and know ‘reality’ and to act according to the ‘reality’ the subject constructs. In this research, the four assumptions are applied to the analysis of ‘natural’ disaster in the following statements, which I will take into consideration to elaborate my analytical frameworks:

- ‘Natural’ disaster is a concept that is the result of a complex combination of subjects’ interpretations of causal factors.
- Knowing ‘natural’ disaster is unavoidably biased and value-laden, and can be understood as a social accomplishment that is collectively negotiated.
- A subject’s interpretations of ‘natural’ disaster are embedded in and to some extent determined by science and policy institutions.
- Various discourses of ‘natural’ disaster causality compete with each other concerning the ‘truthful’ accounts of disaster.
- Different interpretations of ‘natural’ disaster causalities imply different policy responses.

The discussion in Chapter One highlighted how ‘natural’ disaster framing depends on the casual factors and how these are observed as a ‘problem’ to be tackled by policy. Therefore, I propose ‘disaster causality’ as an ‘object’ that implies a ‘policy problem’; in particular, I focus on the knowledge claims that construct the ‘object’, the ‘policy problem’, and the ‘policy responses’. For the elaboration of this chapter, in addition to the ‘object and the ‘policy problem’ and of utmost importance, social constructionism analysis takes into consideration the ‘subjects’ involved in creating the ‘object’ and the ‘policy problem’. This analytical exigency aids in refining the scope of this perspective by explicitly relating the ‘*what*’ (the ‘object’ and ‘problem’) to the ‘*who*’ (the ‘subject’).

It does not suffice to say what ‘reality’ is about, but also who ‘creates’ it, through which means and to what purposes. In other words, under this perspective the subject’s position within an institution, his/her identity, and values are as important as the ‘objects’ in question and how the relationship between the two can be established and evaluated. This

latter consideration conditions the researcher to study also the *'process of construction'*, namely the knowledge production of the 'objects' and 'policy problem'.

Therefore, the process of knowledge production of 'natural' disaster includes, on the one hand, policy makers, scientists, implementers, and other policy-relevant subjects, and on the other hand, the knowledge claims of 'natural' disaster causality and the policy problem. The study of knowledge claims that make possible the 'existence' of 'natural' disaster causality as 'objects' and 'policy problems' can be undertaken by deconstructing these knowledge claims. In this respect, Castree (2001: 13) asserts that:

“Deconstructing these knowledges (of nature) therefore entails denaturalizing them: that is, showing them to be social products arising in particular contexts and serving specific social or ecological ends that ought to be questioned”.

In sum, I set forth the first four components of the *process of construction* for the development of my analytical framework:

- 1) 'Natural' disaster causality as an 'object',
- 2) A 'policy problem' and 'policy responses' determined by 1)
- 3) A subject who constructs/reproduces knowledge
(Policy makers, implementers, scientists, affected people)
- 4) Making of knowledge claims of 1) and 2) by 3).

The following section applies the bases of the social constructionism to nature and environment in order to frame 'natural' disaster as social nature and to flesh out in section three of this chapter the four components enlisted above and thus continue detailing the scope of my analytical framework.

1.2. Nature and environment as social products

In the previous section, I discussed the nature and scope of the social constructionism and I proposed to analyse 'natural' disaster causality as a social object in particular with regard to knowledge production. For that reason, in this section I suggest the concept of 'natural' disaster to be conceived of as a social nature and therefore suitable for a constructionist

examination. Thus, the following discussion shifts to the constructionist perspective of the concept of 'nature'. The concept of 'nature' is of paramount importance for this research because it underpins particular understandings of 'natural' hazards, 'natural' disaster and risk found in scientific descriptions and policy measures, as discussed in Chapter One.

Under the constructionist perspective, it is stated that these understandings not only concern the material world or physical conditions, but mainly ideas, social meanings, and discourses and their implications in policy making, in that they prescribe and indicate courses of action. In this respect and as Feindt and Oels note (2005: 163), a discursive perspective of nature "(...) allows one to understand how nature and the environment are continuously produced through environmental policy making, planning, research, and development, as well as through every day practices".

But prior to reflecting on the discursive perspective of nature in order to conceive of 'natural' disaster as a social nature, it is necessary to recall the difference between the two general approaches to nature: the naturalist, and the constructionist, because they have different epistemological implications that eventually shape different policy responses. Generally, in social theorising about nature –according to Barry (1999) – one is able to identify two general approaches: the naturalist, and the constructionist. In the naturalist, 'nature' is external to society and exists as an independent natural order outside of society, whereas in the constructionist, 'nature' is observed as a construction of society and focuses on analysing the internal relations within society.

Therefore, to Barry (1999) the expression 'social construction of the nature has two connotations. The first of these, denominated 'naturalist', refers to the material, physical production and transformation of the environment by humans (ecological deterioration, agriculture, forestry, landscaping, biotechnology, genetic manipulation, etc.). This is the most commonly known connotation of nature and environment and has been the object of numerous sciences such as ecology, economy and political sciences. The naturalist view conceives nature as something that just *is* regardless of who is involved in describing it and for whose interests it is described; the environment is objective which means that is a factual reality independent of subjective value judgements. The role of the positivist sciences is to approach nature in order to unveil its internal dynamics. Thus, there is a clear separation between the observer and the object that is 'observed'. The 'naturalist' approach to nature, in

fact, underpins the 'naturalist' perspective of risk, discussed in Chapter One, in the sense that risk is a direct function of physical or 'natural' hazards.

In contrast, the social constructionist approach deals with the power and function of language and discourses in constructing the socio-natural 'reality'. In addition to the materiality of 'reality', the environmental dimension of human life is also determined by how social groups interact through the language and narratives of science, policy, mass media, and daily interaction. Empirically, this can be contemplated and researched in the scientific and policy knowledge. For this reason, this connotation of 'social construction of the nature' is adopted in this research. The social constructionist view conceives of 'nature' as a contested 'site', and no agreeable and singular meaning or definition can be reached because contexts and subjects differ. This signifies that knowledges and conceptualisations are context-specific and depend upon who is defining them and for what purposes. As Barry states:

“[...] nature and the environment mean different things and are given different evaluation in different social and cultural settings and in different historical periods. The point of social theory is to make us aware of these evaluative distinctions, to try to understand them, and if possible suggest explanations for them. In this way we can say that there are no 'value-neutral' readings of the environment and nature”.

(Barry, 1999: 19)

Under the constructionist view, one cannot separate facts from values; when one analyses nature, implicit in these descriptions are certain value-judgements and normative positions. I apply this assumption to those 'objects' and 'concepts' that are labelled as 'natural', such as 'natural' hazards, 'natural' disaster, and 'natural' disaster risk, as discussed in the following section. The 'constructionist' approach to nature in fact underpins the social constructionist perspective of risk, discussed in Chapter One, with regard to that risk is not a 'real' division of nature, but instead the result of a political negotiation, constituting an exercise of power. Knowing risk focuses on the processes by which issues and claims are assembled, presented, and contested as 'problems'.

Several authors (Demeritt, 1998; Castree and Braun, 1998, 2001; Hewitt, 1995; Cronon, 1995) discussed the failure of the naturalist notions of 'nature' and society as distinct and separate analytical categories when producing knowledge on the environment and 'natural' systems to address ecological problems. Solutions proposed for ecological problems very often disregard the social and institutional contexts in which they are meant to

be applied. For instance, solutions might become meaningless to people when applied to calling for public participation. Thus, in this research, I propose that 'nature' and 'society' are no longer to be observed as separated, but rather as forming a complex fabric that is constituted of and assembled by social representations, system of meanings, language, and discourses. This is discussed later in the sub-section on the social nature of 'natural' disaster.

Therefore, it is at this 'social' level, which includes the complex fabric of system of meanings, language, and discourses of the 'natural-social' relation, that research of 'natural' disaster within the policy sphere is undertaken in this thesis. Accordingly, a constructionist epistemology of 'natural' disaster is required for building an analytical framework to study 'natural' disaster within the policy sphere. Under this constructionist epistemology, the ideas of 'natural' disaster, 'natural' hazards, and risk and their varying interpretations are shaped, on the one hand, by conceptualisations and meanings the subject entertains of 'nature', and on the other, by the subject's position on State-society relations and the purposes of the institution.

The general underlying assumption adopted in this chapter is that 'nature' can be regarded as the outcome of discourses, power relations, interests, and, in particular, of ideas concerning how society is and ought to be. In other words, in this research, that which is at stake is not only the idea of 'natural' disaster in itself, but the values that specific subjects defend through the discourses that they elaborate. This means that any conceptualisation of 'natural' disaster is mediated by the subject's beliefs and values. 'Natural' disaster can be apprehended through the meanings and beliefs that the subject assigns to specific causal factors, such as 'natural' hazards (hurricanes, heavy rain falls, and floods) and man-made hazards such as infrastructure failures. According to Yanow¹⁴ and again Yanow (1996, 2000), it is through the making of meaning that we come to approach the world and construct knowledge on it.

The issue of 'nature' as a contingent site that involves multiple meanings has been a topic in disciplines such as environmental sociology and environmental history. One of the most quoted books on the different meanings of nature in the modern world from the environmental history perspective is Cronon's edition (1995) of "Uncommon Ground. Towards Reinventing Nature". This work highlights the importance of explicitly recognising 'natures' as human products that are under constant re-constitution. 'Natures' are historic

¹⁴ Personal communication, February, 2004.

human constructions. In rethinking the meaning of nature in the modern world, Cronon and colleagues (1995) brought to the fore two key insights that have emerged from the work of scholars and scientists over the past quarter century. First, the ‘natural’ world is far more dynamic and entangled with human history than popular beliefs on ‘the balance of nature’ have typically acknowledged. Second, ‘nature’ is not, to a great extent, ‘natural’; it is a human construction comprising the way we describe and understand the natural world that is entangled to such a degree with our own values and assumptions that the two worlds can never be fully separated.

Other authors have built on this discussion from the same perspective. Among them, there is agreement regarding the fact that nature is a human construction that is socially and culturally bound (Cronon, 1995; Di Chiro, 1995; Haraway, 1995; Castree, 2001; Demeritt, 2001; Braun and Wainwright, 2001). In sum, I argue that by treating ‘natural’ disaster as conforming a social nature, meanings, beliefs, and discourses that construct ‘natural’ disaster causality must be analysed through and at the same time connected to the institutional context in which the subjects are positioned. Thus, in section 1.3, I present a brief review of the social nature conception, placing emphasis on the manner in which production of knowledge claims of ‘natural’ disaster causality can be approached and evaluated. But before doing that I present some criticisms to the application of social constructionism to ‘nature’ that eventually should be considered for the scope of this research.

1.2.1 Criticisms to social constructionism of nature

Having explained the theoretical underpinnings of social constructionism and in particular how it approaches ‘nature’, it is important to refer to its criticisms and limitations when establishing the relationship between the social and the natural in the analysis of ‘natural’ disaster as a social product. This research intends to explore how bridging ‘nature’ and society can be possible in the policy realm. In doing so, it seeks to place the concept of ‘natural’ disaster within sociology of the environment. In this regard, what is relevant to question is the process whereby epistemological claims of ‘natural’ disaster causality is done.

Because this thesis seeks to explain how ‘natural’ disaster causality claims are constructed, it aims at explaining what ‘nature’ is and how it can be conceptually differentiated between the various referents made by the subjects. Nevertheless, some

criticisms can be identified while establishing the tension between 'reality' and its social construction, between 'natural' disaster and the discourses and arguments that can make possible for it to emerge as an issue of social concern within policy.

Drawing from critical realism and according to Carolan (2005: 396), one can say that "there is distinction between the way things are and our knowledge claims about those objects of knowledge. To conflate the two—to reduce ontology to epistemology—is to succumb to Bhaskar's (1978) epistemic fallacy. This allows, and here is the crux of critical realism (and, thus, what makes critical realism *critical*), for the fallibility of knowledge claims; to open knowledge claims to criticism, testing, and further improvement". In this sense, the reader might get the impression at times that the knowledge claims of 'natural' disasters are portrayed as the 'natural' disasters themselves. It is important to bear in mind this criticism and for this reason the two frameworks that are to be constructed for this research will be used only to explain the argumentation process of the most dominant discourses of disaster at the policy level; in other words, discourses that refer to causal agents that are part of this 'reality'

There is another important point to consider when discussing the social construction of 'natural' disaster. It relates to the manner in which scientific accounts construct knowledge of nature as a social process. From the perspective of the sociology of science, it can be understood that science constructs 'nature' and 'natural' artefacts without referring to an 'external objective natural' condition that can be used to compare the diversity and validity of scientific claims (i.e. the ecological processes of environmental deterioration). Under this view, scientific knowledge of nature may be conceived as relative as any other account, for example that of policy makers and lay people. Prevailing descriptions of 'natural' disaster causality are of scientific nature so in this sense it might be useful to bring to the discussion the criticisms made, for instance, by Murphy (1994) who scrutinises the sociology of science and exposes its internal contradictions. Murphy warns about the fact that sociology, in particular the sociology of science studies, has fabricated science without nature. He calls for the re-framing of sociology of science within natural processes. In this regard Murphy states that:

"the sociological representation of science as a social construction has tended to obscure the discovery of the properties of nature and the effect that discovery has on social action; to ignore that nature itself is a crucial element in the

scientific development of factual knowledge; to gloss over the manipulation of nature (and attendant environmental catastrophes), and therefore, to muddle one of the most significant features of the contemporary world”

(1994: 970)

Following Murphy’s caveats, it is important to bear in mind throughout this thesis that the analyses of the scientific facts of ‘natural’ disaster correspond to descriptions of material and ecological changes that have occurred and that have brought concrete damages and serious alterations. For this reason, it is necessary here to develop a narrative that invokes the material and natural construction of an specific case study in order to understand the severity of floods- this is done in Chapter Four. However the focus of the research is put, as mentioned above, in arguments and discourses of disaster causality. Murphy’s criticism can be considered to develop further research in the future.

1.3 The social nature of ‘natural’ disaster

The social nature debate represents a contemporary growing open debate and an important effort oriented toward addressing the topic of nature as re-constructed by society. Castree and Braun (2001) and Braun and Castree (1998) edited valuable works on what is currently denominated as the *social nature* debate. Experts (such as Cronon, 1995, Demeritt, 1998, 2001; Pelling, 2001, 2003; Castree and Braun 1998, 2001) in different social disciplines (anthropology, geography, environmental history, cultural studies, political economy, and the science studies) have contributed to this debate. The latter is not concerning with single unified perspective, but involves several existing perspectives that seek to explain how *social natures* are being known, re-made, and transformed and by which actors, for whose benefit, and with what social and ecological consequences. In general, the contributions of Castree and Braun and colleagues (1998, 2001) on social natures are aimed at responding to the following central questions:

- Who is currently empowered to define what counts as ‘nature’ –discursively and materially?
- What are the implications of accepted or hegemonic definitions?

- Which counter-hegemonic definitions are available to us at present, and what kind of a world— socially, economically, politically and culturally— do these allow us to envisage?

According to Castree and Braun (1998: 5), two common important points are shared among authors who advocate the social nature approach to ‘nature’:

- 1) In Haraway’s words (cited in Castree and Braun, 1998), “nature cannot pre-exist its construction”: it is figure, construction, artefact, and displacement. It is something made, materially and semiotically.
- 2) “Its making is about much more than just nature. It is impossible to separate nature into its own ontological space. Thus, the remaking of nature(s) has wider implications – it becomes, quite simply, a focal point for a nexus of political-economic relations, social identities, cultural orderings, and political aspirations of all kinds”.

Social natures are defined as the sites at which social production of ‘nature’ occurs and is contested. Different theoretical positions are currently engaged in this task with no apparent predominance of one over the others. For instance, authors of the Marxist tradition recognise the importance of political economy, but suggest that the material transformation of nature in capitalist production underplays other aspects of nature’s re-making, namely, that of its representation. That is why new re-interpretations of the Marxist’s reflection on the nature of ‘nature’ are being made, and these may provide insightful ideas on the interplay between the material and discursive production of nature. In this respect, the origins of these ideas can be traced back to Schmidt’s (1971) “The Concept of Nature in Marx” (quoted in Castree and Braun, 1998), which presents two sides of Marx’s account of the capitalist nature: a critique of representations of ‘nature’ within bourgeois societies and the fragmented theory of nature’s creative destruction under capitalism.

Schmidt’s (1971) accounts of the bourgeois concept of nature as external to society has been criticised because it underplays the role of social relations in constituting nature and society. As noted by Castree and Braun (1998), Neil Smith’s work¹⁵ is relevant regarding the production of nature under capitalism. Smith’s thesis’s main points emphasise the following:

¹⁵ For a detailed explanation, see Smith, Neil (1984) *Uneven Development: Nature, Capital and the Production of Space*, Oxford, Blackwell.

a) the internal relations between society and nature; b) that capitalism constructs and reconstructs entire landscapes as exchange values, and c) capitalism historicizes human relations with nature and society. His central idea of the production of nature contemplates the way in which ‘first nature’ is replaced by a different, man-produced ‘natural’ landscape.

“The competitive and accumulative imperatives of capitalism bring all manner of natural environments and concrete labour processes upon them together in an abstract framework of market exchange which, literally, produces nature(s) anew”.

(Castree and Braun 1998: 9)

At a time when capitalism is causing unprecedented great environmental transformations and because Smith’s reconstruction of Marx underplays the materiality of produced nature’, the arrival of eco-Marxist’s contributions such as those of O’Connor (1998), *i.e.*, the “second contradiction of capital”; Altwater’s (1993) “discounting the future and resource overexploitation”; Benton’s (1989) “naturally mediated unintended consequences of production”, and Harvey’s (1996) “anti-ecological capitalist valuation” (Castree and Braun, 1998) has never before commanded such importance. According to these re-interpretations of the Marxist tradition, nature’s representation becomes a very important avenue to explore. The main discussion among Eco-Marxists concerns the tension between materiality and its representation in the process of knowing and remaking ‘reality’ and the functions executed between human agency and structure.

In fact, this changing tension between materiality and representation in the process of re-making ‘reality’ can be mirrored in the constructionist versions of social problems proposed by Stallings (1997). According to Stallings (1997: 8), there are four constructionist versions of social problems. The first group comprises the strict constructionists represented by Spector and Kitsuse, who equated social problems with process of claims making and claims in response to putative conditions. These authors set forth no assumptions about ‘objective reality’

The second group includes the contextual constructionists represented in the area of risk by Gene Rosa’s “reconstructed realism”. Contextual constructionists retain the focus on processes of claims making and responding. However, they are willing to make certain assumptions with respect to the ‘objective reality’, especially to explain why some claims are easier to promote than others. The third group is the ‘debunkers’ group. These social problem

theorists assume knowledge of objective reality in order to use this ‘knowledge’ to evaluate claims being made on conditions. Thus, they are able to support claims that are consistent with ‘knowledge’ and to discredit, deny or debunk those that are not. And finally, there is the fourth group represented by Armand Mauss, which holds that the problem *is* the process and pays scant attention to the outcomes of the process. Stallings (1997) states that “the social problem status of a given issue is a function of what members of organisations and representatives of institutions say and do about some condition, not of the objective features of the condition itself (whatever they may be). And second, the consequence of what they say and do is simultaneously facilitated and constrained by the characteristics of the organisations in which they participate.” (1997: 8).

Aspects of representation or ‘enframing nature’ are therefore central to Post-structuralist accounts and involve more than only capital and commodities. From the post-structuralist position, the general concern lies in the relation between material changes and the process of cultural intelligibility, in which language is a main activity. This is very important to consider when analysing the manner in which ‘natural’ disasters are conceptualised, as well as by whom, and for which purposes. ‘Natural’ disaster is not understood as a mechanical and neutral activity as the positivist tradition suggests and illustrates by the naturalist approach to ‘natural’ hazards. ‘Natural’ disasters infiltrate into ‘society’ through representation and discourses. In this regard, Castree and Braun state that:

“Our relation with things is always already a sign relation; discursive relations and representational practices are constitutive of the very ways that nature is available to forms of economic and political calculation and the ways in which our intervention in nature are socially organized”.

(Castree and Braun, 1998: 16)

At least two interpretations can be identified with this post-structuralist position. The first focuses attention on the novel ways that capitalism is re-making nature. Capitalising and enframing nature is simultaneous and ineffable. Production and consumption are intertwined with discursive practices and representation (*e.g.*, the commodification of the human body and nature by corporations). In the second interpretation, ‘actors’ are not ‘nature’ and society as separate things, but imbrolios composed of mixed relations among science, politics, organisms, religion, law, economy, and technology. The challenge would be to

identify and analyse ‘networks’ and ‘mediations’ rather than of ‘pure’ entities and ‘interactions’ (Castree and Braun, 1998).

However, the danger of locating agency at the level of ‘culture’ or ‘discourse’ has been identified since organisms and physical systems play in nature’s re-making. Nature materially changes, indeed. The established field of ‘science studies’ with focus on science-as-practice, shows that what counts as nature and nature’s re-making occur within networks that include social, technical, discursive and organic elements simultaneously (Castree and Braun, 1998; Biagioli, 1999; Ziman, 2002)

In sum, the constructionist epistemology I propose for this research implies that:

- Understanding ‘natural’ disaster as social nature entails the roles played by ‘active’ subjects (policy makers, implementers, scientists, and affected people) who are involved in nature’s constitution; therefore,
- Understanding ‘natural’ disaster as social nature entails the process of construction of ‘natural’ disaster causality through knowledge claims; and in this,
- ‘Nature’ has a rhetorical place in the politics of ‘natural’ disaster discourses as instruments of power and control, *e.g.*, ‘heavy rain falls’.

The above discussion is an effort in trying to transfer theory on social nature from environment to disasters and this is why the object of analysis is disaster causality and not the consequences or impact. The examination of ‘natural’ disasters as part of social nature calls for an analysis of actors’ claims in the shaping of causal factors and their interaction. This discussion explores the possibility of engaging disaster scholars with social theory in order analyse the influence institutions and actors have in shaping the discourse and then in constructing disaster ‘realities’. This new research avenue may be important to design policies oriented to reduce disasters risk causes and therefore prevent consequences. So, through this intellectual task one might be in the position of linking disaster discourses to material conditions and consequences.

2. Knowledge production of ‘natural’ disaster and risk

In the previous section, I proposed approaching ‘natural’ disaster as social nature by stating that ‘natural’ disaster are the outcome of knowledge claims and discourses. In this regard, I established the importance of the active ‘subject’ in the knowledge production process of ‘disaster causality’ (‘object’) and the ‘policy problem’. I mentioned that knowledge claim of disaster causality depends upon the subject’s values and beliefs, which are conditioned, in a manner of speaking, by the subject’s position within an institution. At the same time, institutional discourses shape the way subjects talk about things by determining the language and the relevant issues used to frame the ‘object’ or ‘process’. Moreover, institutions shape and are shaped by the type of knowledge claims the subjects make and how these knowledge claims construct specific discourses on and meanings –in this case– of ‘natural disaster causality’ and ‘policy problem’.

In a constructionist epistemology, knowledge production is not a homogeneous process. Constructionist epistemology holds that knowledge is sustained by social processes and that ‘negotiated’ understandings embrace a wide variety of forms and therefore, views of the world. Therefore, to understand how knowledge claims are similar or different, whether they converge or diverge among disaster-relevant subjects, I opted for the concept of ‘social domain’ (see the definition of ‘social domain’ later). This is because, as Hilhorst (2004) notes, the concept of ‘social domain’ is sensitive to diversity and human agency, to the fact that actors can integrate and re-work knowledge derived from different systems and domains, and that the movement of ideas among domains can be identified. Therefore, the objective of this section is to explore and understand the specific ways knowledge is produced within the social domains of disaster and risk. Hence, I link the constructionist analysis of scientific, policy and lay knowledge of risk (Irwin, 2001; Fischer, b 2003; Garvin, 2001) with the notion of social domains of disaster and risk (Hilhorst, 2004).

According to Long (2002) and Villarreal (1994) quoted in Hilhorst, 2004: 57), social domains can be defined as follows:

“(…) as areas of social life that are organized by reference to a central cluster of values, which are recognized as a locus of certain norms, rules and values implying a degree of social commitment”.

(Long, 2002; Villarreal, 1994 quoted in Hilhorst, 2004: 57)

It is assumed that subjects construct and employ knowledge depending on the social domain to which they belong and the position they enjoy within a specific domain. In addition, knowledge construction is co-determined by the subjects' interests and intentions, which are, however, embedded in their social domains. For instance, on the one hand, it is generally admitted that scientists generate information on hurricanes to alert populations and to predict future impacts by means of forecasting, the elaboration of 'risk' maps, and emergency responses. Research outcomes are meant to be the basis for technical and engineering interventions that are in turn meant to control the impact of the heavy rains, whereas on the other hand policy makers negotiate the meanings of disaster both with scientists and affected people by utilising scientific and non-scientific evidence with the aid of rhetorical tools to justify the validity of their claims and actions. Their concerns are not to predict hazards, but to respond to emergency situations and to alert populations on the importance of evacuating risk-prone areas.

Thus, the knowledge construction process of disaster causality between the two groups is of a different type and origin, recurs to different evidence, and has different uses. Nevertheless, inter-connections between the two can be identified. With respect to the disaster context, Hilhorst (2004) proposes three domains of knowledge and action that represent notions of nature-society interaction, vulnerability, risk, and response: 1) domain of international science and disaster management; 2) domain of disaster governance, and 3) domain of local knowledge and coping practices. These domains are classified with the assumption that people belonging to one of these share common values and ideas within that specific domain and differ from the other domains:

“In social domains of response to risk and disaster, ideas and practices concerning risk and disaster are exchanged, shared and more or less, organized because of certain proximity (physical or discursive) in the ways people refer to disaster and risk”.

(Hilhorst, 2004: 57)

Hilhorst (2004), however, does not elaborate on the elements that may constitute the domains, but only assumes that there might be central 'ideas' and 'practices' being constructed as part of particular discourses. But in a certain manner, Hilhorst is suggesting a new avenue that is yet to be explored by empirical research on how central ideas, core values,

and beliefs characterise and sustain discourses of disaster. Therefore, I use the Hilhorst classification and for the purposes of this research, I propose that:

Knowledge claims of disaster causality and the origin and use of evidence and warrants constitute the core argumentative elements of a given discourse that may at the same time characterise a particular social domain within the context of disaster.

These components can allow me to acknowledge the discursive ‘proximity’ or ‘remoteness’ of the subject *vis-à-vis* other subjects within a domain and among domains. Thus, the boundaries of each domain are given both by the content and meaning of the claims and by the subject’s values and beliefs with regard the discourse in which he/she is positioned. It is important to acknowledge that there may be competing claims and discourses within a social domain. Therefore, in following areas of this section, I characterise the three domains of disaster and risk that Hilhorst proposes (2004) by elaborating on types of knowledge, and the origins, recognition, and uses of evidence.

2.1 Knowledge production in the domain of International Science and Disaster Management

To Hilhorst (2004), scientists and disaster managers belong to this domain. This domain is embedded in a modern discourse that frames nature and society as separate entities. Nature is considered a ‘commodity’ that can be appropriated and controlled through ‘expert’ knowledge and modern administration. The intention of disaster management is to control hazards through rational planning and engineering measures. As I discussed in Chapter One of this thesis, the central focus and action of the dominant paradigm (BP) – where this domain can be situated– are the geophysical processes of disaster and the development of technology for monitoring and predicting these processes to provide information for the elaboration of disaster plans and emergency responses as the means for governing disaster. For Hilhorst (2004), intervention in a linear fashion, in which empirical complexity is divided into a series of independently given realities, is the basis for modern administration of disaster.

As Garvin asserts (2001), (positivist) scientific knowledge is rationalist and compartmentalised. It is rationalistic because it is generally conducted according to an

accepted set of methodological rules. The explanation of complex issues –such as, I would argue, disaster and risk issues—is compartmental and the resulting knowledge is specific and limited. The origin of evidence derives from scientific studies that tend to describe causal factors and events as objective and ‘real’. The legitimisation of the supporting evidence depends on the extent to which the latter adheres to the scientific method. In this sense, the dismissal of conflicting evidence is conducted according to adherence to the scientific method and to the standards the scientific community establishes for what can be considered a valid account of things. The final use of this type of knowledge comprises the cumulative body of scientific knowledge (Garvin, 2001).

Within the context of disaster in Mexico, the body of scientific knowledge of ‘natural’ hazards is meant to inform policies. In Mexico, the central research offices devoted to hazards (CENAPRED) and the federal public administration (SEGOB) embody this way of viewing and acting upon disaster and risk. For example, in Mexico at the federal level, on the one hand, the geophysical features of disaster are embodied by the conceptual basis of the SINAPROC and by the scientific characterisation of ‘natural’ hazards delineated by CENAPRED; on the other hand, the General Coordination of Civil Protection and the General Direction of Civil Protection (both of SEGOB) orient their actions toward emergency responses. Thus, these two groups of public institutions can be placed in the domain of international science and management and constitute, since the mid-1980s, the institutional backbone of civil protection and disaster prevention in Mexico. However, the constructionist epistemological position regarding scientific knowledge adopted in this thesis (proposed by Latour, 1987, advocated by Hilhorst, 2004) argues that scientific ‘rationality’ is not always the sole explanatory framework employed by scientists to approach ‘reality’. A number of other factors, such as social relations and the status of the institutions involved, may play a fundamental role in determining the truthful status of scientific knowledge.

Irwin (2001) and Garvin (2001) conceive of the scientific production of information and knowledge of risk as a social process shaped by the positions of various subjects. The authors advance the Sociology of Scientific Knowledge (SSK) as the discipline to be oriented toward explaining how scientific knowledge is generated and legitimated in social contexts. In particular, Irwin (2001) indicates the need of knowing how scientific accounts relate to the social circumstances of their development and how scientific claims come to be considered as valid statements on the natural world. Garvin (2001: 446) states that although scientific

knowledge construction is conducted according to an accepted set of methodological rules, “(...) these rules and any other criteria for judging the value of knowledge are themselves socially constructed and granted credibility through social processes such as accepted practice, group research, and peer review”.

2.2 Knowledge production in the domain of Disaster Governance

Bureaucrats, politicians, and implementers are placed in this domain. This is the domain of disaster response in which society’s priorities regarding risk and vulnerability are defined. In this domain, knowledge derives from the disaster science domain, but in actual decisions and practices, these acquire a different nature; it is mediated by political and bureaucratic governance practice and institutions. Politicians and civil servants weave their own narratives, selecting tidbits from science as they deem fit and according to their own beliefs. These narratives reflect political interest and motivations, but are also informed by the governance of risk, which is culturally shaped (Hilhorst, 2004). The nature-society divide is not as clearly established as it is in the scientific domain. ‘Natural’ hazards are commonly used as rhetorical tools to advance policy claims and to justify governmental actions. The evidence for driving action is generated in a complex set of discourses and arguments that reflect the value-laden nature of *facts* and *truth*.

“(…) Policy is a moral endeavour. By choosing to use, refuse or discard evidence along with the use of persuasion and argument, values are imbued at all levels of policy making. (...) policy making is a negotiated process taking place in an area or policy space that defines a set of relationships between individuals and institutions”.

(Garvin, 2001: 449)

In particular with respect to the type of knowledge and evidence, it can be said that policy is the realm in which knowledge is acquired, adapted, and applied within a highly political context. The decisions of policy makers are incremental and are arrived at on the basis of an implicit institutional context. Policy makers make short-term decisions, but fail to address the long-term implications of decision making. ‘Scientific facts’ are the justification for policy decision. The majority of policy issues are an interrelated set of problems defined by different groups or coalitions that adopt and adapt knowledge to satisfy personal, institutional, and structural imperatives. The legitimisation of supporting evidence depends

on political, social, and economic implications. The final use of this type of knowledge is applied to current situations and context only (Garvin, 2001).

2.3 Knowledge production in the domain of Local Knowledge and Coping Practices

Unlike the remaining two domains, the subjects who make up this domain –local operators of the water and sanitation system in Chalco Valley Municipality, fire-fighters, civil protection agents working at the municipal level, and vulnerable people– can be directly affected by disaster and supposedly represent the target of public policies. These considerations are of relevance because vulnerable people are those who make sense both of the disaster and of the policy measures aimed at preventing these. Local people’s interpretation of disaster risk takes place within a dynamic context of daily activities and survival strategies, but also within the political context where policies operate.

This is the domain of local disaster response and it comprises the ways in which local people cope with emergencies, maximizing their own capacities, resources, and social networks. In this domain, local knowledge can be utilitarian and also a resource of political-economic empowerment (Hilhorst, 2004). Hilhorst points to the high diversity of discourses on nature, vulnerability, and disaster that can be found in this domain.

“Local knowledge is shaped at the interfaces with other domains of knowledge such as scientific and bureaucratic knowledge. Local knowledge is made up of a blend of bits and pieces of information and insights from different perspectives. (...) Local knowledge is produced by experimenting and improvising”.

(Arce and Long, 1993, 2000) (Quoted in Hilhorst, 2004: 63)

Within the local knowledge domain, not all individuals are equally equipped to view situations in the same way due to their position; some are better positioned than others. For example, there are residents who can become part of the local bureaucracy and have access to information and control resources not possessed by other residents. In addition to scientific evaluations and accounts, local people obtain evidence from other sources such as oral stories, common sense, personal experience, and information disseminated by the mass media. People believe and trust to a greater degree in non-formal sources than in scientific ones. As mentioned by Wynne (1998), people’s reactions and responses depend on the trust

they have in institutions regardless of the understanding they have of the technical information.

The origin of evidence lies in popular sources. The legitimisation of supporting evidence depends on the wisdom received. In this respect, the dismissal of conflicting evidence is accomplished according to ‘common sense. The understanding of complex issues (such as issues concerning ‘natural’ disaster risk) is limited by sources and the resulting knowledge is tacit, experiential, and individual. The final use of this type of knowledge is added to body of personal experience. Vulnerable people legitimise risk evidence when it is connected to their social and cultural realities, which are in turn linked to ‘popular wisdom’ rooted in a social rationality. Conflicting evidence is dismissed on the grounds of common sense, and is accepted when it makes sense within people’s worldviews and their own beliefs (Garvin, 2001).

Local people’s discourses and narratives of risk and disaster differ from those of scientists and policy makers in that they are both concerned with nature and state-society relations. This is important because it shapes the people’s interpretations of events regardless of whether the events are thought to be true or false. Thus far, the three domains of disaster knowledge and action were characterised. However, to carry out analysis of disaster causality and policy responses, I will attempt to establish the linkages among disaster causality, the policy problem, and policy responses by focusing on the knowledge production process within the three domains of disaster. This can be effected by analysing the arguments and discourses of the policy-relevant subjects. Therefore, in the following section, I develop two frameworks that will be employed to undertake empirical analysis of the primary information drawn from the interviews.

3. Disaster causality as a policy problem and policy responses: two frameworks to analyse a discursive construction.

In this part, I develop two frameworks. The first framework is to explain the discursive construction of disaster causality as a policy problem based on the argumentative structure. In particular, the purpose of this framework is to aid in explaining how ‘images’ and representations of causal agents and their interactions and consequences are constructed within the social domains of disaster. This is implemented with the intention of examining

how knowledge claims and warrants of scientific and policy arguments are constructed and used to portray Chalco Valley flooding as a disaster. The second framework is to explain how different disaster discourses construct certain policy problems responses. In particular, it analyses the argumentative relationship between the policy intervention and the policy objective.

3.1 Disaster causality, risk definition, and the policy problem

In section 1.3, I proposed that understanding ‘natural’ disaster as social nature implies a process of knowledge claim making of disaster causality. Therefore, I assume here that ‘natural’ disaster become social problems– that is, collective accomplishments– through argumentation. This view concentrates on the processes by which issues are assembled, presented, and contested as problems. How problems come to be observed as real depend not on their supposed objective existence, but on the varying ways subjects construct these during social interaction and political struggle. Individuals and groups negotiate risk and disaster causality claims. According to Stone (1989), difficult conditions become problems when people come to regard them as amenable to human action. This statement can be applied to the analysis of ‘natural’ disaster causality claims and policy problem construction.

As reviewed in Chapter One, the social nature of disaster problem has shifted over time because disaster became an issue of policy relevance. Disaster causality shifting from nature to society is expected to be found among the three social domains of disaster to be researched in this thesis. To identify and analyse disaster causality, one can draw from the theories of causality developed in political science proposed by Stone (1989). The author provides a practical typology of causal theories based on a matrix resulting from relating actions (unguided and purposeful) with consequences (intended and unintended) (see Box 1):

Box 1
Types of Causal Theories

Actions	Consequences	
	Intended	Unintended
Unguided	Mechanical cause Intervening agent Machines 'Brainwashed' people	Accidental cause Nature Weather Earthquakes Machines that run amok
Guided	Intentional cause Assault Oppression Conspiracies that work Programs that work	Inadvertent cause Intervening conditions Unforeseen side effects Neglect Carelessness Omission

Source: Stone (1989: 285)

A cause is considered mechanical when action is unguided or guided indirectly and consequences are intended. Mechanical cause can be things that have no will of their own, but that are designed, programmed, or trained by humans to produce certain consequences. An accidental cause comprises an action that is unguided and consequences that are unintended. This is the realm of 'fate' and accident. There is no wilful intention behind the occurrences, at least not without invoking a purposeful God (Stone, 1989).

A cause is intentional if the action is purposeful and consequences are intended and the inadvertent cause is the result of an unintended action that provokes purposeful consequences. Additionally, under this classification it is acknowledged that causality also can be the result of a complex interaction of various interdependent actions with no clear distinctions of whether they are unguided or purposeful; this has serious implications when attributing blame or responsibility. In this case, the cause could be considered as complex. But, as stated by Stone (1989), complex causal explanations are not very useful in politics because they do not offer a single locus of control, nor a candidate to take responsibility for the problem. The use of this typology can aid in identifying the variety of causal stories,

knowledge claims, arguments, and therefore the discourses that may exist, the manner in which the latter are constructed within each of the disaster domains, and how these interact.

In any case, disaster problem definition incorporates blame attribution and responsibility and how evidence originates and is legitimised within the three domains of disaster. It may be expected that causal narratives or discourses are composed of a mixture of the causal factors. This is due in part by the way subjects within domains construct knowledge and evidence, as explained in the previous section, by choosing pieces of knowledge from other domains, and also by the communication they have with these other domains. For instance, Stone (1989) posits that political actors do not simply accept the causal models afforded by science or the popular culture; they compose the stories that describe the damage and difficulties, and attribute to these the actions of other individuals or organizations. Causal stories are important in the formulation and selection of alternative policy responses due to their rhetorical power.

On the other hand, analysis of disaster risk can be conducted with a sociological theory of social problems. Public policies are designed to address social problems, so in many ways parallels social problems. It is propose here that policy analysis of disaster risk can be conducted as a type of constructionist risk analysis. This can be carried out by examining the claim making process, the claims themselves, and the conceptual structure of the social definition of risk, as suggested by Hilgartner (1992, quoted in Hannigan, 1995).

Social definitions of risk include three major conceptual elements: an object deemed to pose the risk; a putative harm, and a linkage alleging some causal relationship between the object and the harm. Thus, analysis entails the explanation of the processes of what constitute the object of the primary source of risk, the definition of harm (that sparks a variety of claims and counterclaims), and the explanation of an alleged form of causation between the risk object and the potential harm. Constructing these linkages can be attributed to multiple objects through multiple layers of proof and evidence (Hannigan, 1995).

To this point, I have proposed how and why disaster causality can be approached as social problems using Stone's causality typology and the conceptual structure of disaster risk. Now I shift the elaboration of this chapter to the argumentation components of discourses that will be taken into consideration while carrying out the empirical analysis of interviews and secondary information in Chapters Six and Seven.

3.2 Discursive elements of disaster causality

Because I analyse in this research how policy makers, implementers, and other policy-relevant actors attempt to persuade the interviewer of the truthfulness of their accounts, I opted for the argumentation analysis. Fischer (2003: 181) states that "...argumentation is the form employed to persuade an audience that something ought to be the case: that is, a particular action should –or should not– take place, that an event should be interpreted in one way rather than another, and so on"; thus, "(...) it is the argument that constitutes the basic unit of the real world policy analysis".

For analytical purposes, there are two kinds of discursive elements in the analysis of 'Chalco Valley floods causality', namely, the argumentative and the rhetorical elements.

- I. The first group is the argumentative part of the discourse and includes the following:
 - 1) Claim content, which includes the knowledge claims, warrants, and evidence. Warrants may consist of reasons, guarantees, or rules employed to assert that evidence is legitimately utilised to support the inundations claim. To Liakopoulos (2005), evidence is the data at the disposal of the creator of the argument. Data might refer to past events or to a current situation, action, or opinion, but in any case they refer to information that is related to the main claim of the argument.
 - 2) Claim making context that refers to the institutional context from where the subject makes his/her claims along with his/her position within the institution.

- II. The second group refers to the rhetoric part of the argument and considers the following:
 - 1) Claim maker's *ethos* and *pathos*, which includes his/her values and beliefs. Leach (2005) states that *ethos* is concerned with the establishment of the credibility of the author or speaker. For instance, scientists have the '*ethos*' to make stronger claims than other authors. *Pathos* is another form of persuasive argument and is the appeal to the emotion of the speaker.

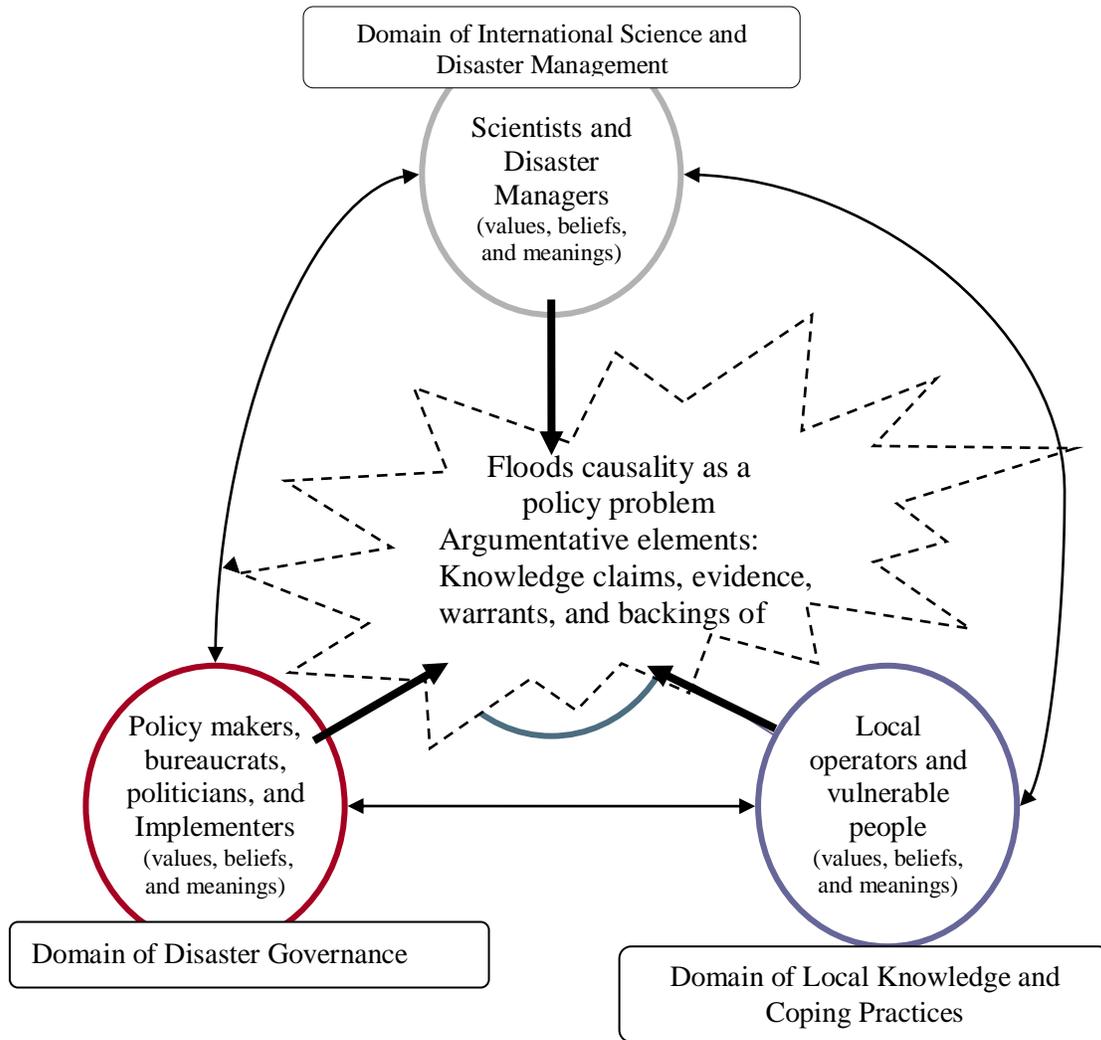
2) Images of natural and man-made hazards or risk objects, such as heavy rain falls and La Compañía Canal. These images serve as the ‘sites’ where blame for the floods can be placed. Images of causal objects are constructed in a simple way to make an argument understandable for all. Frequently, images of natural agents or risk objects serve as backings for the claims. To Liakopoulos (2005: 159), backing “...is a premise used as a means to support the warrant in the argument. It is the source that guarantees the acceptability and truthfulness of the reason or rule the warrant refers to. Similar in the style of the data, it usually offers explicit information”. In terms of image making, the difference between the ‘natural’ and the man-made hazard is very important because it implies the shift from the unintended to the intended action and therefore, the attribution of blame.

3) Images of causal agents such as policy makers, implementers, local operators. Images of the causal agents are the symbolic representation of the subjects who are in some manner blamed for the floods and are responsible for action taking (or non-action taking). Images of causal agents and the consequences can be found and examined in the backing and evidence that refer to past events or to the current situation or action related to the main claim of the Chalco Valley floods argument.

4) Images of Chalco Valley’s people or intended ‘target’ populations. In both cases, these images refer to the characteristics and stereotypes of particular groups of people who are said to be the beneficiaries of civil protection policies. These images are also used as backing of the disaster causality claims and of policy responses arguments, because affected people are constructed both as the culprits and the victims of their own actions.

The framework for analysing the discursive construction of ‘Chalco Valley Floods Causality as a Policy Problem’ is represented graphically in Figure 1 and is employed in Chapter Six.

Figure 1. Framework for analysing the discursive construction of ‘Floods Causality as a Policy Problem’ in the social domains of disaster.



3.3 Policy responses of floods discourses: from objectives to implementation

In this part, I develop a framework to explain the argumentative construction of a public remedy, known in the research as ‘policy responses’, with regard to the Chalco Valley floods. I considered four policy-analytic elements: 1) policy objectives; 2) type of intervention; 3) policy instrument, and 4) implementation. These elements are shaped by the problem constructions explained in part 3.2 of this chapter. From the outset, I assume that the policy objective (the principles guiding the ‘best’ course of action) is closely related to the main claim that constructs the problem. For instance, if the ignorance of the residents and migrants of Chalco Valley is believed to be the main factor that conditioned the floods, then the main policy objective is oriented toward making ‘ignorant’ people aware of the risks and to ‘educate’ them in order to change their behaviour and to avoid their being stricken by inundations or heavy storms. In the same vein, the type of intervention relies on the belief or evidence of *how* to address the main claim, in other words, *how* to achieve the policy objective. For example, according to this objective, the ‘ideal’ intervention favoured by some CENAPRED and CNA policy makers is top-down risk communication, which ideally requires coupling with adequate regulatory control of land use to avoid the settling of people in unsafe places.

I take here John’s definitions of policy instrument and implementation (2002: 204, 5), according to whom this is a tool governments use to implement public decisions, and for whom implementation refers to the stage in the policy process concerned with turning policy intentions into actions. For instance, a policy instrument can be a programme that specifies the scope of public participation in emergency actions, and the changes that result from these actions refer to the implementation stage, *i.e.*, the evacuation of affected people from flooded streets.

I argue that floods causality discourses and the consequent problem constructions determine how specific policy responses are believed to be valid and adequate for solving inundations problems. In particular, I also argue that ‘adequate’ policy responses to prevent disaster should set up objectives and actions meant to address the people’s vulnerability to floods, and not only the natural hazards or the damage provoked in populations and infrastructure by the disaster impact. Therefore, this framework serves to analyse later in Chapter Seven how different disaster causality discourses and floods problem constructions implied and shaped different groups of policy responses, which may show inter-relations.

The issue of inter-relations is extremely important because as it helps to understand the emerging ‘advocacy coalitions’ (Sabatier (1993) across the four discourses that may reinforce complementary policy responses.

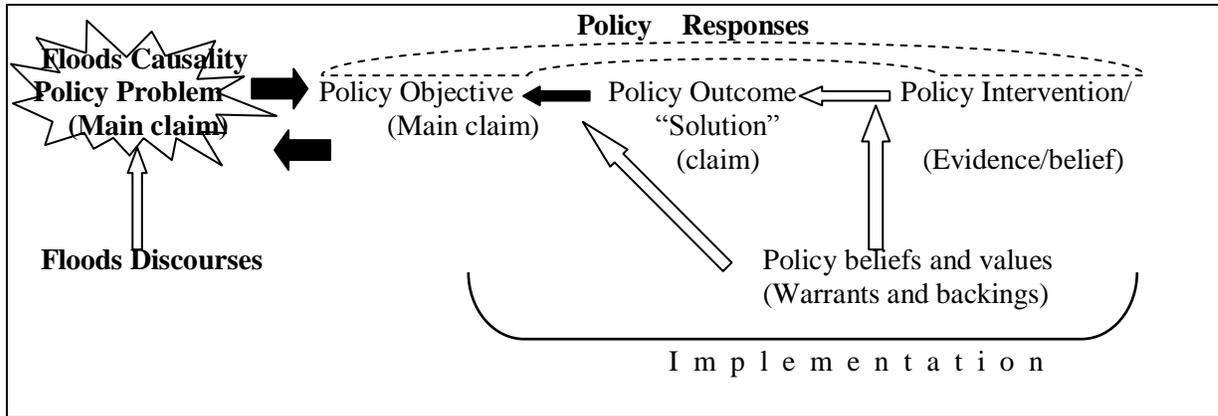
Policy solutions may vary depending on how casual agents are portrayed in relation to the floods causes. In some cases, the policy response is meant to be a technical task oriented to forecast and control heavy rainfalls, whereas in others it is an institutional communication activity to evacuate people from flood-prone places or to improve building codes and law enforcement, in order to withstand the impact of earthquakes and hurricanes, to mention a few. For analytical purposes, I adapted the causal theory framework (Stone, 1989), explained in previous section 2.3.1, to examine the policy responses, and in particular, the intended relation between objective and intervention. To do this, I purposely select the intentional cause type because disaster prevention implementation is ‘believed’ to be the outcome of human will.

It is noteworthy that an intentional cause is when action is wilfully taken to bring about desired positive consequences. Therefore in this case, consequences parallel outcomes that could be the ‘accepted’ proof that objectives are achieved, while causes parallel the needed intervention. This is what in terms of Hambrick’s model (quoted in Gasper, 2000) is known as the normative inputs of the argument: turning cause-and-effect into means-and-end. The argumentative analysis of the ‘policy intervention-policy objective’ relation is aimed at responding to the following questions:

- What is/are the right course(s) of action for each problem construction?
- What justifies the specific objective? What are the proposed interventions?
- How do beliefs and warrants support and legitimise the intervention to achieve the desired policy objective?

It is important to note that I do not intend to prove a ‘factual relation’ of the impact of a policy, but only to explain the previously mentioned argumentative relation, which might be connected with the rhetorical construction of the problem already elaborated in section 3.2 of this chapter. The framework for analysing the argumentative relation between policy interventions and policy objectives is represented in Figure 2 and is employed in Chapter Seven to conduct interpretive analysis:

Figure 2. Framework of an argumentative relation of policy responses: Policy Intervention--Policy Objective



With regard to the interpretive analysis, I refer to the examination of policy objectives and outcomes, instruments, and implementation and in particular, to the examination of meanings (values and beliefs) and metaphors embedded in and reproduced by the concrete policy arguments found in interviews, texts, and rhetorical tools, such as civil protection plans and programmes. Risk Atlas was created to convert policy intentions into actions. It is assumed that ‘ideal’ policy intervention is the ‘correct’ way to target objectives and populations and also, to convey shared meanings of events in order to promote change. For example, information campaigns coupled with adequate regulation of land use to limit exposure to risk are the instruments ‘selected’ by some CNA policy makers as the ‘correct’ tools to promote change in the behaviour of the people of the Chalco Valley. It is important to underline that these analytical frameworks focus on city, national and state level administrative actors because they are key informants and represent the most relevant policy actors in creating arguments and implementing responses.. Finally it is necessary to mention that I do not pretend to provide theory (institutional or organisation theory) to help explain the reproduction of discourses or their competitive interaction. This is beyond the scope of this thesis.

CHAPTER THREE. METHODOLOGY

Introduction

This chapter presents the methodology and includes the approach, central and research questions, methods and the justification of the case study. It also describes the study populations, and selection of interviewees, the policy institutions according to the social domains of risk and disaster, the time scale, the research sites, and the limitations of the study. Because this research is concerned with the understanding of the social construction of ‘natural’ disaster causality and policy responses in Mexico, the purpose of the fieldwork was to obtain primary and secondary information of the policy system regarding ‘natural’ disaster prevention and civil protection in Mexico, in particular with regard to the Chalco Valley inundations and affected people’ interpretations. The fieldwork took place in two stages: the exploratory fieldwork –between November and December 2001– which aided me in designing the methodology for the final fieldwork. The final fieldwork was carried out from January to May 2003 –seven months in total. The final fieldwork methodology comprised 36 interviews applied to policy-relevant actors and to 23 affected residents of El Triunfo, San Isidro, Avándaro, and Unión de Guadalupe.

1. The Approach

This thesis adopts the social constructionist approach (Gergen and Gergen, 1991; Schwandt, 1994; Hannigan, 1995; Denzin, 2000) that is concerned with the world of inter-subjectively shared, collective social constructions of meaning and knowledge that are determined by political, social, and cultural processes. According to this approach, ‘reality’ is created by social interaction that involves history, language, and action. Schwandt (1994: 125) states that reality is expressible in a variety of symbols and language systems and is stretched and shaped to fit purposeful acts of intentional human agents. (Thus), theory construction and knowing possesses an instrumental and a practical function. To Fuss (1989), “...what is at stake for the constructionist are systems of representations, social and material practices, laws of discourses, and ideological effects. In short, constructionists are concerned above all with the *production* and *organization* of differences, and they therefore reject the idea that

any essential or natural givens precede the process of social determination” (quoted in Schwandt, 1994: 125).

In Chapter Two, I discussed in particular the nature and scope of the social constructionism approach and its analytical applications to this thesis. The analysis is focused on the subjects’ interpretations and discourses of ‘natural’ disaster causality and policy responses. More specifically, the units of analysis are the knowledge claims that construct the object of ‘natural disaster causality’, the ‘policy problem’, and the ‘policy responses’. Therefore, the methodological implications of this approach to the thesis are the following:

1. Because the research intends to explain the processes of construction of ‘natural disaster causality’, then *how* and *why* research questions are adequate for obtaining information. To respond to the questions, a qualitative methodology for obtaining primary information was employed.
2. The responses provide rich and detailed information of the interviewee’s position on the topic at hand and how the subject regards it. For these reasons, the tool selected is the semi-structured interview.
3. No ‘objectivity’ is pursued; thus, the qualitative methodology adopted is not meant to prove ‘objective’ knowledge concerning the ‘objects’ and ‘processes’, but rather is intended to explore the ways in which the subjects construct these objects through discourses, arguments, and meanings.
4. Qualitative analysis allows the researcher to establish and understand the relations among the subjects, the objects, the context, the system of meanings, and the system of statements that this thesis researches. According to Denzin (2000: 8), qualitative researchers “... seek answers to questions that stress *how* experience is created and given meaning”.
5. Because language is crucial for understanding the representations and social constructions of ‘natural’ disaster within policies, arguments and discourses are the analytical units of this research. Therefore, argumentation and discourse analysis is chosen as the best way to analyse the information.
6. Because ‘disaster causality is the central ‘process’ to be analysed, exploring all arguments that the subjects expressed give rich material to ‘arrive’ at the discursive level.

2. The Research Questions

2.1 Central Questions

1. How and why are certain processes of environmental change framed as ‘natural’ disaster in the decision-making sphere?
2. How do these framings shape and condition the emergence and nature of responses at the policy level?
3. How are people vulnerable to floods framed both in disaster discourses and policy responses?

2.2 Secondary Questions

1. How is ‘disaster causality’ framed by policy-relevant subjects?
2. What are the main causal discourses of the Chalco Valley floods? How are these constructed?
3. How are ‘images’ of causal agents and their interactions constructed to depict Chalco Valley’s floods as a policy problem?
4. What are the main rhetorical elements of the Chalco Valley’s floods problem? How do these operate in depicting ‘reality’?
5. How do disaster causality policy problems shape policy responses?
6. What are the policy elements of the Chalco Valley’s floods problem?
7. How do these operate in constructing the ‘desired’ policy responses?
8. How do meanings, beliefs, and warrants support and legitimise interventions to achieve the ‘desired’ policy objectives and outcomes?
9. How do policies portray those who are most at risk?

All nine questions are framed within the two analytical frameworks developed in Chapter Two. Questions one to five address the issue of the ‘floods causality policy problem’, which is at the core of framework No. 1 (“Framework for analysing the discursive construction of ‘Floods Causality as a Policy Problem’ in the social domains of disaster” (see Figure 1, section 2.3.2) With regard to question number one (‘disaster causality’ framing), I seek to explore the process by which policy-relevant subjects relate actions to consequences, in other words, how ‘causality’ is constructed. Question two maps the main ‘causality discourses’ and explores, with the aid of empirical information, the manner in which this was carried out for the case of the Chalco Valley floods. The third question aims at explaining how claims of ‘natural’ disaster causality construct disaster as a policy problem. This is important because answers to this question provide explanations on how claims evidence, in a certain way, determine causality shifting from nature to society and in this sense, the possibility of human intervention.

As explained by analytical Framework 1, policy arguments are frequently replete with metaphors and other symbolic images to convince the audience and to make arguments compelling and understandable for all. Therefore, question four explores the weighty influence of the rhetorical elements in the argumentation. Question five links ‘natural’ disaster causality to policy responses. This linkage lies at the centre of the hypothesis, because it is argued that policy objective and intervention are closely related to the main claim that constructs the policy problem. As stated in Framework 2 - section 2.3.3 (Argumentative relation of policy responses) - policy responses are shaped by problem constructions. In this regard, questions six to nine explore in detail the argumentative construction of policy responses, which is conceptually explained in Framework 2 as ‘policy implementation’.

By answering question six, I am able to explore the diversity of policy objectives (main claim), policy outcomes (‘solution’), and policy interventions (evidence) found in the interviewees’ arguments. It is important to examine how the policy elements operate according to the problem construction in order to identify similarities and differences among all interviewees. Question eight is at the core of the argumentation analysis of policy responses because it unpacks the process by which policy intervention is legitimised depending on the types of evidence employed (beliefs and meanings). Finally, on answering question nine, I can explore whether some policy responses, previously unpacked, take into

consideration people's vulnerability to floods. This addresses the last part of the hypothesis and may provide explanations for how policy responses claims prevail in Mexico's civil protection and disaster prevention systems.

3. Methods

3.1 Secondary Information

As the majority of the secondary information collection and review preceded the collection of primary information, the following is a brief discussion on how the secondary information was utilised to support the final fieldwork. Prior to initiating this research, I had little knowledge and information regarding the disaster policy system in Mexico. I was only aware that there was a governmental body that is in charge of tackling disaster, assisting victims, and co-ordinating the activities of other ministries in case of emergency, namely, the General Coordination of Civil Protection of SEGOB. I also knew that there was a scientific research centre responsible for providing information for policy making, the CENAPRED. In addition, the information I had concerning Chalco's inundations, the context, and the socio-demographic composition of communities was scarce and fragmented.

In order to draw a more detailed picture of the case study and to complete the analytical framework, secondary information and relevant literature on theoretical issues on disaster, risk, and policy were sought and analysed. Documents and newspaper clippings were also obtained to complete the elaboration of the contextual Chapter Four on the case study of Chalco Valley floods and of Chapter Five, which is concerned with the disaster policy context in Mexico. Analysis of content was performed to identify the main issues that arose as a result of the inundations, such as socio-environmental change and urbanisation in the Chalco Valley region, the Chalco Valley floods of 2000, and the socio-economic consequences that affected people's interpretations of the floods and the claim making process, emergency aid actions and responses, and civil protection programmes at the federal and State of Mexico levels, among others. The search for and collection of secondary information was conducted through exploring official and non-official resources.

Official sources included publications and policy documents of the Institute of Geography and Information Systems (INEGI), the National Centre for Disaster Prevention

(CENAPRED), the National Institute of Ecology (INE), the State of Mexico's Ministry of the Environment, the General Direction of Civil Protection of the State of Mexico, the Federal Ministry of Environment and Natural Resources (SEMARNAT), the General Coordination of Civil Protection of SEGOB, and the General Direction of Civil Protection of SEGOB.

In order to understand the structure and functioning of the Civil Protection Policy System in Mexico and to explore the natural disaster policy process, a number of policy documents were reviewed. These included policy reports on assessments of the socio-economic impact of disaster in Mexico between 1980 and 1999 (CENAPRED and SEGOB, 2001; CENAPRED, SEGOB, and CEPAL, 2000; Bitrán, 1999; CENAPRED, 1999; Gelman, 1996), Programmes of Civil Protection of the State of Mexico (Gobierno del Estado de Mexico, 2002, 2001), and the National Programme of Civil Protection (SEGOB; 2001 a, 2001 b). On arriving at the analysis of the literature obtained, I would have a general idea of the relationship between knowledge and policy making, especially in relation to the manner in which the disaster scientific body (CENAPRED) informs public policies at national and state levels.

Regarding understanding of La Compañía Canal (LCC) problematic, several documents (CENAPRED, 1994; CNA, 2001 a, 2001 b) were consulted because there was a need to obtain a detailed view of the failures and malfunctioning of LCC and the institutional responses that were deployed during and after the floods. In relation to the Chalco Valley floods of 2000, newspapers were obtained to re-construct the main moments of socio-environmental change in Chalco Valley, in particular during the floods of June 2000, the key actors, and their main arguments in framing the phenomenon. The press office of Regional Administration of Valley of Mexico (GRAVAMEX) that belongs to the National Water Commission (CNA) kindly provided me with newspaper clippings.

3.2 Primary Information

Because this research is concerned with the understandings, discourses, and interpretations policy makers have within specific contexts with respect to 'natural' disaster causality and policy responses, I employed a qualitative methodology. Qualitative methodology allowed me to gain information on the interviewee's world and the meanings of and beliefs on certain social problems to which the interviewee is attached.

The method employed was the interview. By interviewing people, one is able to explore differences, inconsistencies, meanings, and arguments. To Stroh (2000), interviews provide answers to ‘how’ and ‘why’ questions. Interviews aim at being conversations that explore an issue with participants, rather than to test knowledge or simply categorize. As presented previously, the central questions of this research concern understanding *how* and *why* certain type of ‘disaster causality’ are framed as ‘natural’ phenomena, and how ways of framing exert particular influences on policy responses to the extent that exposure of vulnerable people to floods risk is concealed, that is, specific institutional responses that are not socially sensitive. This explains the selection of this method.

It is noteworthy that selection of this method was determined to a certain extent while I was engaged in the preliminary fieldwork. During this fieldwork, I applied a few semi-structured interviews to policy makers and government officials by using an open-ended questionnaire. Testing involved formulating and wording the questions, examining the inclusion of the relevant issues in question such as ‘natural’ disaster and risk conceptualisations, existing policies, the emergency measures provided, to mention a few of these. Testing also entailed discarding questions that at the end of the research were found to be unimportant. Also during the preliminary fieldwork and with regard to local people, unstructured interviews were undertaken because the objective was to develop an informal talk with local people that could shed some light on their personal interpretations of the floods of June 2000 and of the government’s responses. This piloting exercise proved useful for developing the semi-structured interviews that were applied during the final fieldwork.

Because the interviewees were policy-relevant actors, such as scientists, policy makers, and civil servants, I chose in particular the ‘semi-structured’ interview. Esterberg (2002) states that the goal of the semi-structured interview is to explore a topic in detail and in a more open fashion than the structured interview, and to allow interviewees to express their opinions and ideas in their own words, from their own points of view. According to Russell (2000: 210, 211), semi-structured interviews are based on the use of an interview guide. This is a written list of questions and topics that need to be covered in a particular order. Semi-structured interviews works very well in projects in which one are dealing with managers, bureaucrats, and elite members of a community, people who are accustomed to using their time efficiently. It demonstrates that one is in full control of what one desires to obtain from an interview, but at the same time this interview type leaves both interviewer and

informant to follow new leads. It demonstrates that the interviewer is prepared and competent, but that he/she is not attempting to exert excessive control over the informant.

Semi-structured interviews evidenced certain particular limitations for this type of research, which is aimed at delving into the social meanings of events that comprise a beginning, middle, and an end, such as 'floods causality'. More unstructured talks afford richer information in terms of storylines or narratives that, as in this case, could have arisen had a narrative interview been conducted. To a certain extent, this shortcoming was resolved, because sections of the questionnaire were related specifically to narration of floods causal factors, agents, and scenarios. An in-depth analysis of questionnaire responses, such as the argumentation analysis that I undertook, permitted me to arrive at the 'core' of the meanings and beliefs.

Another limitation can be related to the control exerted by the interviewer over the interviewee. When attempting to lead the conversation, some important aspects from the interviewee's point of view may have not been expressed, due to the fact that some policy makers may have been observed as, in some way, responsible for the inundations. Thus, it was expected that some information would not emerge. This shortcoming was overcome by attempting to open the discussion toward apparently 'less important' issues that might not have been related to the inundations. Once this was accomplished, additional information was set forth and, in a way, filled the gap.

In this thesis, the general purpose of the interviews was to investigate the discursive dimension of 'natural' disaster, risk, and policies. Gathering secondary information of plans and programmes on disaster and civil protection issues, water management and sanitation, and urbanisation and land use was central to cover the first and second parts of the hypothesis. Obtaining additional information on the Chalco Valley region and its ecological and socio-historical transformation was required as well, as explained previously.

Interviewees selected at the policy level possess very good quality information due to their involvement with the problem; thus, they are seen as key informants. Therefore, the interviews were not designed for the general public, but rather for a group linked directly to the topic. These interviews provided primary information to develop an in-depth analysis employing argumentative and discourse analysis. This was intended to cover all the different policy makers, implementers, operators, and other policy-relevant actors who are directly related to the topic, and specifically to the type of disaster relevant to this study, i.e., water

management officials who deal with inundations. The selection was also made on the basis of reflecting the balance in the construction and reproduction of the discourses. In this way, an ex-policymaker who was involved in the past in coordinating civil protection actions at federal level was interviewed as well.

For this purpose, the interviewees were from the sectors of disaster prevention, civil protection, environment and natural resources, water issues, and urban planning, as well as NGOs. The research participants were not meant to be a representative, typical sample, but were those who could provide rich and detailed accounts about the issue. Thus, they were selected on the basis of their relevance to the topic. Within the policy system, these are the individuals who make policies, design programmes, and coordinate responses with regard to inundations prevention and mitigation, water provision and sanitation, and attention to emergencies.

Therefore, this permitted me to explore a number of subjects' position regarding the causality of the Chalco Valley floods within the policy system and according to the meanings that the interviewees attached to it. Thirty six semi-structured interviews were conducted. A few informants, such as the Army colonel responsible for Plan DN-III, the Undersecretary of Urban Development of Mexico, and the Minister of Ecology of the State of Mexico, refused to be interviewed. A list of all interviewees is presented in Appendix III.

At the local level, twenty three semi-structured interviews were applied to people who live in the most affected *colonias* and who were most affected by the Chalco Valley wastewater floods: *Avándaro; San Isidro; El Triunfo, and Unión de Guadalupe*. Characterisation of the affected people who were interviewed is provided in Chapter Four. First contacts were established in Unión de Guadalupe, and this was made possible thanks to the help of a Catholic priest who lives and works in a parish located in the neighbouring *colonia* La Providencia. A snowballing technique allowed me to contact and interview people in the remaining three *colonias*: Avándaro; San Isidro, and El Triunfo. Interpretations and experiences of floods causality and floods risk expressed by affected people were gathered using purposive sampling. As shown by Hiernaux (2000) Hiernaux et al (2000) and informed by the preliminary fieldwork that I conducted in December 2001, Chalco Valley has been evolving from an homogeneous community to more heterogeneous communities that vary in terms of income, ethnic origin, gender, and age. See Chapter Four to gain an appreciation of this fact.

Because two different target populations were selected, two different semi-structured questionnaires were designed and applied; one questionnaire type was addressed to scientists, policy makers, implementers, operators, and other policy-relevant subjects, while the second was designed for and applied to people affected by the Chalco Valley floods of June 2000. The questionnaire applied to policy makers was intended to reflect the political and instrumental nature of knowledge that characterises the policy process. It covered the following aspects: a) policy makers' and implementers' conceptualisations of natural disaster, disaster risk, and vulnerability; b) policy formulation and implementation; c) evaluation of natural disaster policies, and d) policy makers' interpretations of the Chalco Valley floods and of the people affected. These aspects are linked to the analytical frameworks as follows:

Aspect a) of the questionnaire addressed the issue of 'Floods causality as a policy problem' by exploring the argumentative elements of discourses including images of causal agents and risk objects. Aspects b), c), and d) addressed the issue of 'policy implementation' by exploring the argumentative elements of policy objective, outcome, and intervention. The questionnaire applied to affected people reflects the tacit and experiential knowledge of risk and natural disaster that is embedded in people's daily-life interactions. It included the following aspects: a) Affected people's interpretations of the floods; b) the impact of the disaster on the household and at the *colonia* level; c) affected people's evaluation of governmental responses deployed prior to and after the floods; d) the claim making process of the affected people, and e) the coping strategies of the people affected. Aspect a) was considered for the issue of 'policy implementation', and aspects b), c), and d) provided very valuable information for re-constructing the case study as a whole. (See complete versions of the questionnaires in Appendix II.)

All interviews were tape-recorded. Recorded interviews possess advantages over note-taking. As documented by Lezama (2000) and according to Heritage (1984) quoted in Silverman (1994), the use of recorded information facilitates data collection and makes possible a repeated and detailed examination of what was said within the context of which it was said. Transcripts allow other researchers to possess direct access to the sources of what is being claimed to serve as an appropriate analysis of a particular problem. This renders the analysis, as Heritage (1984) affirms, subject to public scrutiny, and minimises biases in

interpretation of the data. Then, transcriptions were coded using IN VIVO qualitative analysis software to facilitate management and analysis of the information.

4. The Justification of the Case Study

Analysis of open-ended interviews, policy reports, and documents related to the Chalco Valley floods and the civil protection responses, which that was carried out during the preliminary fieldwork, were of great value because they provided me with insights concerning justification of the case study. Civil Protection and the disaster prevention policy system in Mexico and in the Chalco Valley *colonias* affected by the June 2000 floods were chosen as a suitable case study for proving the hypothesis for the following reasons:

1. In Mexico, the majority of policies and programmes conceptualise and frame disaster as 'natural' events that are void of social content. This fact has had an impact on institutional responses, *i.e.*, remedial responses, engineering works to control hazards, to mention only a few.
2. Scientific and technical information on natural hazards is dominant, and information feeds policy making to the extent that structural causes, dynamic pressures and unsafe conditions that render poor people vulnerable to risks are not considered as a disaster policy issue.
3. The Chalco Valley floods are a good example to demonstrate that disaster issues at the policy level are socially constructed and in which discursive and political elements play a key role. Local people addressed claims to authorities regarding the physical conditions of LCC canal; authorities advanced their views, labelled the disaster as 'natural', and blamed inhabitants for having relocated in the zone and for not being risk-avoiders.
4. 'Naturalising' disaster is a way of excluding other possible perspectives and interpretations that could take the social and political dimensions into consideration.
5. Although the Chalco Valley floods could be considered as a 'low-impact' event compared to the great disaster that have provoked thousand of human and material losses, this case illustrates that which is expected to occur most frequently in Mexico due to urbanisation trends in the peri-urban interface of Mexican cities, where floods vulnerability increases.

6. Some research had been conducted in the region prior to my preliminary fieldwork. The majority comprised anthropological and cultural studies on ethnicity and social identity (Comboni, 2000; Ramírez, 2000; Aguilar, 2000; Hiernaux, 1991, 2000) Hiernaux et al (2000), urbanisation and households demographic composition (Lindón, 1999), urban sociology (Lindón,2000), history (Tortolero, 2000; Huerta, 2000), and town planning (Banzo, 2000). Nevertheless, no research on disaster (from the social constructionism approach) had been conducted either at the policy or at the community level. Social and political processes appear to be relevant if one desires to understand why disaster prevention policies have been as they have to date. This research aimed at producing knowledge in this respect.

This case study has both an instrumental and an intrinsic value. It can be an instrumental case¹⁶ study because it can provide insights into the discursive construction of ‘natural’ disaster causality within policies. But it also has an intrinsic value, because I seek a better understanding of floods vulnerability within the context of late urbanisation in the eastern periphery of Mexico City and of the way Mexican policies address these questions.

5. Study Populations and the Selection of Interviewees

At the policy level

Chapter Four describes the policy system that deals with civil protection and ‘natural’ disaster prevention issues. It provides an institutional map that identifies SINAPROC institutions, their functions and linkages, and the selection of the public sectors relevant for this research and the equivalent interviewees. The justification of why these policy sectors and individuals were selected follows here.

I. Civil protection and disaster prevention sector

Civil protection officials are responsible for dealing with disaster prevention, mitigation, emergency aid, and restoration. By law, they are entitled to design and implement

¹⁶ To Stake (1995), quoted in Creswell (1998), an instrumental case study focuses on a specific issue rather than on the case itself, which becomes a vehicle for better understanding of the issue. An intrinsic case study focuses on the case because the latter holds intrinsic or unusual interest.

programmes and projects, coordinate emergency responses, and promote the articulation of public institutions. Within the policy system, they are considered as the central actors for promoting the so-called 'culture' of disaster prevention. The three levels of the government were included, and three different kinds of groups within these three levels were identified. Public officials who make policies and are involved in the politics either at the federal or the state level constituted the first group. Operators who are responsible for emergency responses in case of disaster comprised the second group. They work at the state and municipal levels. And finally, the CENAPRED and UNAM scientists made up the third group. These people produce and communicate knowledge that is meant to be for the use of policy makers and operators. CENAPRED and UNAM scientists (civil and geophysical engineers and hydro-meteorological specialists) were chosen because of the influence they may exert both in the Civil Protection sector and in other public sectors as the producers of *the* knowledge needed to prevent disaster.

II. Environment

The second sector includes the environment sector. This sector deals with, among other scenarios, problems related to natural resources and the ecological conservation and processes of natural origin whose consequences may exert environmental impacts on the society, such as forest fires. Thus, the purpose here is to examine the role that this sector has played in the policy process, particularly with regard to its relationship with the Civil Protection sector in terms of disaster conceptualisations and institutional responses. Federal public officials were interviewed due to their influence on policy making and environmental politics. At the State level, officials involved in ecological problems that occur in the Metropolitan area of Mexico City where Chalco Valley is located were also chosen. An equivalent relationship to that of the federal level was pursued.

III. Water issues and sanitation

For obvious reasons, the water sector is included because it has to do with sanitation, sewage systems, hydraulic infrastructure provision and protection, and inundations attention and emergency actions. As mentioned throughout this document, the inundations were caused by

the rupture of a sewage canal managed by the CNA in coordination with the CAEM. Information given by policy makers on the floods was crucial in order to examine their interpretations, evaluations of the event, and therefore the type of responses they provided as the best course of action. In terms of policy making, it was relevant to understand how these individuals related problems of water management to disaster risk, disaster, and land use planning.

IV. Urban development and planning

This sector was included to understand to what extent urban planners' conceptualisations and framings of natural disaster and disaster risk are linked to urbanisation, ecological deterioration, and land use planning. It is necessary to examine, on the one hand, the relationship between urbanisation roots causes and the increase in people's vulnerability to disaster risk, and on the other, the policy makers' conceptualisations of natural disaster and the responses deployed before and after the floods.

V. The Mexican Oil Agency (PEMEX)

PEMEX was selected because its workers usually assist the civil protection system in case of disaster and emergencies by providing equipment and specialised personnel either to rescue people or to repair the damaged infrastructure. In addition, PEMEX has embarked on public programmes aimed at improving the protection of people in face of the risk posed by the dangerous activities and facilities associated with PEMEX.

VI. Non-governmental organisations

Very frequently, NGOs assist affected people in a number of ways. They participate once the disaster has taken place. In this case study, Caritas México sent personnel and equipment to the affected *colonias*. Thus, the Caritas México coordinator was interviewed. With regard to other NGOs, no other references and contacts were found, although it is assumed that other NGOs might have participated in assistance and emergency tasks.

VII. Others

The Director of Cultural Affairs of Chalco Valley is also a key informant. He participated in the coordination of foreign aid in the aftermath of the floods. He channelled domestic aid and linked local people and affected people to national and international media. Therefore, his interpretations were relevant. The Civil Protection expert of the National Autonomous University of Mexico (UNAM) was one of the most important scientists and had formulated the conceptual and methodological bases for the establishment of the Civil Protection System in 1986. His accounts are crucial to understanding the origin and evolution of the system.

At the community level

Following the justification of the case study presented previously, the people affected by the floods are the target population at the community level. The goals of interviewing floods-affected people were the following: 1) to prove that vulnerable people are not constructed as target populations of civil protection and disaster prevention policy; 2) to prove that the specific vulnerability of those affected was not factored into the design and implementation of policy responses, and 3) to demonstrate that the construction of ‘disaster causality’ is a social process in which the claims of both policy makers and the affected people interact through discourses and arguments in seeking truthful accounts of the floods. A purposive sample was also employed. According to Denzin and Lincoln (2000), with this sampling strategy the researcher seeks out groups to whom the processes being studied are most likely to occur. Therefore, the interviewees chosen were required to be vulnerable people exposed to floods risk.

The preliminary fieldwork had previously indicated that the Avándaro, El Triunfo, and San Isidro *colonias* were those that would be flooded. Subsequent visits during the final fieldwork showed that Unión de Guadalupe was inundated as well. Approaching potential interviewees was not an easy task even though previous contacts were made. After several attempts, the previously mentioned Catholic priest accepted to help and introduced me to the first affected person, who happened to live in the *colonia* Union de Guadalupe (that belongs to the municipality of Chalco) and to a resident of the *colonia* El Triunfo. Thereafter, to approach additional individuals, I employed a snowballing technique, as previously explained. The first interviewee introduced me to her neighbours, who in turn indicated to me

those who would be possibly willing to be interviewed, etc. In the end, affected people from all *colonias*, except for El Molino, were contacted. Despite the fact that several attempts were made to approach people in El Molino, no success was achieved. Thus, bearing this in mind but not pursuing any type of representativeness, the following considerations were also taken into account on selecting interviewees for the final fieldwork:

- I. Vulnerable people currently living under the unsafe conditions of the *colonias* affected by the floods in the Chalco Valley and Chalco municipalities. The variables considered to characterise Chalco Valley residents as vulnerable are discussed in Chapter Four, section 4.3.2, and comprise the following: a) Physical environment: Unsafe housing, risk-prone location, and erosion or damage of housing materials; b) Fragile economy: Capital, assets, and savings lost or damaged jeopardising livelihoods, and job losses or unsalaried people, and c) Policy responses: Unequal distribution of emergency aid and goods according to damage, increase of insecurity and social protection mechanisms, inadequate warning and claim making of affected people.

- II. Diversity of interpretations of the floods in the affected households. When possible, at least two people per household were interviewed, including elderly people; 15 households were visited. It is argued that interpretations of ‘floods causality’ and floods impact within the same *colonia* and among households of different *colonias* may vary according to age, ethnicity, and gender. Moreover, interpretations of floods risk and floods also may depend on the experience of the people with floods. People’s experience of floods may be influenced by house location and floods risk proneness, the damage inflicted, and the type of emergency aid and government response received. Not all affected residents received the same provisions and attention from the Federal and State governments. For a detailed explanation of the ‘unsafe conditions’ that characterise the vulnerability of interviewees and their coping capacities for all four *colonias*, see Chapter Four, section 3.2.

6. Grouping of Science and Policy Institutions according to the Three Social Domains of Response to Risk and Disaster in Mexico

The following grouping of policy institutions was achieved after the final fieldwork was conducted and after having begun an in-depth analysis of interviewees' claims of floods causality and risk. Thus, grouping of policy institutions was carried out taking into consideration the concept of social domain applied to risk and disaster knowledge and responses (Hilhorst, 2004) as reviewed in Chapter Two. In Chapter Two, I mentioned that knowledge claim of disaster causality depends on the subject's values and beliefs, which are conditioned to a degree by the subject's position within an institution. At the same time, institutional discourses shape the way subjects talk about things by determining the language and the relevant issues used to frame the 'object' or 'process'. Thus, by performing argumentative analysis of the interviews, I intended to examine empirically similarities and differences among interviewees' claims. In other words, I wanted to know whether knowledge claims of 'disaster causality' and evidence may constitute the core argumentative elements of a specific discourse that may, at the same time, characterise a particular social domain of disaster in Mexico.

6.1 Domain of Disaster Science and Management

This domain includes scientists and disaster managers. The following interviewees were included in this domain:

Civil Protection and Disaster Prevention Sector

- General Director of CENAPRED
- Research Director of the CENAPRED
- Researcher on socio-economic issues of CENAPRED
- Director of Capacity Building and Training of CENAPRED
- Director of Information and Communication of CENAPRED
- Civil Protection expert of UNAM

6.2 Domain of Disaster Governance

This domain includes bureaucrats and politicians of various sectors, such as Civil Protection, Environment, Water, and PEMEX.

Civil Protection and Disaster Prevention Sector

- General Coordinator of Civil Protection
- General Director of Civil Protection
- Former General Coordinator of Civil Protection
- General General Director of Civil Protection of the State of Mexico
- Director of Risk Atlas of the State of Mexico
- Coordinator of the Metropolitan Programme of Civil Protection
- General Director of Civil Protection of Mexico City

Environment Sector

- Minister of Environment and Natural Resources of SEMARNAT
- General Attorney of Natural Resources of SEMARNAT
- General Director of Public Policies of SEMARNAT
- Delegate of SEMARNAT in the State of Mexico
- Undersecretary of Ecology of the State of Mexico
- Coordinator of the Metropolitan Environmental Programme

Water Sector

- General Manager of Gravamex of CNA
- General Coordinator of Water Provision and Sanitation projects of Mexico Valley of CNA
- Manager of Hydraulic Infrastructure of CNA
- Director of Hydraulic Operations of Gravamex
- Manager of Infrastructure Protection and Emergencies Assistance of CNA
- Director of the Hydraulic Programme of CAEM
- Head of Social Participation Unit of Gravamex

Urban Sector

- General Director of Land Use Planning of SEDESOL
- General Director of Urban Management of the State of Mexico

Mexican Oil Company (PEMEX)

- General Director of Environmental Protection

6.3 Domain of Local Coping Strategies

- Director of ODAPAS of the Chalco Valley Municipality
- Emergency Coordinator and Disaster Attention, Caritas-México
- Director of Cultural Affairs of Chalco Valley-Solidarity
- Affected residents of El Triunfo, San Isidro, Avándaro, and Unión de Guadalupe

7. Time Scale and Research Sites

From January to June 2003, the final fieldwork took place in Mexico City and in the State of Mexico. Public institutions and governmental bodies at the federal level were located in Mexico City. Federal policies and programmes of SINAPROC constituted the national framework for states and municipalities to elaborate their own policies. Thus, several interviews were carried out in Mexico City. With regard to the State of Mexico, a number of interviews were applied in Toluca City (the State capital) and in the municipality of Naucalpan. The majority of Ministries and public institutions are based in Toluca because it is the capital city of the State of Mexico. Other interviews were undertaken in the municipality of Naucalpan, where the Ministry of Ecology and the CAEM are situated. The affected people interviewed live in *colonias* Avándaro, San Isidro, and El Triunfo, which belong to the municipality of Chalco Valley-Solidarity, and also in Unión de Guadalupe, which pertains to the municipality of Chalco (see PHOTO 4 in section 3.2, Chapter Four).

8. Limitations of the Study and Issues of Bias

Besides the methodological limitations mentioned earlier regarding the scope of the interview and to what extent the semi-structured interview allowed the interviewee to feel free to express his/her views about the causal narrative of floods, some other limitations can be mentioned at this moment. The constructionist approach of this research assumes that the interpretive analysis is, in itself, a subjective process. One's own values and beliefs in certain ways are also present in the interpretation of the interviewee's interpretations. My own positionality as a male professional may have influenced the dialogue with the interviewees. Regarding female poor residents of the affected *colonias*, these may have been hesitant and little defensive because they did not know exactly what role they were supposed to take in

the conversation of 'unequals' where sometimes male 'ideas' and 'voices' tend to dominate female's. Moreover, even though I introduced myself and explained the purpose of my research project at the beginning of the interview, there might be some interviewees who were not clear enough about my precedence and the final use of the information.

One of the issues that I deliberately wanted to emphasise while applying the questionnaire was the rhetorical influence of the adjective 'natural' in qualifying disaster. By 'naturalising' disaster I expected to find common meanings within respondents' answers that may allude to accidental factors of natural forces. At the same time, by applying this term I expected to identify the existence (or not) of hidden ideas that alluded to social processes like poverty and ecological degradation in respondents' discourses. I acknowledged that I ran the risk of purposively leading the respondents to pre-given answers. This risk was overcome by asking other related-questions to allow interviewees to further explain the meaning of 'natural' disaster and the components they thought to be important as the triggering factors.

Due to the nature of this approach, my analysis cannot be considered as objective, the opposite, it is about one analysis out of several that can be done. I am also part of and share meanings with the different communities that in turn influence my analysis. Thus, the theoretical and methodological imperatives of this research are to *understand* the social situations in a specific historical moment in a specific society. Extrapolation is not applicable to similar situations; this means that the results found in this research are not expected to be found in other similar situations, although some generalisations and descriptions might be considered as useful for other research. However, the theoretical and methodological proposals found in this thesis can be contemplated as a way to undertake a novel analysis of public policies. I am able to say that I covered nearly all of the policy-relevant-actors involved in this policy problem.

CHAPTER FOUR: THE CASE STUDY OF CHALCO VALLEY'S FLOODS

Introduction

Chronic flooding in the Chalco Valley, State of Mexico, is the outcome of past and present socio-environmental changes which have taken place in Mexico City's South-Eastern peri-urban interface. This flooding is the result of a complex interaction between urbanisation in an ex-lacustrine area, permanent ecological deterioration and ground subsidence, poor sanitation and inadequate policy responses. Far from solving the flooding problematic, short-term policy responses have increasingly created unsafe conditions for current residents. A socio-historical analysis of disaster reveals the importance of taking into consideration particular social actors and institutions in hazard generation and flood vulnerability over time.

This chapter analyses four aspects of this flooding problematic: 1) Chalco Valley's floods of June 2000; 2) urbanisation, former policies and floods risk generation in Chalco Valley region from a socio-historical perspective; 3) current policy responses and the failure of risk management of La Compañía Canal (LCC) and 4) people's vulnerability to floods in the four worst affected *colonias* of Chalco Valley-Solidarity and Chalco, namely *Avándaro*, *El Triunfo*, *Providencia*, *San Isidro* and *Unión de Guadalupe*. Information analysed was drawn from interviews to policy makers and affected people by the floods of 2000 and from newspaper articles, policy reports and geo-statistical data.

To analyse the floods of waste waters that took place in Chalco Valley in June 2000, I put the case study into historic and socio-environmental context in order to identify the root causes and dynamic pressures that led to unsafe conditions under which vulnerable people currently live. Unsafe conditions are characterised in particular with regards to the chronic hazardousness of the physical environment, LCC problematic, the sanitation system, the fragile economy of affected people and their coping mechanisms. Civil protection measures and disaster prevention policy responses implemented before and after the floods are also examined.

Finally vulnerable people of the *colonias Avándaro*, *El Triunfo*, *Providencia*, *San Isidro* and *Unión de Guadalupe* are characterised in terms of housing location and damage; capital and assets loss and inability to replace assets, unequal distribution of emergency aid

and social protection mechanisms such as coping strategies, reconstruction of livelihoods and claim making power of residents. At the end of this chapter, I use the PAR model (Blaikie et.al. 1994, 2003) to draw the chain of causation that resulted in Chalco Valley's floods of 2000.

1. Chalco Valley's floods of June 2000

The South Eastern peri-urban interface of Mexico City has become a flood prone area. In June 1st 2000, 80 hectares of the territory of Chalco Valley were inundated with wastewaters. Floods were caused by the rupture and discharge of LCC, an open-air sewage canal that collects domestic water from two municipalities in the State of Mexico: Chalco Valley-Solidarity and Chalco. More than 6,700 households were affected with gastrointestinal, skin and water-borne diseases, in addition to electricity and piped water being cut-off and lack of food supplies. Five *colonias* were the worst affected: Avándaro, El Triunfo, San Isidro, Unión de Guadalupe and El Molino. A segment of the Mexico-Puebla highway between kilometres 26 and 28 was submerged and many coaches, trucks and automobiles got stuck. Transportation of goods and services from Mexico City to Veracruz was interrupted. The Chalco Valley's inhabitants, mainly low-income families, were severely affected and unable to cope with the disaster. Emergency aid and assistance were rapidly provided by the army, Red Cross and the firemen department of both local and neighbouring municipalities.

Rapid assessments of the canal walls were undertaken and a prompt response was provided to stop the water from flowing out of the canal. In the third day of the aftermath, the former President Zedillo declared the area a *disaster zone*. The Ministry of Social Development and the Ministry of Public Health joined efforts and provided food, clothes and other basic goods, and implemented a sanitary programme to avoid epidemic outbreaks and contagious diseases. Explanations about what happened were broadcast on radio, TV and in newspapers, but at that time nobody was certain about what caused the canal to collapse. A few hours after the tragedy, the National Water Commission (CNA) carried out an investigation to find out what happened. The official evaluation soon established that the canal rupture was due to the impact of heavy rain on the canal walls; in effect, nature was blamed for the tragedy. However, according to some of the affected inhabitants interviewed by the author of this thesis, the Chalco Valley's 'environmental disaster' was human-

induced. Some said that canal wall fissures posed a risk for many years, but authorities did not pay enough attention. Local inhabitants had previously warned of the potential tragedy; and in their view, authorities did not act in order to prevent it.

Federal and State authorities labelled it an emergency or 'serious' inundation, but not a disaster. Amongst them, there was little agreement about the 'real' causes. They had different opinions about the flood's origin. On one hand, some said that regional transformations of the basin, such as aquifer depletion, subsidence of the terrain and urbanisation were the 'real' causes of the canal breakage; on the other, some blamed the lack of adequate maintenance of the canal as the main cause. State of Mexico governor viewed such environmental transformation as a 'normal' outcome of the changes which have been taking place in the geo-hydrological dynamics of the Chalco Valley over many years. It took 7 days for the Army and technicians from the CNA to block the hole and repair the canal wall. Services, infrastructure and lifelines were only completely restored after two months.

LCC has turned into an environmental hazard which poses a constant threat to inhabitants. CNA has responded by reinforcing and heightening the canal walls and dredging the canal bed. Paradoxically, that has created unsafe conditions and increased risk over the years. The Chalco Valley floods in June 2000 represent the worst and most recent episode of a series of past recurrent flooding events which have been taking place in the region for the last 30 years, since urbanisation began in the 70 s in the South Eastern peri-urban interface of Mexico City. Thus chronic flooding is the result of a complex interaction between urbanisation in an ex-lacustrine area, permanent ecological deterioration, ground subsidence, poor sanitation and inadequate policy responses. Far from solving the flooding problematic, short-term policy responses have increasingly created unsafe conditions where vulnerable residents currently live. There are two main explanations for this: the fact that floods have been mainly regarded as natural and physical phenomena that are tackled with technical solutions, and the particular, distinctive features of the Mexico City peri-urban interface where floods occur.

Contemporary critical analyses of disaster (Maskrey et.al. 1993; Wisner et.al. 2003, Bankoff, Frerks and Hilhorst et.al. 2004) emphasise the role played by human agency and institutions in constructing risk and disaster vulnerability over time. A more adequate approach to disaster should then consider the socio-historical context of environmental transformation and risk construction, and particularly institutions, actors and programmes

operating within the landscape, in this case the South-Eastern limits of Mexico City bordering the State of Mexico. The following sections examine the progression of floods vulnerability in the Chalco Valley region using the PAR model proposed by Blaikie et al (1994). Unsafe conditions under which vulnerable people live are traced back to their root causes in order to understand the socio-historical context of the inundations.

2. Urbanisation, former policies and floods risk generation in Chalco Valley

As explained in Chapter One the PAR model proposed by Blaikie et.al. (1994, 2003) is oriented to identify the processes involved in the progression of disaster vulnerability. It has been chosen to develop this chapter for the following reasons. Flood risk and the Chalco Valley's chronic inundations should be explained not only as a function of the existing hazards, such as the LCC and the rainfalls, but more generally in relation to historic, urban, social and political processes occurring in the south-eastern peri-urban interface of Mexico City.

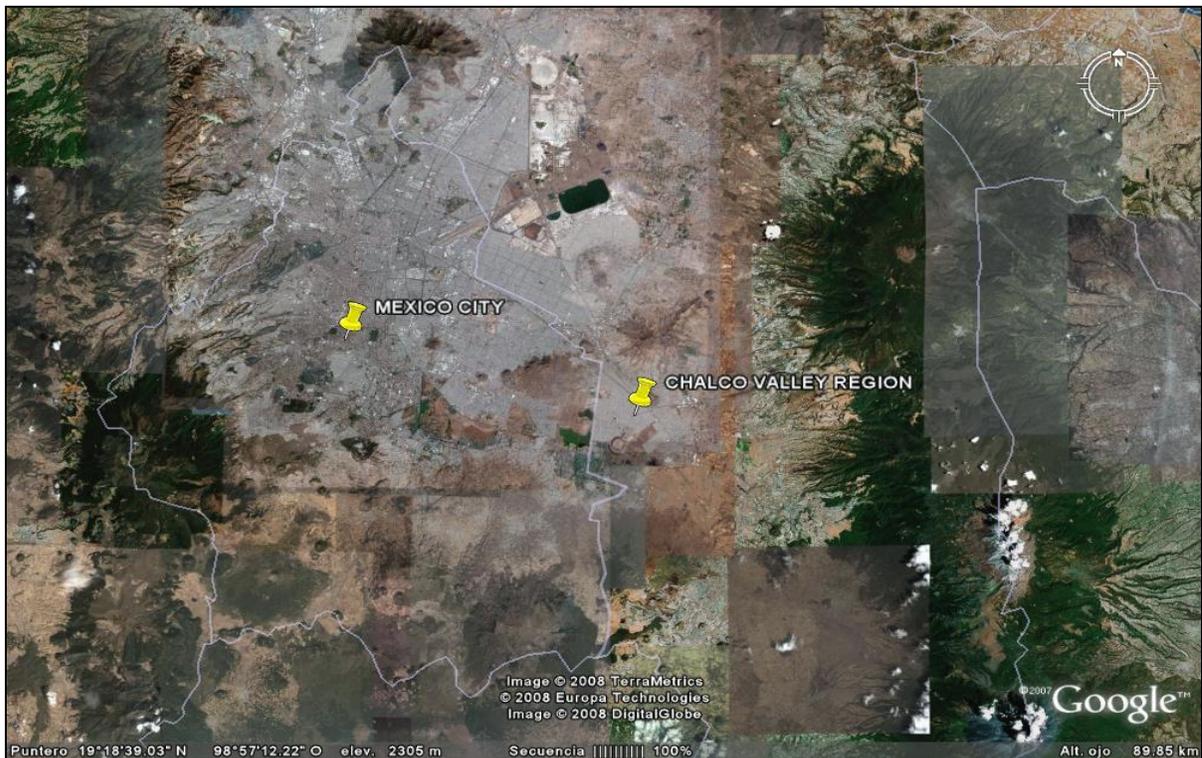
The analysis of political decisions and social change, productive and water and sanitation management projects implemented in the Chalco Valley region since the end of XIX Century, and of the urban-economic system in Mexico since 1940's, helps explain how the socio-environmental deterioration of the former lake of Chalco and subsequent urbanisation increased hazard generation and flood vulnerability. This perspective of flood analysis is important because it frames disaster as social processes; it puts disaster vulnerability into a socio-historical context and allows us to explain the social nature of flooding and the reasons why it has been a chronic risk to residents in Chalco Valley. It also gives inputs to understand the permanent failure of policy responses which fail to address the social and political dimensions of disaster. In the following sections, vulnerability root causes and dynamic pressures are examined.

2.1 Socio-environmental change in Chalco Valley between the Spanish Conquest and the beginning of XX Century

The Chalco Valley Region is composed by the municipalities of Chalco, Chalco Valley-Solidarity and Ixtapaluca and is located in the South-Eastern peri-urban interface of Mexico City. In ecological terms the Chalco Valley region is considered part of the central

basin of Mexico since the former Chalco Lake and rivers system were connected to the Mexico's central valley (see PHOTO 1). The National Population and Housing Census 2000 reports that the Chalco Valley region housed 1,620,048 inhabitants, of which the vast majority are low-income families whose income was below two minimum wages per working person per day (INEGI, 2001).

PHOTO 1. Mexico City and Chalco Valley Region



Source: Google Earth, 2008; edited by Fernando Aragón (2008)

The Metropolitan Area of Mexico City is located in the central basin of Mexico and represents the centre of the economic, social and cultural life of the country. It occupies 0.03% of the nation's territory; houses 20% of its population i.e. 19 million people (INEGI, 2001) and represents 35 percent of the gross domestic product. Since the beginning of the 20th Century, after the Mexican Revolution, it became the main urban settlement due to a range of factors: (1) great immigration flows from the countryside and other cities, (2) increase of industrial activities, (3) concentration of infrastructure and means of production, (4) centralisation of political power and administrative functions.

The development of Mexico City has been closely related to the dynamics of the hydrological basin over which it sprawls. Since ancient times, its ecosystems played a key

role for settlers in terms of use of natural resources and rich biodiversity, ecological productivity and availability of water for consumption and production purposes. The basin of Mexico's Valley is a closed hydrological watershed of approximately 7,000 square km. Its lowest part, a lacustrine plain, has an elevation of 2,250 m above sea level. The basin is enclosed on three of its sides by a succession of magnificent volcanic ranges of more than 3,500m and a series of hills. These circumscribing mountains represent an important physical boundary limiting the expansion of urbanised areas (Ezcurra, E, et al 1999)

The Mexico Valley was populated by pre-Hispanic dwellings under the dominion of Tenochtitlán Empire, which housed almost 2 million people before the Spanish Conquest in 1519. Agriculture provided the majority of consumption goods. The *chinampas*¹⁷ was the main agricultural system that sustained the households and promoted the trade amongst the settlements, from Tlatelolco village in the Northern zone to Xochimilco and Chalco in the South-Eastern zone.

It is said that during the Spanish Conquest period the first great socio-ecological process of environmental change took place within the basin, just when the modes of production became unsustainable due to alternations in the hydrological cycle and disruption of pre-Hispanic management of ecosystems (Huerta, 2000). It is important to mention that environmental degradation did not commence with urbanisation under the Spaniards; there were in fact severe ecological problems associated to resources depletion during pre-Hispanic times, although some authors agree, the increase in magnitude, velocity and intensity of such environmental change was more noticeable after the Conquest. Thus, in the 16th Century, Spaniards chose to battle against the water rather than live with it. The desiccation of the Mexico Valley lake and the decrease of its ecological productivity were the result of a process which began when the Spaniards imposed a totally different way of life; a European urbanism in a fragile ecosystem.

Mexico City's population grew drastically throughout the 20th Century during the long post-war period of rapid economic growth based on import-substitution industrialisation. Investment was particularly drawn to the agglomeration economies

¹⁷ Chinampas is an intensive and highly productive agricultural system formed by a succession of raised fields within a network of canals dredged on the lakebed (Ezcurra, E. et.al, 1999: 7). For a more detailed explanation about the ecological and economic role of Chinampas in the development of human settlements in the Basin of Mexico, see Chapter 4 in Pezzoli, Keith, 1998.

provided by Mexico City. Immigrants were also attracted. This does not mean that the city provided adequate living and working conditions for all its inhabitants. Quite the opposite: the lack of housing provision is reflected in the fact that as much as 60 per cent of city's growth is the result of people building their own dwellings on unserved peripheral land, while informal subsistence work has always accounted for a large proportion of total employment (Connolly, P., 1999:56)

Having briefly reviewed some aspects of the socio-environmental change which took place in the Mexico Valley as a whole, let us now focus on the Chalco Valley region, in order to understand both its inner transformations and its articulations with the Mexico Valley dynamics. Explanations about recent urbanisation in Chalco Valley region do not solely explain its present situation regarding hazard generation and the risk faced by vulnerable groups. Prior to the urbanisation boom that took place between late 1970s and 1980s the region underwent radical socio-environmental changes which, to some extent, resulted in changes in the hydrologic dynamic of the Valley and therefore its chronic proneness to flooding. Radical changes can be traced back to the end of 19th Century and the beginning of the 20th. The Chalco Valley region as we know it today cannot be completely understood unless we look at the environmental history of the Chalco Lake, its irreversible transformations and the social institutions and actors involved.

Rich biological diversity and high ecological productivity characterised the Chalco Lake since ancient times. According to Huerta (2000) this was the result of ecological dynamics among three different landscapes: the lacustrine ecosystem, the valley and the mountains and volcanoes of the Sierra Nevada. Rich soils, rivers and aquifers formed a complex hydrological system that created conditions for sustainable production. What Huerta proposes is a 'symbiosis' hypothesis which underlines the symbiotic nature of landscapes in regulating the Chalco Valley basin and the ecological basis for sustaining the regional economy.

High ecological productivity fostered economic development, based on a complex integration of lacustrine, agriculture, cattle ranching and forestry activities organised in different modes of production from *haciendas* and *ranchos* to factories and community-based systems. Plenty of resources were exploited and several agricultural goods were traded

between the Chalco Valley and Mexico City. *Haciendas* produced grains and cereals¹⁸, wood and charcoal; local communities by the riverbank collected animals and plants and the mountain villagers carried out forestry and agricultural activities. By the end of 19th Century the Chalco Valley was considered the main grain supplier to Mexico City.

Rivers played a crucial role not only in the maintenance of the hydrologic system of the whole Chalco Valley but also were of fundamental importance for other economic activities. In addition to irrigation and transportation, the rivers *Acuautla*, *La Compañía* and *Tenango* provided hydraulic energy for mills and textile factories. Nevertheless, conflicts over natural resources between the *haciendas*, *ranchos* and villages were not the exception. For instance, by the end of 19th Century the paper factories San Rafael and San Antonio Abad disputed the use of La Compañía River. According to Huerta (2000), it was not until the ‘arrival’ of capitalism between the end of 19th and the beginning of the 20th Century that conflicts notoriously aggravated and the lake of Chalco underwent a radical transformation. Irrigation schemes, an extensive canal network, as well as the management of water for the promotion of commercial agriculture and a lake drainage project implemented during the last administration of President Porfirio Díaz (1884-1911) radically transformed the region.

As analysed by Connolly (1991) and Perló (1999) during the administration of President Porfirio Díaz the most ambitious hydraulic infrastructure work ever done at that time in Mexico’s history took place. Mexico Valley Hydraulic Plan implemented during President Díaz second administration (1884-1888) had the main objective to prevent chronic inundations that were occurring in Mexico City. The Plan comprised the construction of the Mexico City sewage system and an open canal that would channel rain and waste waters out of the Mexico Valley. It took 14 years the Federal Government, through the *Junta Directiva del Desagüe* (Sewage Corporate Commission), to build *El Gran Canal del Desagüe* which, at the time of the opening in March 1900, was considered the most important and costly engineering work in Latin America. In this regard, the desiccation of Chalco Lake was the last stage of this long-term Plan even though since 1856 the Federal Government had already contemplated to drain Chalco Lake. In fact, preliminary engineering and technical assessments done by the Federal Government, Chalco Lake was considered to be an

³ “During the second half of the XVIII Century and the first decade of the XIX, 50 large and medium sized *Haciendas* of Chalco produced, just in one harvest, the total volume of maize that was consumed in Mexico City per year, the equivalent to 200,000 *fanegas*” (Huerta, 2000: 70).

important water body to be controlled in order to reduce flood risk in Mexico City surroundings. Regarding this, La Compañía Canal got diverted and connected to *El Gran Canal del Desagüe* to discharge the waste-waters of Chalco Valley's *colonias*.

A more detailed description helps explain how specific actors, institutions, political relations and modernization projects provoked a major environmental impact and development in the region. Drawing from the accounts of Huerta (2000), Tortolero (1996) and Beltrán (1998), three moments of change can be identified. Firstly the construction of the Morelos railway in 1878 promoted commercial agriculture in the Chalco Valley region. The construction of railway infrastructure facilitated private capital investment. The Spanish brothers Remigio and Íñigo Noriega –who migrated from Asturias, Spain in late 1860's- founded the enterprise *Negociación Agrícola y Anexas*, acquiring several *haciendas* and *ranchos*, developing high scale agriculture and controlling the whole economy of the region¹⁹. This was possible thanks to the modernisation of agriculture, innovation methods (new seeds, tools and mechanization), capital investments, high levels of fertility in the Valley and, most importantly, to the close friendship the Noriega brothers had with the then President Porfirio Diaz.

Secondly, deforestation in the surrounding forests triggered soil erosion. Vast amounts of soil and organic matter ended up in the rivers and lake beds, reducing both their capacity and ecological productivity. This emerging situation was perceived by the Noriega brothers to be negative for the region's development and the perfect opportunity for them to put into practice the long awaited lake drainage project²⁰. The Noriega brothers had planned to drain the lake in order to reclaim 10,000 hectares of fertile soil for agricultural purposes. This move also reflected growing concerns about the water quality of La Compañía river which was being constantly polluted with chemicals and inorganic and organic matter dumped by the San Rafael paper mill.

⁴ Noriega brothers acquired *haciendas* like Zoquiapan of 8,582 has; Rio Frio of 5,400 has; San Geronimo and Texconuxco ranch of 842 has; La Compañía of 5,043 has and the *hacienda* Xico (Tortolero, 1996; Beltrán, 1998).

⁵ It is worth mentioning that plans for draining Chalco Lake dated back to 1827-1833. The government of the State of Mexico issued two decrees in which the cost of constructing a canal for diverting the lake waters to the Lake of Texcoco was estimated (Beltrán, 1998:3).

By 1894 the Noriega brothers, who at that time were also owners of the *hacienda* Xico (with an extension of 78 has.) which included the entire Chalco Lake, asked for permission from the Mexican government –specifically the Minister of the Interior and Communications and Transport- to construct a canal to discharge waters from Chalco lake into the Texcoco lake. They acknowledged that Chalco lake drainage would allow them to have larger extensions of highly productive land. They managed to convince the authorities that it was more productive to keep agriculture land dedicated to commercial corn rather than maintaining local fisheries, which were seen as an ‘out-dated’ economic activity linked to marginal indigenous groups. As observed by Tortolero (1996), during the draining process the government stepped back and left the *hacendados-empresarios* [entrepreneur landlords] in charge of all the hydraulic works²¹.

And thirdly, a network of canals was constructed to develop commercial agriculture. However, social problems emerged during the desiccation and construction of the hydraulic system. For instance, floods occurred in the Chalco village and San Juan de Dios *hacienda* during the deviation of the La Compañía River and construction of the network. This provoked social protests by Chalco villagers and, as a flood prevention strategy, the affected population responded by destroying the canal walls in different up-stream sections, thus preventing their land from being flooded again. It was not until 1908 that Íñigo Noriega finally declared drainage works completed (Beltrán, 1998), although they were rehabilitated during the 1960’s by the federal hydraulic authorities.

The ecological and economic landscape of Chalco Valley that had remained ‘untouched’ for several centuries changed dramatically over the last 30 years of the 19th Century. In short, the following transformations were observed: the introduction of the railway system, the construction of canals and dikes for agriculture, the operation of paper and textile mills, deforestation to obtain wood, the establishment of modern commercial agriculture companies and the lake drainage.

The business rationale (as exemplified by the Noriega brothers’ case) produced efficient strategies to take control of the natural resources. As Tortolero explained, on the one

⁶ “... 203 kms of canals were built; one canal of 16 kms length carried waters from lake of Chalco to the lake of Texcoco. ..[A]nother canal located in the north side of the Xico hacienda carried waters coming down from the hills of *Tlalmanalco, Gonzalez, La Compañía, Zoquiapan* straight to the lake of Texcoco. And the rest of the canals (154 kms.) were for the sewage system, irrigation and the transportation of harvests (Tortolero, 1996:125)

hand they would benefit from the existing natural resources to set up a big company and, on the other, they prevented local inhabitants and fishermen from accessing and exploiting the lake under an auto-subsistence rationale, which made them dependent on such companies. According to Tutino (quoted in Tortolero, 1996) between 1870 and 1910 Chalco Valley underwent an economic expansion that benefited the landlord elites, who put pressure on the vast majority of peasants. As such, the Chalco Valley inhabitants played a marginal role in the modernization of the region. That was one of the main reasons why they felt harmed and were encouraged to participate in the Mexican Revolution, demanding the restitution of their land, their productive assets, resources and livelihoods.

From the accounts presented above, it becomes clear that Chalco Valley's proneness to flooding should be framed as an outcome of a socio-historic-environmental process developed in the South-Eastern peri-urban interface of Mexico City with the involvement of specific social actors and modernization projects. Even though heavy rains have been a permanent natural phenomenon throughout the region due to the presence of the mountain ranges and their climatologic functions, their hazardousness is a man-made product. The area where people settled in the Chalco Valley is an extended plain territory whose topography results in water flowing down from higher elevations such as the mountains ranges, besides the infiltration capacity of the terrain is diminished because of the fact that the groundwater is near the surface. Problems associated with flooding are becoming more frequent, as more and more settlements are established in the high risk zones, i.e. near the La Compañía Canal. It is in this socio-environmental context that illegal urbanisation occurred in late 1970s. In this research, illegal urbanisation is understood as the process whereby the selling-buying of plots for housing development takes place out of the legal framework and market. In Mexico, commonly, clandestine sellers, *ejido* owners, representatives of the Revolutionary Institutional Party (PRI) and local authorities have acted together to allow poor people to get affordable land even despite the ecological unsuitability and risk proneness environment.

2.2 Political economy of the urbanisation in Chalco Valley after the Mexican Revolution

In 1910 the Mexican Revolution took place. Social uprising spread across the whole Republic and particularly in the central region. One of the goals of the Mexican Revolution was to put into practice an agrarian reform which would give indigenous communities back their land and the right to benefit from natural resources. It was thought that this social

movement would ultimately create conditions necessary for peasants to claim the basic means to develop their own communities. The most significant achievement is considered to be the creation of the *ejido*²². The *ejido* is a state-owned parcel of land given to peasant communities for agricultural use. The *ejidatarios* are those who manage and benefit from the *ejido*. In order to create *ejidos*, land formerly owned by *hacendados* and *rancheros* was expropriated and returned to the agrarian groups who were labelled the ‘original’ owners.

By 1958 the vast majority of *ejidos* were constituted in the Chalco-Amecameca region. In the central region of the Republic, however, agrarian redistribution did not solve the production problems of *ejidatarios*. According to Banzo (2000) land distribution modalities and the high population density prevented the newly created *ejidos* from receiving extensive pieces of land. In the Chalco Valley, the *ejidos* extend to between 0.5 and 5 has. Under these circumstances, rural population could not make a decent living out of agriculture. For example, Banzo reckons that in the 1940’s, 150 days of work per year were needed in order to get sufficient benefits from an *ejido* of 3.5 has. This labour product was not sufficient for the *ejido*’s reproduction.

Impoverishment, low economic and ecological productivity, the establishment of a corridor of factories along the Mexico City-Puebla axis (1940-1960’s), and the fact that the region has always been geographically close to Mexico City, encouraged peasants to emigrate from the Chalco Valley. Only a few remaining *ejidatarios* maintained this mode of production until mid 1970’s when the demand for peri-urban land for popular settlements notoriously increased. To understand the economic and territorial trends that followed it is important to describe the national urban dynamics during the 1940-1970 period in which the whole of the Chalco Valley’s transformation can be re-framed.

Since 1940 the national policy of import substitution supported industrial and urban development to the detriment of agriculture. This policy reinforced the polarising role of big cities. Political and administrative centralisation and the supply of various kinds of services determined the location of industrial firms. Salaried work and its inherent social advantages attracted large flows of rural workers to the main urban centres. The attraction of cities translated into high demographic growth. Between 1940 and 1960 annual growth rates reached 5%. The population of Mexico City’s Metropolitan Zone (ZCMC) tripled its size

²² Before the creation of the *ejidos*, communal land (*tierras comunales*) existed in Mexico; communal land was owned by peasants before the arrival of Spaniards.

during that period, from 1.9 million in 1940 to 5.4 million in 1960. This type of urban development promoted the expansion of popular settlements in the cities periphery. Low-income groups unable to afford renting or buying houses within the central city ended-up settling in the peri-urban interface of the main Mexican cities.

According to Banzo (2000) this was due to a combination of various processes: industrialization; the development of the service sector in the economy of the central city, reducing the space and promoting land speculation; demographic growth resulting in a housing deficit the state could not tackle; and finally the extension of transportation that led to the dissociation between living and working place. This growth of low-income settlements in the cities' periphery represented the prevailing phenomenon of urban space transformation. In the Chalco Valley between the mid 70's and 80's, *ejidatarios* abandoned their ejidos and sold them to illegal land promoters, who in turn divided them into lots of 200 square metres. Few pieces of land were allocated for environmental and urban facilities. Housing development in the Chalco Valley begun in the mid-seventies and spread between the Mexico-Puebla highway (reaching Iztapalapa delegation, La Paz-Los Reyes and Chimalhuacán municipalities) and the Xico hill. (Hiernaux, 1991:185; Hiernaux, 2000: 35, 39).

According to Hiernaux (2000), urbanisation in the Chalco Valley constituted a very orderly process of clandestine plotting, organized by local politicians and professional illegal land promoters, who made a huge profit from selling the ejidos. It was not until 1989 that the State²³ intervened, legalising the selling-buying operations, handing out deed titles and, years later, providing services. The population's quality of life in the emerging illegal settlements of the Chalco Valley was very poor. Basic urban services were lacking as were social equipment and infrastructure. In 1988, just a few months after taking over the presidential office, the former President Carlos Salinas used the Chalco Valley case to launch his new social policy programme called *Programa Nacional de Solidaridad* (PRONASOL - the National Programme of Solidarity). The Chalco Valley became synonymous with PRONASOL; the "cradle of Solidarity" (Varley, 1996). It is a commonplace to say that

⁷ CORETT, *Comisión Nacional de Regularización de la Tenencia de la Tierra*, the National Commission for the Regularization of the Land Tenure is the federal agency in charge of legalising rural land.

⁸ The municipality of Chalco Valley-Solidarity was officially formed in November 1994. Before that time that area was part of Chalco municipality.

PRONASOL radically transformed the Chalco Valley; however, in the following section a brief analysis of the impact of PRONASOL in the Chalco Valley will help explain how its implementation in the medium term created the material and social conditions for hazard generation and floods vulnerability.

2.3 PRONASOL in Chalco Valley and local environmental deterioration

In December 1988 the former President Carlos Salinas announced the national launching of PRONASOL in the Chalco municipality. Thus Chalco became the symbol of PRONASOL; the political marketing images and social propaganda depicted Chalco as the cradle of a new social policy. During the 1980s Chalco municipality underwent the second highest growth rate at state level after the Chimalhuacán municipality. In 1980 its population was 78,393 inhabitants, a figure that increased up to 282,940 in 1990, representing an average annual growth rate of 14 percent. By 1995 Chalco municipality had 175,430 inhabitants and the Chalco Valley-Solidarity municipality alone, 286,906. This meant that at the end of the 1990s Chalco Valley-Solidarity reached an annual growth rate of 10 percent, ranking 10th amongst all 122 municipalities in the State of Mexico as far as population size is concerned and represented 2% of the total population of the Metropolitan Zone of Mexico City (Sobrino, 1996).

As an illegal settlement of Mexico City periphery, Chalco municipality lacked basic services. According to Sobrino (1996) in 1990 there were 53,980 houses with an average of 5.24 members per household; but only 29.9 percent of them had access to drinking water. This figure represented the lowest percentage in the whole State of Mexico. The sewage system covered only 25.3 percent of houses while 94.7 percent had electric energy but over half was supplied by clandestine methods, connected to high voltage lines along the Mexico-Puebla highway. Only one inhabitant out of three had access to health services. Given the lack of basic services and poor quality of solutions (septic tanks, open sewers) Chalco was considered to have been the 'lost city' (*la ciudad perdida*) Under these social circumstances PRONASOL was 'born and grew'.

PRONASOL's main goal was to attack poverty by raising the living standards of the most impoverished and promoting social participation at base community level (Sandoval,

1993). But according to some authors other implicit goals were pursued: social investment and political control (Sandoval, 1993); political strategies for securing the necessary support to continue in a neo-liberal direction (Dresser, 1991); and in a more conventional way, addressing poor people's basic needs (Sobrinho, 1996).

At this moment it is worth discussing the `political culture of clientelism` that has permeated in some manner the implementation of development policies in Mexico and had an impact in disaster prevention measures. The `political culture of clientelism` is a central issue in Mexican politics because it has conditioned the allocation of resources to meet people's needs. One example of this situation is the process of land tenure regularisation that has been the object of political struggles. Varley (1993 and 1996) has documented the importance of land tenure regularisation in maintaining political stability in urban areas between 1970's and 1990's in Mexico. She calls for bringing into the analysis of `squatter settlements` the political implications of regularisation of the *ejido* land. This is important since Chalco Valley's urbanisation occurred on *ejido* land. Varley showed that *ejido* land regularisation is "an element in the state's repertory of responses to demand-making by the urban poor. It has helped to maintain political stability by demobilizing independent organization in low-income areas and by remobilising the urban poor within the limits of political activity prescribed by the existing regime (the then PRI regime)" (1993:268)

Even though it is important to recognise the politics underlying this policy and its broader implications, in the following the focus is put on the impact PRONASOL had in meeting poor people's basic needs and its relation with hazards generation. It is at this collective level - drinking water and sewage system provision, paved roads- that conditions for hazards creation and risk construction can be analysed. The implementation of PRONASOL in the region represents another very important moment of change. But, to what extent did services and public works carried out during PRONASOL implementation really provided solutions to such collective problems? Did PRONASOL meet social needs in the short run by increasing hazardous conditions and the likelihood of chronic flooding?

PRONASOL programmes were classified in three categories: Social well-being, productive projects and regional development. Here the focus is put on those issues belonging to the social-well being category, i.e. drinking water, sewage systems, street rehabilitation, improvement and paving, environmental projects and housing. These are the aspects that have collectively determined flooding proneness and disaster vulnerability but

which were intended to fulfil basic needs. Up to now, chronic flooding has been the result of the poor functioning of the sewage system (being LCC a central part of it) and its connection to the terrain sinking, according to affected residents and experts. In addition, the pollution of water pipelines has permanently prevented Chalco's inhabitants from having access to safe drinking water.

According to Sobrino (1996) despite the fact that Chalco's population was poor, the main challenge it faced was not that relating to private conditions, such as minimum wages, but to the lack of collective basic services. By analysing the relationship between expenditure per project and population needs, the most severe problems identified were those associated to the lack of sewage system and drains, drinking water and health services. Sobrino observed that the majority of economic resources were actually channelled to social well-being and productive projects. Spatially speaking, the *colonias urbano populares* (popular urban neighbourhoods) of the Chalco Valley region benefited in particular from drinking water pipelines, sewage, electrification, sidewalks and in some cases pavement.

PRONASOL expenditure in Chalco on these projects amounted to 221.8 millions of new pesos, the equivalent to 54.4 percent of the total amount invested in the whole municipality and equal to the total amount invested in all PRONASOL projects in the Ecatepec municipality, the municipality with the second highest expenditure at state level. The drinking water project cost 41.4 millions of new pesos, providing benefits to 14,995 houses. The expenditure in the sewage system was the highest in absolute terms and amounted 102 millions of new pesos (Sobrino, 1996).

Despite these improvements (between 1989 and 1991, 46,000 water outlets were installed under PRONASOL [Schteingart and Torres, 1997:161]), Sobrino reported that the quality of life of Chalco's population after PRONASOL was precarious because 50 percent of the houses still lacked sewage and drains and 4 out of 10 did not have drinking water. Other assessments agree with this statement. Schteingart and Torres reported that in 1990 the water consumption in Chalco averaged 82 litres/inhabitant/day, which was the lowest consumption level in all the 122 State of Mexico municipalities. Chalco was also ranked the lowest in terms of volume coverage; the demand averaged 0.8 m³/sec whereas the supply was 0.3 m³/sec, thus representing a deficit of 0.5 m³/sec. It is worth mentioning that between

1989 and 1993 Chalco was the municipality that received and used more PRONASOL resources²⁴ than any other municipality in the State of Mexico and the rest of the country.

Despite all the public works carried out, health problems continued. Drinking water and sewage projects did not diminish the incidence of gastrointestinal diseases because the water was polluted either by underground or above ground sources. The quality of piped water was so bad that inhabitants continued to buy drinking water supplied by trucks, a situation that represented a heavy economic burden²⁵. The supply frequency was another problem. More than half of the houses were supplied only few hours a day and in some houses the volume of vital liquid provided was insufficient. Another important issue is related to the instalment and maintenance of the sewage system. Although Chalco was better serviced since 1991, due to the nature of the terrain and that the groundwater is near the surface, it has proved difficult to widen and maintain the network.

As mentioned in the previous sections of this chapter, La Compañía River performed a fundamental ecological and economic role during the time of the *haciendas* and the factory boom. However, it is important to underline the process of environmental degradation that it has undergone after PRONASOL, in particular how the river turned into an open sewage canal. In the last twenty years it became part of the sanitation system, used as the main open dumping stream of the *colonias* both in Chalco, Chalco Valley-Solidarity and Ixtapaluca municipalities. The sewage network channels untreated domestic wastewaters and human excrement to LCC. Eight pumping stations are continuously discharging highly polluted water, which constitutes a permanent threat to the adjacent *colonias*. For that reason LCC has become a matter of concern for both the inhabitants and municipal, state and federal water authorities. However, at the time of writing this chapter (December 2006) no final solution has been provided yet.

Less than fifteen years after the implementation of PRONASOL, environmental problems are far from being tackled and solved. PRONASOL not only failed to solve the sanitation problematic but actually increased the hazardousness of the canal and the probability of flooding. A time bomb was set up ready to explode, and it did! In the next part

⁹ For the State of Mexico municipalities the pool of PRONASOL resources was compounded by federal and state sources (from 20 to 30 percent) and by international credit managed by the National Bank for Public Works (50 percent)

²⁵ Analysis of interviews to affected people undertaken in Avándaro and San Isidro colonias in the Municipality of Chalco Valley-Solidarity during the first semester of 2003.

of this section, LCC problematic is examined in order to explain its hazardousness and its relation to chronic risk and flooding.

3. Hazards, people's vulnerability and recent policy responses.

3.1 Recent policy responses and the failure of risk management of La Compañía Canal.

La Compañía River originates in the side of the Ixtlaccíhuatl volcano and flows down towards the North-East discharging into the Canal General in the former lake of Texcoco. It is 30 km long and is formed by the tributaries San Rafael, Santo Domingo and San Francisco rivers. It crosses the plateau of the former Chalco Lake, the Mexico-Puebla highway and the federal road (see PHOTO 2).

PHOTO 2. Municipalities of Chalco Valley-Solidarity, Chalco and Ixtapaluca



Source: Google Earth, 2008; edited by Fernando Aragón (2008)

When the river enters the municipalities of Chalco Valley-Solidarity and Chalco it is used as an open sewage canal (labelled 'La Compañía Canal') that receives domestic

wastewater pumped up from the sewage system and hazardous wastes from industries located along the canal. In Chalco Valley-Solidarity, ODAPAS [the water management and sanitation body of the Chalco Valley] operates four pumps serving each one an average of 13, 000 m³/day of domestic wastes, while CAEM [the water and sanitation body of the State of Mexico] operates another four. There are also seven factories which dump industrial wastes downstream in the segment that crosses the Ixtapaluca and La Paz municipalities²⁶. The water content is primarily compounded of eroded soil that accumulates and reduces the canal capacity, domestic wastes like excrement, and other organic matter and toxic waste. Garbage and dead bodies of dogs and other animals have also been found. All this obstructs the water flow.

As it was mentioned earlier, floods have been a recurrent phenomenon in the Chalco Valley since the beginning of the XX century and they should be regarded as the outcome of an historical process in which natural and social factors have intervened. As reviewed above in section 2, due to changes in modes of production and land use inhabitants' relationship with floods have changed over time; and after being used as a vital resource, they turned into a threat to settlers. Flood hazardousness is, in this particular case, the result of the combination of rainfall (especially during rainy season between May and September), urbanisation on flat land, ground subsidence due to overexploitation of groundwater and a malfunctioning sewage system and LCC. They constitute what is commonly called 'known threats' because of their repetitive behaviour patterns. Known threats in the region are old phenomena and have been primarily related to river and canal overflows²⁷. As observed by comparative studies on vulnerability and risk mapping (Trujillo et al 2000), flooding cases like this one are becoming more frequent. More and more settlements are precariously built in high risk-zones such as in the peri-urban interfaces of cities in the developing world.

¹⁰ Paper mill 'San Jose', smelting factory 'Volcanes', Chemical Akzo Nobel, carton paper mill 'Los Reyes' paper mill Heda, slaughterhouses 'La Paz' and 'ABC Los Reyes' and Yakult (CAEM, 2003)

¹¹ Reports found in the Water Historical Archive show that, for instance, in August 1937 a group of Chalco's peasants (*Sociedad Local de Crédito Ejidal de 'Unión Progreso de Chalco'*) demanded to the Agriculture Minister a prompt solution to the floods caused by the overflow of the Ameca river that wrock havoc in their cultivation, jeopardizing 2,000 *ejidatarios* households livelihoods. As solution authorities proposed to control the peak river flows by constructing a deviation canal to discharge in idle zones and thus reducing the water volume. (SHCP, 1937; SAF, 1938)

Official reports and affected residents' accounts of past events point to the failure of the sewage system and LCC overflowing when explaining the occurrence of floods. In this context LCC is regarded today by the local people as a severe chronic hazard that poses a permanent threat to them. In fact, it has overflowed several times since late 1980's. Experts' findings agree. In 1994 the National Centre for Disaster Prevention (CENAPRED, 1994) carried out an analysis of the La Compañía River functioning and concluded that between the upstream hydrometric stations of San Marcos and San Lucas and the downstream hydrometric station of Los Reyes there was a high volume gradient of 28 m³/sec, which meant that overflowing was occurring. Fissures of the canal walls and consequent leakages may also help explain that.

Moreover, local people are able to distinguish between different types of flood hazards according to the flow origin, the extent of the damaged area and the composition of the water. When interviewed, Avándaro residents adjacent to La Compañía Canal referred to collective memories of past floods caused by the canal overflow and the upward filtration of groundwater. A male resident of that *colonia* says that, for many years inhabitants of Avándaro had to tackle those two kinds of hazards which sometimes are seen as separated threats. Actually they complained to local authorities about the '*unexplained floods that used to spring up from underground*'. In response, in 1992 the CNA provided a water pump to cope with that specific hazard, disregarding the whole sewage system. That became a routine situation and a person was even hired to operate the machine on a daily basis. Another source of concern to inhabitants is the walls cracking. As mentioned by a resident '*[...] through the cracks the canal cries and we get worried*' (Fieldwork interview, February 2003). In response to this threat, CNA has been carrying out a monitoring scheme in order to identify potential wall collapses.

Groundwater extraction has caused serious subsidence and is interfering with drainage systems increasing flood risk. According to Mosser (2002) 12 m³/sec of underground water is extracted whereas only 8 m³/sec is naturally recharged. The plateau is sinking 40 cm per year and undergoing a racking process. The sinking is permanently modifying the topography to the extent that a 6 km segment of the canal, between the Tlapacoya Hills and the La Caldera volcano, 'rose' 3 to 4 meters higher than the plain and has no slope so water frequently stagnates (CNA, 2000 b; Gravamex, 2001; Bitrán, et. al.,

2000). According to Hernandez Lastiri (2001)²⁸, in that segment the ‘soft’ terrain is made of clay and it ‘crashes’ against the hard geology of the hills. As a result, cracks on the canal walls have been observed since 30 years ago. To Hernández Lastiri it is a common known process that is getting worse with the urbanisation of the zone. The CNA’s response to the problem has consisted in the reinforcement and heightening of the canal walls and the dredging of the canal bed, as seen in Photo 3.

PHOTO 3. Maintenance works of La Compañía Canal



Source: CENAPRED (2000)
Edited by Fernando Aragón (2006)

Nevertheless, according to CENAPRED experts, despite these public works being carried out there is uncertainty about the canal condition and its operation. As stated by CENAPRED it is an impossible task to predict either the appearance of the wall cracks or their magnitude and timeframe: *“This phenomenon suddenly and unexpectedly happens”* (Bitrán, et. al. 2000:75). Another problem associated with the operation of the canal is that related to the malfunctioning of the sewage system which was installed under PRONASOL. Affected residents constantly referred to waste waters springing up through the drains. This situation

¹² Personal communication during an interview carried out in November 2001. Samuel Hernandez is the resident engineer of CNA in charge of coordinating maintenance works to *La Compañía Canal*.

gets worse during the rainy season. It is assumed that pumps cannot cope with the high volumes of storm water and the network and sewers get blocked.

In this context one can say that there *are* different flood hazards. Some of them are perceived as known, common events whereas others are seen as unexpected inundations. In fact one can assume that they make reference to different causes and effects of different magnitude. As a consequence of the above, the risk situation linked to the LCC is a complex system created both by material transformations and differing interpretations of flood causes. LCC problematic is a good example of how a problem is socially constructed depending on the various actors involved. Therefore, there is no single conclusion of the whole problematic but several interpretations. For instance, policy makers and water officials affirm groundwater extraction and therefore ground subsidence is the main determining factor for LCC to crack. Others like affected people say that the lack of adequate maintenance is the main cause.

The previous description of LCC situation shows that it is the result and combination of past physical transformations of the environment driven by human action. LCC is a man-made hazard, but still there are different interpretations about flood causes and consequences. Experts refer to uncertainty and natural forces like storms and geo-hydrological transformations to admit that something dangerous might happen; whereas inhabitants' hazard awareness allows them to distinguish various sources of risk flooding, being LCC the most important.

As observed by Wisner et al (2003) hazards are intertwined with human systems, in affecting the pattern of assets and livelihood among people. It has already been seen how poor people migrated to a high risk zone and how settlements and policies have influenced the transformation of environmental conditions such as soil, topography, water availability and sanitation systems, all of which increased hazard and flood risk. In the next section of this part, vulnerable people in Chalco Valley are characterised in the light of the flood events. This is done in order to understand both unsafe conditions that resulted from the inundations and the way in which people coped with the disaster and advanced their claims to local authorities, and how the latter responded. This characterisation is not meant to represent a complete description of the flood vulnerability of the affected region, but is a qualitative analysis of some affected residents, their vulnerability, their interpretations of the event, of their flood risk exposure, and of the government's responses.

3.2 People's vulnerability and floods impact in four *colonias* of Chalco Valley: the chain of causation

In this last part, I characterise people's vulnerability to floods in four *colonias* of Chalco Valley. To do this, I draw from the PAR model explained in Chapter One (Wisner et al 2004), placing particular attention on what the authors referred as the 'unsafe conditions', that is, the "... specific forms in which the vulnerability of a population is expressed in time and space in conjunction with hazard" (p. 55) The geographical areas considered for this research include four of the *colonias* most affected by the floods of June 2000; three of these are part of the municipality of Chalco Valley-Solidarity, including *Avándaro*, *El Triunfo*, and *San Isidro*, and one pertains to the Chalco municipality, *Unión de Guadalupe* (see later PHOTO 4). Until 1999, the area of what is now known today as *El Triunfo* was formerly part of *Unión de Guadalupe*. *Avándaro* is adjacent to *La Compañía Canal* and is on the north side of the Mexico City-Puebla highway. The remaining three *colonias* are in the south side of the highway. In 2000, the Chalco Valley-Solidarity municipality had 323,461 inhabitants (49 percent males, 51 percent females), and Chalco 217, 972 inhabitants (49 percent males and 51 percent females) (INEGI, 2000). In order to analyse the 'unsafe conditions' of the vulnerable people in the affected *colonias*, I first describe some socio-economic factors that contribute to shape people's proneness to floods, and afterward I move on to examine three 'unsafe conditions', namely 'physical environment' 'fragile economy', and 'policy responses'. In particular, I focus on housing location and damage; capital and assets loss and the inability to replace these; unequal distribution of emergency aid and social protection mechanisms such as coping strategies, and the claim making power of residents.

PHOTO 4. Location of the *Colonias* Avándaro, El Triunfo, San Isidro, and Unión de Guadalupe with regard to La Compañía Canal and the Mexico-Puebla highway.



Source: Google Earth, 2008; edited by Fernando Aragón (2008).

Table 1 compares socio-demographic data among the affected *colonias*. Data are taken from SCINCE (*Sistema para la Consulta de Información Censal*), INEGI (2000). In terms of population size, San Isidro is the largest *colonia*, it quadruples the other three and it is the one that houses the most economically active population, that reaches almost 3,000 people. In contrast, San Isidro houses the majority of economically inactive population of more than 2,500 people. In all four cases, the ratio between economically active/inactive populations is 50/50. Working population earning between 1 and 2 minimum wages reaches 43 percent in El Triunfo, 42 percent in Avándaro, 44 percent in Unión de Guadalupe and 42 percent in San Isidro. Working population that earns between 2 and 5 minimum wages is as follows: 34 percent in El Triunfo, 35 percent in Avándaro, 34 percent in Unión de Guadalupe and 34 percent in San Isidro.

TABLE 1. Socio-demographic Data of the Affected Colonias of Chalco Valley and Chalco

Socio-demographic data	El Triunfo	Avándaro	U. Guadalupe	San Isidro
Total population	1,631	1,960	2,190	8,160
Male population	809	976	1,075	4,046
Female population	822	984	1115	4,114
Population in male-headed households	1,335	1,536	1,794	6,580
Population in female-headed households	256	319	264	1,388
Ratio of male/female-headed households	84/16	83/17	87/13	83/17
Economically active population	617	732	730	2,963
Economically inactive population	512	600	742	2,593
Ratio of economic active/inactive population	55/45	54/46	50/50	53/47
Non-working population	8	15	19	48
Working population without income	32	36	27	134
Working population with less than one minimum wage	53	54	62	320
Working population with 1–2 minimum wages	264	307	320	1,239
Working population with 1–2 minimum wages (%)	43	42	44	42
Percentage of working population earning up to 2 min. wages ²⁹ per day	58	55	56	58
Working population with 2–5 minimum wages	213	258	246	1,006
Working population with 2–5 minimum wages (%)	34	35	34	34
Percentage of working population earning between 2 and 5 min. wages per day	42	45	44	42
Working population with more than 5 minimum wages	12	35	28	115
Percentage of working population earning more than 5 min. wages per day	2	5	4	4

Source: SCINCE (Sistema para la Consulta de Información Censal), INEGI, 2008.

²⁹Minimum wage, *salario mínimo*, is the minimum wage an employer is legally obliged to pay to a worker per day for his/her work. In the State of Mexico in 2000, the minimum wage was 32.70 Mexican pesos (MX) (1US dollar equalled 10 Mexican pesos in 2000). The national average for the year 2000 was 35.12 MX. In Mexico, the minimum wage is set by the *Comisión Nacional de Salarios Mínimos*, National Commission of Minimum Wages. (www.conasami.gob.mx, accessed in 13/05/08).

Also drawing from SCINCE, Table 2 compares the housing characteristics of the affected *colonias* considering house materials, piped water and sanitation, and number of residents per household.

As was discussed in section 2.3 of this chapter, PRONASOL became a very important policy in meeting collective needs such as water and sanitation during the urbanisation of the Chalco Valley-Solidarity and Chalco municipalities. This is reflected in the number of houses with sewage system and piped water as reported by SCINCE. In total, nearly 100 percent of houses have access to water service regardless its quality –as analysed previously in section 2.3. Regarding housing materials of roofs and walls, in general two types of materials were reported to be found: ‘temporary and permanent’. Houses with temporary materials are built with asbestos or cardboard roofs, whereas houses with permanent materials are built with concrete or brick walls,

TABLE 2. Data of housing, water provision and sanitation in the affected *Colonias* of the Chalco Valley and Chalco municipalities

Socio-demographic Data	Avándaro	El Triunfo	San Isidro	U. Guadalupe
Number of houses	412	355	1,766	454
Average number of residents per house	4.67	4.57	4.61	4.59
Average number of residents per room	1.81	1.9	1.93	2.15
Inhabited houses	419	358	1749	481
Inhabited owned houses	397	348	1,701	448
Owned houses with light or temporary material roofs	139(35%)	134(38%)	540(31%)	167(37%)
Owned houses with concrete or brick roofs	255(65%)	212(62%)	1,156(69%)	278(63%)
Owned houses with light or temporary material walls		4	25	6
Owned houses with concrete or brick walls	392(na)	343(98%)	1,670(98%)	439(98%)
Owned houses with sewage piped to the public network (%)	360 (90%)	337(96%)	1,617(75%)	428(95%)
Owned houses with piped water inside the house(%)	149(62%)	65(79%)	380(76%)	63(84%)
Owned houses with piped water inside the property	243(37%)	277(19%)	1,290(22%)	377(14%)

Source: SCINCE (Sistema para la Consulta de Información Censal), INEGI, 2008.

Having briefly described some socio-economic features, I move on to explain, in qualitative terms, the ‘unsafe conditions’ that characterise people’s vulnerability that resulted in floods impact in Chalco Valley in 2000:

- I. Physical environment: Unsafe housing and risk-prone location, and erosion or damage of house materials.
- II. Fragile economy: Capital, assets and savings lost or damaged, jeopardising livelihoods, and job losses or unpaid.
- III. Policy responses: Unequal distribution of emergency aid and goods according to damage; increase of insecurity and social protection mechanisms; inadequate warning and claim making of affected people.

The information analysed derives from interviews conducted during the first semester of 2003 and is also drawn from on-site field observation and secondary sources such as INEGI geo-statistics data of INEGI, policy reports, and newspapers.

I. Physical environment

Two physical aspects were identified as common characteristics of housing in the previously mentioned four *colonias*: a) unsafe housing and location, and b) house materials that can be easily eroded or damaged. The impact of 2000 floods caused houses and other assets to be lost or damaged in varying degrees ranging from contamination of rooms with wastewaters and inundation with mud to complete erosion of house walls, floors, and roofs, which rendered these unsuitable for living (see Photos 5 and 6, later).

PHOTOS 5 and 6 *Colonia Avándaro* in the aftermath of the floods of June 2000



Source: CENAPRED, 2000

Avándaro is adjacent to LCC; thus, it is exposed to groundwater up-filtering and to constant canal overflowing, mainly during rainy seasons. The vast majority of houses in Avándaro are one-storey houses that were completely inundated; wastewaters rose up to a height of more than two meters, eroding house walls. Residents had either to temporarily move out or to stay on the roofs of their houses while awaiting assistance. A few two-storey houses coped better with the flooding; thus, some of these residents could stay on second floor during the entire emergency period. El Triunfo is exposed to canal over spilling because it is located immediately in front of the LCC and across the México-Puebla highway in the

lowlands where the Tlapacoya hill slope ends (see PHOTO 4). Different types of houses are found. The poorest houses made of cardboard were washed away by the currents; these inhabitants lost everything. Two-storey houses were more resistant, and in the aftermath, as in the case of Avándaro, affected people preferred to remain on the second floor than move to the shelters. Due to the ground-sinking process, a large number of houses have drains connected to the sewage system above the house's floor level. This situation makes them more prone to flooding. In addition, the piped water is of poor quality; therefore, residents need to purchase water that is carried in tanks or sold in bottles. This represents a huge economic burden, as discussed previously in section 2.3. Housing materials were damaged by the wastewaters that filtered through the walls, to the extent that some rooms were unsuitable for future living. Very crowded rooms were found in some households, for instance, nine people distributed in two small bedrooms (average size, 9 sq. meters).

Like El Triunfo, San Isidro is located immediately in front of the Canal and across the México-Puebla highway in the lowlands where the Tlapacoya hill slope ends (see PHOTO 4). San Isidro is a flood-prone site due to the following three reasons: 1) It is exposed to canal overspilling; 2) the underground-water layer is very shallow (one meter in depth), and 3) the sewage system does not work properly. This means that frequently, wastewaters stagnate for several days a week. One-storey houses are commonly found in San Isidro and are less resistant in this particular hazardous environment. During the rainy season, domestic wastewaters spring up through the drains, and it is common for houses to become flooded. Sometimes water pumps are not operating, and wastewaters flow back to the houses through the sewage system. Additionally, as it is in the case of El Triunfo, houses are below the sewage and drains level.

Although piped water is very expensive, its quality is very poor; thus, residents are required to purchase bottled water, which is also not of good quality. The secondary sewage tube that is connected to the house is very narrow (30 cm) in relation to the volume it was meant to carry. There are no water meters; regardless of water consumption and number of residents, every household is charged the same amount, *i.e.* MX\$ 750 per year per household (1\$US dollar equalled \$10 MX, Mexican pesos in 2000). Household composition ranges between five and seven members who live in one or two rooms, as in the case in El Triunfo.

Unión de Guadalupe belongs to Chalco municipality and is located southeast of El Triunfo. Its boundaries are the following: to the north, Zaragoza Street; to the west,

Solidaridad Avenue; to the east, *colonia* Nueva San Isidro, and to the south, *colonia* Tres Marías (see PHOTO 4). Unión de Guadalupe was the least affected of the four *colonias* and inundations were provoked by the malfunctioning of the sewage system. Wastewaters sprung up through the drains and underground water filtered up through the soil. Floods level barely reached more than 50 centimetres. In houses nearest to El Triunfo, *i.e.*, between Dr. Barragán and Oriente 35 Streets. One-storey houses are also commonly found in Unión de Guadalupe, but some families could afford to build a second floor. Additionally, as in the cases of El Triunfo and San Isidro, houses are below sewage and drains levels. Unlike in Avándaro and El Triunfo, some roads are paved. Although piped water is very expensive, its quality is very poor; thus, people are required to purchase bottled water, which is also of poor quality.

II. Fragile economy

The fragile economy of the *Colonias* of Chalco Valley at the time the fieldwork was undertaken depended on capital, assets, and savings that can be easily lost or damaged, thus jeopardising the livelihoods of the households. This is also determined by the chance that the worker had during the time the emergency and the post-emergency phase of the disaster, of losing his/her job or of not being paid due to being unable to be at the workplace. Avándaro and El Triunfo were the worst affected *colonias*. In Avándaro and El Triunfo, people lost all their goods including furniture, electrical appliances, and food stocks such as rice, beans, and milk. The worst affected residents were unable to remain at their houses, and were obliged to incur unanticipated expenditures for renting rooms elsewhere temporarily (for periods of up to 3 months). This represented a huge economic burden because people spent a high percentage of their income (up to 45 percent) to cover these rent amounts. In addition, during the interviews they mentioned not having food stocks and savings to cope with the emergency. This situation made them more vulnerable to future floods impact.

Despite the important losses in capital and goods, at *Colonia* El Triunfo there were families who were able to rescue certain articles, such as refrigerators and sofas, because they could carry these items up to the second floor, thus avoiding their being flooded. Moreover, some interviewees reported having suffered psychological disorders and illness. This prevented them from going to work; consequently, they were dismissed from their employments. Also, some residents were afraid of losing their household goods; these people

remained on the roofs of their houses and were thus prevented from going to their places of employment. As a result, they were not paid for the days on which they were absent from work.

Unlike Avándaro and El Triunfo, not all areas of San Isidro were inundated as a result of the incident. Houses were flooded up to 1.5 meters by the wastewaters. People living in one-storey houses lost nearly all of their household possessions, such as furniture, stoves, and clothing. In some cases, residents were required to spend their money on renting rooms elsewhere. Some landlords took advantage of the situation and charged these people very high rents (up to MX\$1,000 pesos per month). Because Unión de Guadalupe is south of El Triunfo, it took several hours for the wastewater floods to arrive. This time-lag allowed people more time to carry their belongings up to the roof or second floor, and to place sand-bag barricades at the doors, especially those who fortuitously had construction materials at home. However, some female-headed households were more vulnerable because the women are physically weaker and were unable to carry heavy items up to the roof.

Additionally, this vulnerable situation was amplified by the fact that these women had to work and also look after the house. Goods and furniture were damaged and became useless. Wastewaters filtered through walls and floors. Affected people were unable to go to work, in some cases were not paid for days they were absent, and some lost their jobs, as had occurred in Avándaro, El Triunfo, and San Isidro *colonias*. There are some people who work at home in their own workshops, such as electrical and mechanical; thus, they lost their capital. Some unattended households were burglarised. Blankets and other goods that were meant to be distributed to all affected people at the La Providencia Church were sold three months later at the *Ignacio de Loyola* Church located in Unión de Guadalupe.

III. Policy responses and affected people's coping strategies

I include in this section affected people's interpretations of government responses prior and after the inundations. Vulnerability also depends on how the government and NGOs allocate emergency aid to the affected people, that is, whether aid is distributed equally according to damage and needs. In other words, I analyse to what extent the aid provided helped households not only to endure and resist floods impact, but also to become better prepared to cope with future hazards. This also leads to examination of the elements of social

protection on which vulnerable people could rely for tackling daily life only in the aftermath of the inundations.

In Avándaro, some inhabitants were evicted and re-settled in the *Colonia Los Cuatro Vientos* up-stream of LCC and near San Marcos Huixtoco village. They were offered new houses under the *Instituto Nacional de Fomento a la Vivienda de los Trabajadores del Estado* (INFONAVIT)³⁰, which is a publicly funded housing programme to assist poor people to acquire inexpensive credit to buy affordable houses. The eviction of tens of residents brought as a consequence that fewer people remained in Avándaro. Those who remained expressed a feeling of insecurity and loneliness. Insecurity is an important issue, and impact of floods and the policy is assessed by residents in terms of neighbourhood disruption, which is expressed in the relation <fewer neighbours = more insecurity>. In addition, they mentioned having no extra money to pay policemen to patrol the zone; this has been the 'normal' practice in Chalco Valley.

Inhabitants who remained were threatened by local authorities regarding that water and energy supplies would be suspended if these people did not move out of Avándaro. Several affected families were reluctant to leave the zone; thus, they continued to be exposed to the chronic inundations. Affected people had few coping strategies with respect to future floods. Canal inspection was carried out by the residents themselves. They developed a rudimentary early-warning system regarding canal overflowing. There is also a security alarm to warn the neighbours who remained of the presence of potential burglars. All families kept several dogs to provide protection against burglars.

It is noteworthy that not all households coped in the same manner. There was the case of a man who was a local politician in the Chalco Valley-Solidarity³¹ municipality who mobilized and channelled resources and information from the outside Chalco Valley to his own benefit, thus avoiding the floods. He owned a house in Avándaro, but also another in Los Cuatro Vientos, allowing him to reduce the impact of the floods in his own case. As described at the beginning of this, section income levels are very low, making it difficult for people to recover fully. Female-headed households –as also described previously– were found to experience greater difficulty in recovering, because they were required to work and engage in the housekeeping as well. Inhabitants who moved into a housing complex provided

³⁰ Institute of the Housing National Fund for the State Workers.

³¹ Information drawn from an interview with a male resident of San Isidro in March 2003.

by the State (in *Colonia Cuatro Vientos*) found it easier to reconstruct their livelihoods, even though they contracted a credit scheme. In foreseeing future inundations, families who remained built a second floor. Some inhabitants with political relations received more benefits when they moved out. There is the case of one resident who received four houses as a trade-off.

To this point, in all cases but in the case of people who were evicted, self-help reconstruction of houses had taken place by the time the fieldwork ended –March–May 2003. Authorities denied relief aid to current residents and excluded them from future emergency aid because of their reluctance to re-settle in *Los Cuatro Vientos*. At El Triunfo, several coping strategies before, during and after the floods were reported to have been developed. Prior to the floods, organised groups activated a domestic early-warning alarm with regard to the LCC situation. Inhabitants from the neighbouring *Colonias* of San Isidro and Unión de Guadalupe joined together and participated in the reinforcement of canal walls. Immediately after the floods, the affected residents organised a ‘commission’ for permanent overseeing of the canal and warning residents of the potential increase of the water level.

The ‘commission’ reports to the *Delegado*,³² who in turn reports to the municipality President. It was found that the commission was not functioning as expected; it rarely convenes. In addition, commission members have no power to enforce authorities to respond. Local authorities coordinated inundations drills only twice, and as expressed by El Triunfo interviewees, such practices were useless. During the floods, in general, emergency aid was provided to mitigate material losses. Family and neighbour networks provided help during the emergency stage by sheltering affected people in their own unaffected houses.

Residents of the *Alfredo del Mazo Colonia* helped in cooking food for the *El Triunfo* residents. The poorest inhabitants were unable to afford house modifications for coping with future inundations; they became more vulnerable. Since the floods, several households have built second-floor rooms in foreseeing future inundations. A compensation scheme of MX\$10,000 per affected household was implemented; therefore, affected people were meant to receive these funds. It was reported that in some cases, affected people did not receive the money, whereas non-affected people did receive it. This was both reported in some newspapers and was found during interviews with affected residents. The Catholic Church was involved in distributing aid in the form of blankets, clothing, etc.

³² A *Delegado* is the person who is a representative of several households of the same blocks within a *colonia*.

In San Isidro, some affected people who were able to move to their relatives' unaffected houses, either in the same *colonia* or in other places. Aid in the form of food was not equally distributed; distribution of foodstuffs and goods was carried out by the Catholic Church, which kept some and sold some. Affected people received help-in-kind from friends and relatives. Shelters provided accommodation for a few days for some people, who moved once they found friends with whom to stay. The same compensation scheme was implemented. Some continued to construct a second floor and had already moved all their furniture and additional household items to the second levels. One can assume that this implicitly means that they foresee similar upcoming inundations.

Because Unión de Guadalupe is located south of El Triunfo, it took several hours for the floods to reach there. This time-lag permitted people more time to carry their belongings up to the roof or to the second floor, and to place sand-bag barricades at the doors, especially those who fortuitously had construction material at the home. However, some female-headed households were more vulnerable because their members were unable to carry heavy belongings up to the roof, in addition to their being required to work and also to do the housework.

Household response varied according to the origin, trajectory, and magnitude of the inundations. Some affected residents were sheltered at the La Providencia Church, and others moved to relatives' homes, and other places, such as the bordering Nezahualcóyotl Municipality and Mexico City, where they stayed for over a week or more. Some affected people coped better with the floods because they were less dependent on external aid. People who worked or those supported by the company that employed them could afford to buy the items that they needed on their own. Thus, networks of family and friends were of fundamental importance. Unemployed women depended solely on external aid.

Floods drill and contingency plans for evacuation were put into practice by affected residents but with the passing of time, interest faded, along with participation. In interviews with local residents, information emerged that people did not trust the authorities while implementing the plan. According to affected people, drill and planning coordinators are useless individuals without experience. In Unión de Guadalupe, residents are aware of future events; therefore, they coordinate to respond at the moment of the emergency. As in the case of other *colonias*, aid in the form of food was not equally distributed; the distribution of

foodstuffs and goods was in the charge of the Catholic Church, which kept some of these and sold some.

A reconstruction scheme was implemented by the Federal Government: Ten thousand MX were handed out by SEDESOL (this is the same compensation payment previously referred in pages 154-5) per household to affected households, and furniture was also distributed to those that lost theirs. By the time of the fieldwork, some people were constructing a second floor and had already moved all their furniture and other household items to the second level of their homes. This might mean implicitly that they foresee similar upcoming inundations. Affected residents have addressed their claims to local authorities with regard to the Canal situation and sewage-system malfunctioning. Their main concern was the lack of maintenance of LCC. In any case, according to interviewees no action by the government has been taken. There is a common idea among El Triunfo residents that the best way to solve the problem definitively is to pipe the canal. Each year before the rainy season, inhabitants ask local authorities to dredge and clean the canal. One year, before the floods of 2000, Avándaro's residents addressed complaints to the Municipal President in order to provide maintenance (dredging) for LCC. As a result of this request, CNA provided a water pump to discharge floodwaters into LCC.

San Isidro interviewees mentioned that they addressed claims to local water authorities on LCC conditions, lack of maintenance, and the likelihood of breaking from the beginning of the 1980s. When maintenance is performed, it is carried out at dates approximating the rainy season. Claims making has not been a collective activity; some people have been involved more than others. It is said that lack of leadership impedes the organizing and forming of committees for taking action. A few days after the floods of 2000, affected and non-affected residents from various *colonias* including Avándaro, El Triunfo, San Isidro, and Unión de Guadalupe gathered at the highway and manifested their desire to close the highway. The reason: aid had been halted, and compensation money was not given to all of the affected individuals; instead, unaffected people did receive these monies. Mob organizers were threatened by authorities. Claims had been addressed to local water authorities concerning LCC, lack of maintenance, and the likelihood of its breaking since the beginning of the 1980s. An episode occurred when the canal fractured and claims were addressed to the then Municipal President, but no action was taken.

Figure 3 shows the chain of causation that resulted in the Chalco Valley floods in 2000. It is important to mention that the PAR model applied has been criticised in the literature because it is difficult to identify linkages between root causes and unsafe conditions and also because interior drivers for vulnerability are downplayed. Nevertheless the chain of causation is presented here to explain how root causes might have evolved into unsafe conditions that interacted with the hazards. The figure summarizes the process explained through previous sections of this chapter.

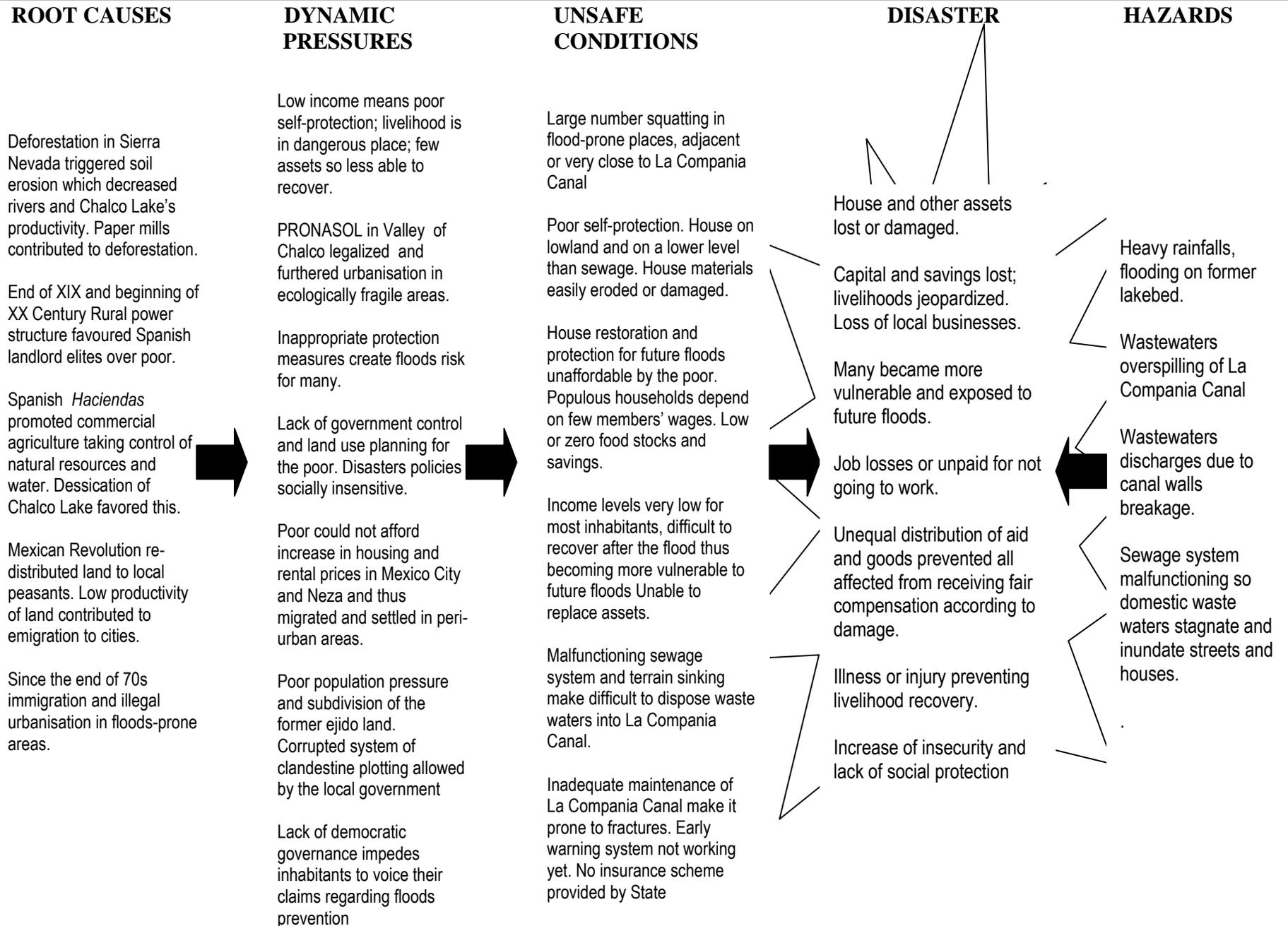
The analysis of water-related vulnerability in this chapter aims to contribute to the already existing knowledge on the topic in the sense that the explanation of flood vulnerability as a socio-historical process emphasises issues of environmental justice and human rights (Restrepo, 1995), citizen's rights (Castro, 2004) and the need to acknowledge climate change adaptation as a policy choice (Landa et al, 2008)

Concerning water access as a citizen's right, Castro (2004) has justified the need to explain water-management problems not only in terms of the technical solutions but considering also the social ones for the Mexico City context. An explanation of issues such as water scarcity requires an understanding of how natural and social processes intertwine, as often they cannot be explained away solely by reference to climatic or hydro-geological constraints. The socioeconomic and political inequalities that determine the exclusion of large sectors of the population from full access to water and sanitation services have to be integrated into water and sanitation policies. Castro states that unfortunately, the incursions of social science that have informed mainstream water policies since the 1980s have largely overlooked the centrality of the water-related conflicts as part of a social process involving the exercise of substantive citizenship rights and the governance of public affairs such as the provision of water services. This chapter's findings contribute to the understanding of the social dimensions of water vulnerability by discussing the socio-economic processes that put people at flood risk and informing disaster prevention and water and sanitation policy.

Regarding the issue of climate change adaptation, Landa et al (2008) emphasise the need to develop an integral risk weather management at policy level. In order to do so, it is of paramount importance to produce knowledge on climate dangers, vulnerability and the various examples of water resources conservation. In this sense, the analysis of this chapter provides concrete inputs on how to establish linkages between urbanisation and poor people's exposure to water-related hazards. It can be argued, then, that climate change

adaptation measures should be placed into the development context of cities and regions and by consider the processes whereby vulnerable people respond to chronic water-related hazards.

FIGURE 3. CHAIN OF CAUSATION THAT RESULTED IN CHALCO VALLEY'S FLOODS



Conclusions

This chapter puts floods into a socio-historical perspective, provides elements to explain both the nature and dynamics of the peri-urban interface³³ in time and space and emphasises the social dimension of disaster. Human agency, institutions and policies are a central part of the social dimension of flood analysis. The focus here is on the dynamic relationship between hazard generation and vulnerability construction, where institutions and social actors played a key role. Natural hazards are not only caused by natural phenomena but also the outcome of socio-environmental changes over time such as urbanisation, migration and capitalist development. The material essence and meanings of hazards have changed over time and depend on the projects and policies implemented. Natural resources can become a threat to human populations and can be shaped by the impact humans make on ecosystems and man-made systems.

Great moments of social change provoked radical transformations between society and the environment, which in turn paved the road to risk construction. This is illustrated by the transformations driven during the Spanish Conquest and the Mexican Revolution. Migration and urbanisation in the peri-urban interface should be taken into consideration when analysing floods because rural-urban dynamic pressures have produced unsafe conditions where poor people currently live. Policies designed and implemented to address basic collective needs can be conditioning factors for hazard creation and risk exposure in the long run. PRONASOL promoted the legalisation and consolidation of illegal settlements in a flood-prone area in the Chalco valley and that made poor residents more vulnerable to hazards produced by La Compañía Canal and the sewage system. Prevailing explanations for floods that are based on La Compañía Canal as the most important source of risk conceal other forms of hazards that are also relevant, such as the malfunctioning of the sewage system and ground water up-filtering. Differing conceptualisations of hazards and floods either highlight or hide causes of disaster, their impact and what or who is to blame. This has been illustrated by the various interpretations of the people affected and of policy makers with regard to inundations in general and La Compañía Canal in particular.

³³ “The peri-urban interface can be characterised as a heterogeneous mosaic of natural, agro and urban ecosystems affected by the material and energy flows demanded by urban and rural systems. In socioeconomic terms the PUI is the place where a continuous but uneven process of urbanisation takes place accompanied, generally, by land speculation, informal and illegal activities. The social composition of the PUI is highly heterogeneous and subject to change over time, where weak and fragmented institutional arrangements co-exist” (Allen, 2003).

CHAPTER FIVE. THE DISASTER POLICY CONTEXT IN MEXICO

Introduction

In Chapter Four, I presented the case of Chalco Valley floods of June 2000 in order to understand, among other issues, how governmental responses were put into place to cope with floods impact. I concluded that ‘preventive’ programmes and actions were not designed to tackle people’s vulnerability in the face of flooding hazards, while emergency responses proved to be adequate temporarily to halt the wastewaters of LCC from flooding the *colonias* and to prevent people from contracting contagious diseases.

This research seeks to explain the relation between ‘natural’ disaster framings and institutional responses at the policy level to understand that the Chalco Valley floods were socially constructed. It is necessary, then, to understand how the arguments and discourses of disaster causality and the institutional responses were constructed by the main subjects involved, namely, scientists, policy makers, implementers, and local operators. Thus, I sought to examine in depth the policy context, that is, the public sectors and institutions involved in disaster prevention and civil protection in Mexico. Therefore, the aim of this chapter is to analyse both the National System of Civil Protection of Mexico (SINAPROC) and the Civil Protection System of the State of Mexico (CPSM), their institutional organisation, and functions.

In section 1 of this chapter, I briefly review the historical evolution and conceptual origins of SINAPROC; focus is placed on the ‘Systemic-Cybernetic’ model that underpins SINAPROC, and I seek to explain how this model determined the conceptual structure of disaster at the policy level in Mexico. In addition, I review the nature of the institutional responses deployed during the administrations of former Mexican President Vicente Fox and State of Mexico governor Arturo Montiel (2000–2006 and 1999–2005, respectively), and I delimit the current scope of SINAPROC and the CPSM. Because it is assumed that institutional discourses are embedded in the various policy artefacts, in section 2, I discuss civil protection programmes at the federal and State of Mexico levels. I focus in particular on the programmes designed during the previously mentioned administrations because it was prior to and during that period that the Chalco Valley floods occurred.

1. Historical background, conceptual origins and the foundational framework of the National System of Civil Protection in Mexico

In Mexico, concepts and policies related to natural disaster have emerged from within the realm of civil protection. A brief historical review shows that the development of civil protection has been an issue of governmental concern dating to second half of the XIX Century. Garza (2001) noted that the first attempts to protect populations from calamities began in the XVIII Century, when a group of civil servants called *serenos* inspected streets and alerted inhabitants in the case of fire. *Serenos* were replaced in 1890 by policemen. However, it was not until President Benito Juárez's administration in the 1870s that the first 'programmes' and fire-fighter groups were created to protect the population from fires, floods, and earthquakes. An example of this is the *Junta General de Socorros* that was conformed to assist the people affected by the floods in 1888 in several states of the country in co-participation with the Army. Some years later, under the ruling of President Porfirio Díaz, the Fire fighting Service was institutionalised and the Mexican Red Cross was created.

The international geo-political context played an important role in the origins of civil protection. Gelman (1996) notes that the origins of civil protection are rooted in the idea that Mexico could need protection from enemy air bombings during the time of World War II. Thus, in many nations such as Mexico, the Army is in charge of the coordination of the emergency assistance to the affected and 'wounded' and the setting up of refugee shelters. To Garza (2001) and Gelman (1996), one of the most significant moments that shaped the civil protection system in Mexico as we know it today was when the federal government installed the 'civil protection service' in 1942 for protecting the population against air attacks from Germany, Japan, and Italy during World War II. The service convened inhabitants and the participation of the ministries of the Army, Navy, Communications, Public Works, Public Health, Public Assistance, Department of the Federal District (Mexico City administration), and the Ministry of Internal Affairs the latter performing as coordinator of all of these.

Although the civil protection service 'faded away' as a 'institutionalised' service, since that time disaster have been an important concern for the Mexican government, to the extent that within the National Plan of Development (2000–2006; 2007–2012), there has been an explicit federal government commitment to investment in emergency, restoration, and relief plans and to mainstreaming risk reduction into

development policies and planning; examples of this policy situation is the creation and implementation of the Fund for Natural Disasters (FONDEN) and the Fund for Natural Disasters Prevention (FOPREDEN) respectively during the 1990's. By the 1940s, disaster were conceived of as a type of air raid, and this conception exerted a significant influence on the types of responses deployed and therefore, on the current conceptualisation of the SINAPROC.

In this regard, it is worth mentioning that emergency actions and assistance to affected people and restoration to 'original' conditions have been activities coordinated by the Mexican Army through the already created Plan DN-III in 1966. Plan DN-III continues to be considered the most important (and visible) aid response deployed by the Mexican government in the aftermath of disaster. The objective of the Plan DN III-E is to implement emergency actions to assist people affected by disaster by rescuing, evacuating, providing medical assistance, protecting, maintaining social order, and preventing future calamities by monitoring risks (Secretaría de la Defensa Nacional, PLAN DN-III).

Experts agree that the most significant moment that finally determined the creation of a 'Policy System' at both the Mexico City and national levels occurred when the Mexico City earthquakes took place on September 19 and 20, 1985.³⁴ This is considered the turning point regarding disaster policies. At that time, the Mexico City and Federal governments were not prepared to cope with such terrible consequences, including over 10 thousand deaths according to government reports, huge damages to the infrastructure, the interruption of basic services, and the inability to create social conditions for the reconstruction of many zones. Thus, the former President de la Madrid (1982-1988) and the Federal Government-at-large came to realise that an institutional framework was necessary to coordinate action and tackle disaster impact. As a result of this and in the aftermath of the 1985 earthquakes, the Federal Government responded in October 1985 by installing the National Commission of Reconstruction (Comisión Nacional de Reconstrucción),³⁵ (CNR) whose main objectives were the following:

³⁴ Two previous disasters caught the attention of the entire Mexican society: the eruption of Chichonal Volcano (1982), and the explosion of chemical plants in San Juan Ixhuatepec, State of Mexico (1984), but these were not of the magnitude of the Mexico City earthquakes in 1985. They can be seen as part of the entire awareness process that the society developed; this reached its peak with the 1985 earthquakes.

³⁵ The National Commission of Reconstruction, through its technical secretariat, formed nine sub-committees that elaborated the BI: 1) Research on civil protection; 2) Identification and detection of

- “1) to co-ordinate assistance for affected people, and
- 2) to set up the basis for establishing mechanisms, systems, and organisations to assist population better in future disaster, incorporating the experiences of public, social, and private institutions, the scientific community, and the population”;

(Comisión Nacional de Reconstrucción, 1986: 13)

To achieve the second objective, the CNR (1986) elaborated the document entitled “Basis for the Implementation of the National System of Civil Protection” (BI),³⁶ which contains the rationale, justification, contents, and institutional framework of a national policy necessary to cope with disaster. According to BI, the goal of the national civil protection policy had been conceived to “protect citizens against the dangers and risks resulting from the eventuality of disaster”. Within the context of the whole National Plan of Development (1983–1988), a National System of Civil Protection (SINAPROC) needed to be created to express the State’s responsibility and to respond to the challenges of Mexico’s development in joint fashion with the participation of the society. This policy was established to channel governmental efforts and to provide the means to preserve the population’s lives, goods, and services in the face of vicissitudes and risks and therefore, to contribute to the progress of Mexico.

Since its inception in 1986, SINAPROC was said to be a ‘functional system’ composed of three main components (CNR, 1986, Gelman 2003,³⁷ and Gelman, 1996): 1) an institutional structure; 2) a conceptual and planning framework, and 3) methods and procedures. The institutional structure included government ministries of different kinds, such as ‘normative’ and ‘operative’ ministries such as the Army, the Navy, Urban Development and Ecology, Health, Communications and Transportation, Public Education, Trade and Industrial Development, PEMEX, and the National Commission of Electricity and the specific bodies of civil protection (at federal, state, and municipal levels) and sought to integrate the private and social sectors as well. The civil protection bodies would operate within the existing institutional structure, and this was thought to be the platform on which ‘new’ policy orientations would take place. In this

catastrophes; 3) Technological development; 4) Social organisation and participation; 5) Education and capacity building; 6) Law framework; 7) Planning, organisation, and execution of immediate action; 8) articulation between the Federation and State and municipal governments in civil protection matters, and 9) Social communication.

³⁶ This was published in the Official Newspaper of the Federation, May 1986.

³⁷ Interview with Gelman, May 2003.

regard and as stated in BI, public administration would ‘learn’ how to add ‘new values’ of civil protection to its existing functions.

With respect to the conceptual basis, BI took note of the fact that a ‘systematic’, ‘objective’, and ‘rational’ model was necessary to approach ‘civil protection and disaster problems’ with the participation of science, technology, and public administration. BI included, among other sections, a ‘diagnosis’ that was intended to examine the level at which knowledge of the disaster and civil protection situation was at the time in Mexico. This would establish the base for prospective thought on the critical problems that would be solved in the future. This ‘diagnosis’ included three dimensions: a temporal; a spatial, and a demographic one (this latter referred as the ‘social’ component) (CNR, 1986). But, what is important to refer in this thesis is to understand the manner in which ‘natural disaster’ was framed in this diagnosis.

My analysis of the diagnosis shows that there is a significant physical geographic determination of disaster framing, although human’s actions were recognised as a relevant component. Disaster was defined in terms of natural agents (geology, volcanism, environment, hydro-meteorology, climatology) that exert a disturbing character on human populations. These were labelled as the disturbing agents (DA). It was argued that society can contribute to avoid or diminish calamities by tackling DA through normative actions such as land use planning and legal frameworks.

The second component comprises the ‘affectable’/‘affected’ agents (AA). These are populations, goods, services, and infrastructure. Population density and distribution in the Mexican territory are ‘the social’ aspects considered in the conceptual framework. Populations could face risk when DA occurs in a specific area (Gelman, 1996). Highly dense risk zones are prone to disaster; thus, preventive actions should be undertaken in these geographic regions. And the third component is the ‘regulatory agents’ (RA), which are regulations, norms, actions, and works oriented toward protecting the AA and controlling and preventing DA from generating destructive events. RA can be the legal, political, and administrative frameworks, the financial and material resources, and the monitoring and forecasting systems of natural threats. It was thought that scientific and technical knowledge of the physical processes is sufficient to identify causes and consequences of natural disaster and their impact on populations.

Therefore, disaster conceptual structure was constructed as a linear simple equation that comprised the previously mentioned three substantive parts as follows:

$$\text{Disaster} = (\text{DA} * \text{AA}) - \text{RA}.$$

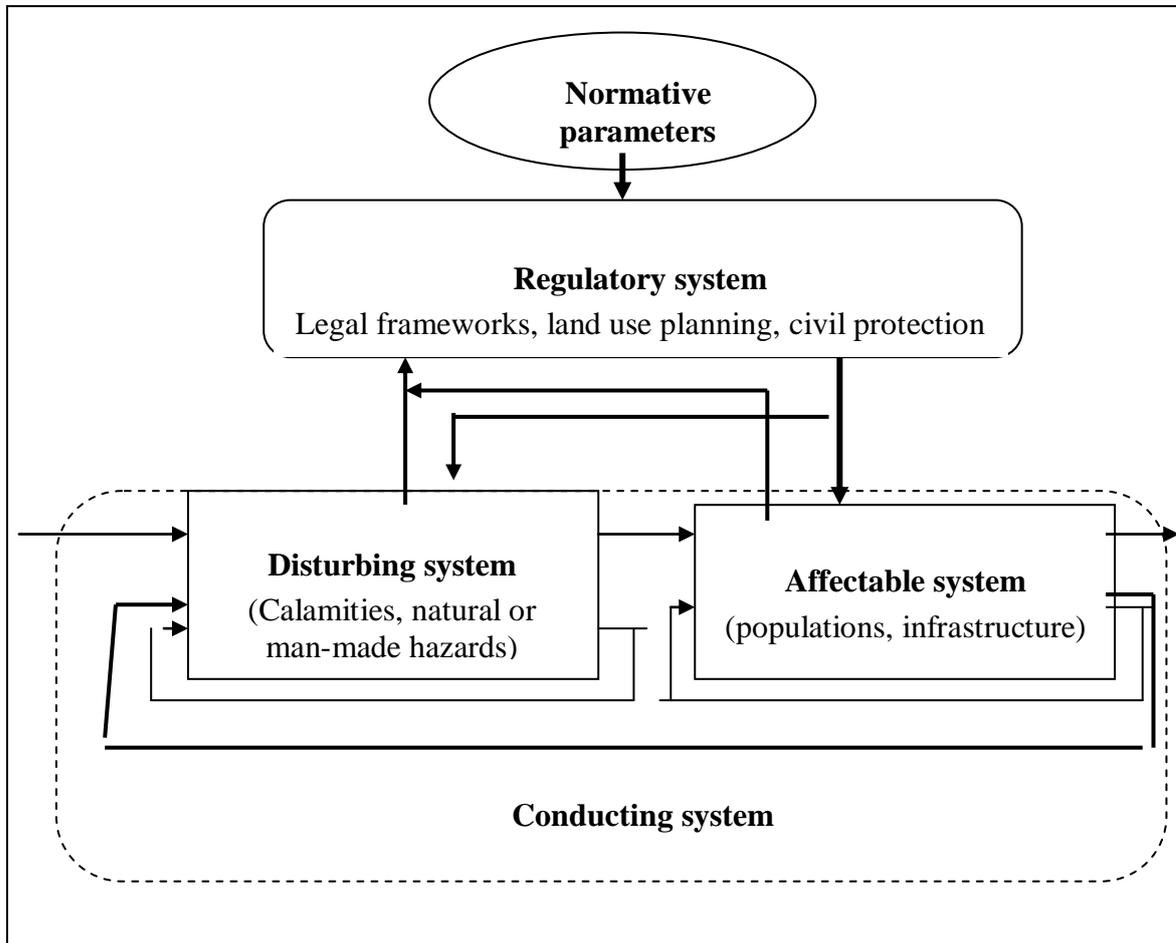
At this time, it is important to mention that this conceptual basis was elaborated not in a vacuum, but in a specific institutional setting, and it was the result of the application of a ‘model’ proposed from within the Institute of Engineering of the National Autonomous University of Mexico (UNAM). The theoretical underpinnings of the foundational framework are rooted in the ‘Systemic and Cybernetic’ model developed by Gelman³⁸ in the mid-1980s (1996, s.f.) as part of the programme denominated *Investigación Interdisciplinaria sobre Desastres, IID*³⁹ (Interdisciplinary Research on Disaster), which aimed to study, forecast, and control disaster in an interdisciplinary manner.

According to Gelman (1996: 14), the model is ‘systemic’ because it provides the means to understand the relations among all components, and it is ‘cybernetic’ because it allows us to view the control mechanisms that govern the organisational structures and the management and planning processes. The three main assumptions of the ‘Systemic and Cybernetic’ model are the following: a) Disaster can be framed as systems; b) Intervention can be carried out in the system, and c) Steering and control functions of all subsystems are important for either impeding or diminishing disaster occurrence or for decreasing disaster impact. Figure 4 (later) is a representation of the framework. Gelman labels this the ‘Fundamental Paradigm of Disaster’, upon which the entire SINAPROC was conceived.

³⁸ Interview with Gelman, May 2003.

³⁹ For Gelman, to date, the IID has made relevant contributions in the establishment and development of crucial institutions such as CENAPRED and SINAPROC itself.

Figure 4. ‘Fundamental Paradigm of Disaster’



Source: Gelman (date n.a.), modified by F. Aragón (2004).

In Chapter One, I mentioned that Prince’s concept of disaster had an impact on further theoretical developments. It appears that this ‘Systemic Cybernetic’ model shares Prince’s main assumptions. One can observe how the concept of disaster employed in BI resembles that of Prince. Thus, disaster in BI is defined as follows:

“(…) the event concentrated in time and space, in which either society or part of it suffers severe damages and losses, to such an extent that social structure misadjusts and impedes society from developing its essential activities, affecting its vital functioning” (CNR, 1986: 70)”.

And, the following is the objective of the National System of Civil Protection as stated in the CNR:

“To protect the person and society in the eventuality of a disaster provoked by natural or human agents, by undertaking actions to reduce or eliminate human losses, the destruction of material goods, and the damage of nature and the interruption of society’s essential functions”.

(Ibid: 111).

Thus far, I have reviewed key elements upon which the national policy of civil protection was founded, because it was important to trace the institutional background and the conceptual underpinnings that served as the basis for the further policy developments that finally became the basis of the current SINAPROC. Next, the most recent versions of SINAPROC and CPSM are discussed with the aim of delimiting the policy system, as this thesis focuses in particular on its programmes and laws.

2. The National System of Civil Protection and the Public Institutions.

The National System of Civil Protection (SINAPROC) is the public policy system in charge of civil protection and disaster prevention issues in Mexico. Its main goal is to protect the lives of Mexican citizens. According to SEGOB:

“The SINAPROC is an organic and articulated set of structures, relations, methods and procedures established by public institutions with the participation of several volunteer, social and private groups along with the authorities of the States, Federal District and municipalities, aimed at protecting population against dangers and risk in the likelihood of a disaster”.

(SEGOB, a 2001: 23).

SINAPROC is composed by the following sectors (see Figure 5):

2.1 Ministry of Internal Affairs (SEGOB) is the federal head and the main ministry responsible for civil protection. SINAPROC is headed by the Minister of Internal Affairs, who reports directly to the President of the Republic. SEGOB is responsible for guaranteeing order, peace, and safety to all Mexican citizens. In terms of civil protection, SINAPROC coordinates all public institutions’ actions when a disaster takes place and channels foreign aid (with the participation of the Ministry of International

Relations) into the Mexican territory. In the light of a potential emergency situation, governors request that SEGOB issue a ‘disaster declaration’ (*declaratoria de desastre*) in order to receive federal funds from the Natural Disaster Fund (FONDEN). Only the Minister, along with the President of the Republic, is legally entitled to determine whether a situation *can be officially and legally considered* either an emergency or a disaster.

2.2 General Coordination of Civil Protection (GCCP) belongs to the Ministry of Internal Affairs and is the central office that coordinates the SINAPROC. This General Coordination promotes the implementation of the NPCP, the elaboration of programmes at the federal, state and municipal levels, the coordination of emergency responses and the FONDEN, and the promotion of a civil protection ‘culture’ and communication. It is entitled to announce emergency and disaster situations declarations and to channel FONDEN economic resources to assist disaster-affected people and affected regions. It delegates specific functions in its three general directions: FONDEN; CENAPRED, and the General Direction of Civil Protection (GCP).

2.3 General Direction of Civil Protection (GCP) is charged with designing, formulating, and evaluating policies and programmes oriented toward preventing disaster and protecting populations. It provides advice to ministries and other public institutions on the matter and coordinates these when prevention, assistance, and restoration activities are required in case of disaster. It is the ‘operational arm’ of the General Coordination. It may also be involved in advising CENAPRED on risk diagnosis. It is the ‘operative arm’ of SINAPROC because it coordinates emergency aid and disaster mitigation.

2.4 Fund for Natural Disaster (FONDEN) was created in 1998 to provide complementary funds to Mexican States and municipalities when disaster consequences are of such a high magnitude that the existing responses of the States and their financial sources are insufficient. It assesses and determines the allocation of funds to Ministries and State governments, and provides advice to state and municipal governments to constitute Trusts to cope better with natural disaster. It also proposes regulatory criteria for the adequate operation of FONDEN. Funds are mainly targeted to vulnerable

groups: children; women; elderly and handicapped people, and less favoured groups in terms of low income.⁴⁰

2.5 National Centre for Disaster Prevention (CENAPRED) is a scientific and technologic research centre founded in 1990 whose objectives comprise the development of knowledge and the promotion and application of technologies to prevent and mitigate disaster. Its mandate is also to provide professional training and to communicate preparedness and auto-protective measures to people exposed to disaster contingencies. It provides technical guidelines for policy formulation. CENAPRED elaborated and edited the Special Programme of Disaster Risk Prevention and Mitigation 2001–2006 (DRP), in which 60 projects for preventing and mitigating disaster risk are proposed within the Civil Protection Programmes (2001–2006; 2007–2012).

2.6 State System of Civil Protection is made up of the State unit and the State council of civil protection. The former represents the operative and normative body, and the latter is the advisory body in which public, private, social, and academic sectors ideally participate. The general director of civil protection of the State government is the head of the State system. There are 32 systems, one for each State. One of its mandates is to elaborate and promote the implementation of the State Programme of Civil Protection. The State System of Civil Protection coordinates emergency aid in all municipalities under its jurisdiction. The Governor of the State is entitled by law to request extra aid and funds from the GCCP.

The Civil Protection System of the State of Mexico (CPSM), whose origins can be traced to the Mexiquense Solidarity Committee (*Comité de Solidaridad Mexiquense*) created in April 1986 as a consequence of the 1985 earthquakes, is integrated by the State Council of Civil Protection, the General Direction of Civil Protection of the State of Mexico (belonging to the Ministry of the Interior of the State of Mexico), and several other ministries of the State of Mexico's government and social and private organisations and institutions. According to the Civil Protection Programme of the State of Mexico 1999–2005, the CPSM has addressed a number of 'calamities' with

⁴⁰ Funds have already been applied to promote temporal employment programmes oriented toward restoring productivity and infrastructure, *i.e.*, zones affected in the State of Yucatán by Hurricane Isidore in 2003.

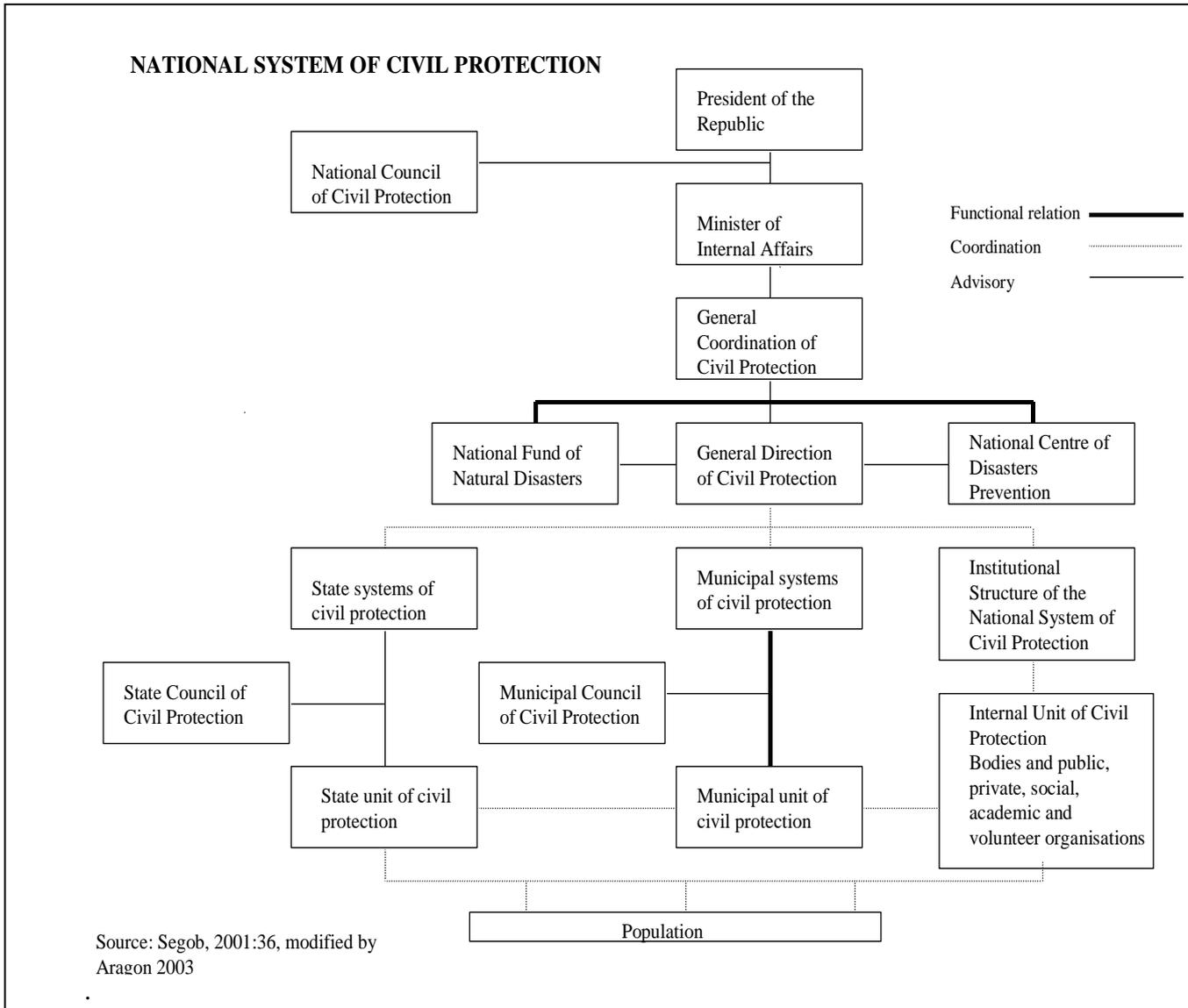
success (the San Juan Ixhuatepec explosions, Popocatepetl volcano eruptions, forest fires between 1998 and 2000, to mention some), protecting people's lives, goods, and the environment with the aid of the information technology systems, the transportation and communication infrastructure, and different groups such as the Fire-fighters of the State of Mexico, volunteer groups of different kinds, and NGO's.

2.7 Municipal System of Civil Protection is compounded of the municipal unit and the municipal council of civil protection. The former represents the operative body, and the latter, the advisory body in which ideally public, private, social, and academic sectors participate. The Fire fighting Department is usually attached to this system and operates under the municipal director's orders. To date, civil protection system has not been installed in all municipalities. According to the General Coordinator of Civil Protection in 2003, 80 percent of the 2,446 municipalities in Mexico had civil protection units.

2.8 Institutional Structure is made up of various Ministries such as Social Development, Environment and Natural Resources, Transportation and Communications, Public Health, the Army, the Navy, and decentralised state-owned companies such as the Mexican Oil Company (PEMEX) and the Electricity Federal Commission (CFE). It coordinates activities and emergency responses to cope with disaster consequences. The Ministries take part in the damage evaluation process as well. For example, the Ministry of Public Health coordinates and guarantees the provision of medical services to the affected population to avoid the spreading of contagious diseases such as cholera.

2.9 Population refers to the population-at-large, that is, all people living within the limits of the Mexican territory. Population is said to be the main civil protection policy target.

Figure 5. National System of Civil Protection (SINAPROC)



3. Civil Protection Programmes

3.1 National Programme of Civil Protection 2000–2006

In Mexico, the National Plan of Development (NPD) is the national strategic planning aimed at fostering a ‘sustainable human development’. By law, once the elected president takes over office, he along with his ministers are obliged to design the NPD for a period of six years to coincide with the 6-year Presidential term of office. One of the five axes of the NPD is ‘Governance and Security’ (*Estado de Derecho y*

Seguridad), which establishes the need to promote both a reactive and preventive civil protection system. It is said that this can be achieved through the implementation of the National Programme of Civil Protection (NPCP).

NPCP is the main policy instrument that seeks to enhance people's awareness of the risks posed by natural, technological, and environmental dangers and to strengthen the commitment of the policy sectors to reduce risk that may affect infrastructure, natural resources, and people's livelihoods. NPCP is also oriented toward promoting civil participation in order to build more resilient communities in the light of future hazards, and toward mitigating and reducing the economic and social losses caused by disaster (SEGOB, a 2001). NPCP has four general objectives:

1. To transform the SINAPROC into a preventive system, strengthening social participation, and enhancing the mitigation of natural and anthropogenic disaster.
2. To articulate policies and actions involving the ministries, institutions, and organisations that integrate the SINAPROC in order to prevent and assist affected populations in case of emergencies.
3. To develop mechanisms to detect and forecast natural hazards and to communicate such information to populations and to the SINAPROC-at-large.
4. To generate a self-protection culture and a responsible attitude on populations exposed to disturbing phenomena.

(SEGOB, 2001 a: 69).

NPCP contains the objectives, means, strategies, and lines of action to regulate and coordinate SINAPROC activities. It is linked to a group of normative frameworks such as the Civil Protection Law of each Mexican state⁴¹, and several agreements and decrees that frame the involvement of the participation of national and international organisations of various kinds and roles. The NPCP (SEGOB, 2001 a, 2007) states that the main challenge SINAPROC faces is to conform a 'preventive' civil protection system that could integrate federal, state, and municipal levels, population, and social and private sectors. The basic underlying assumption is that disaster can be prevented through the participation of the whole society. Ideally, SINAPROC should achieve a

⁴¹ There are 31 States and one Federal District (Mexico City) in the Mexican Republic.

‘preventive character’ and not only a reactive one, as the case has been up to date (April 2008).

According to the NPCP, Civil Protection policy goals should then be oriented:

- To raise people’s awareness on the risks posed by natural, technological, and environmental hazards.
- To reaffirm the commitment of public authorities to reduce risks that affect people’s sustenance, socio-economic infrastructures, and natural resources.
- To promote citizen participation to enable them to resist disaster.
- To reduce economic and social losses caused by disaster.
- To further research, capacity-building, and resources allocation to contribute to preventing or reducing the most striking risk effects on vulnerable people.

To accomplish all this, risk reduction must be mainstreamed into the actions and programmes of the different development sectors of public administration. Nevertheless, it is not clear as to how this can take place within the actual organisational structure and policy system. In this regard, efforts were made in an attempt to ascertain the main obstacles to be addresses in order to ‘infuse’ ‘preventive values’ into civil protection policies. In this vein, during the Fox administration (2000–2006), recommendations and conclusions were drawn by SEGOB and CENAPRED in the search for a ‘real’ disaster prevention system (SEGOB, 2001, a). The following is a review of the main assumptions and arguments set forward by SEGOB and CENAPRED that reflect the SINAPROC view of a disaster prevention policy and possible solutions proposed:

- *Lack of information and a ‘culture of prevention’ among populations.*

It is believed that the dissemination of the scientific information of threats and disaster is the key element to develop a ‘culture of prevention’. The underlying assumption is that people’s response to avoid risk exposure is determined to a certain degree by the physical characterisation of hazards and how this can influence attitudinal and behavioural changes, therefore triggering ‘the expected actions’ Thus, it is thought that a ‘scientifically informed’ society is better able to cope with disaster than a scientifically illiterate one. It is also assumed that all populations find scientific and

technical information meaningful to act and respond, regardless of their differing positions and roles in society. The institutional response desiring to tackle this problem should be able to generate more and better scientific information regarding disaster risk. For instance, evaluation of hazards at the local level for the construction of Risk Atlas by state governments is a central tool to improve risk management.

- *Weak participation of government, population, and social and private sectors in disaster programmes.*

In the SEGOB-CENAPRED view, it is argued that strengthening the participation of all sectors of society would improve the effectiveness of disaster policies because everyone would know what to do and how to do it. This shortcoming, in fact, is linked to the way people make sense and acquire knowledge of the 'risk situation'. Thus, it is assumed that participation can be enhanced by acknowledging 'risk exposure' and consequently changing people's behaviour. Again, as this takes place with regard to knowledge of risk, I argue that participation is not contextualized in the subject's position in society.

- *SINAPROC is a reactive-oriented system that must to be changed.*

Up to 2008, the SINAPROC has been a system that reacts once a disaster has occurred. Without denying the crucial importance of emergency responses, mitigation, and rehabilitation measures for restoring society's well-being, SEGOB and CENAPRED state that SINAPROC needs to become a preventive-oriented system through the implementation of risk reduction measures. This has become a central concern for nearly all policy makers interviewed,⁴² but changes to mainstreaming risk reduction 'values' into all policy sectors involved in development and disaster prevention are not underway at present, not is even the manner in which to proceed.

⁴² Interviews conducted between March and May 2003 with the General Coordinator of Civil Protection, General Director of Civil Protection, General Director of CENAPRED, Coordinator of Capacity Building of CENAPRED, Coordinator of Communication of CENAPRED, and Research Director of CENAPRED.

- *Decision-making process and information generation are excessively centralised.*

SEGOB and CENAPRED believe that, as do other public policies, that local governments and populations in all municipalities are enabled and need to be entitled and empowered to make decisions that affect them. Since the 1990s, decentralisation of planning processes and administrative functions in the public policy domain have been a central concern in the democratic transition in Mexico. In this vein, it is widely accepted in disaster science and policy communities that, for instance, a Risk Atlas at state and municipal levels can become a central tool to regulate development, land use planning, and productive activities in order to reduce risk. To date, only some cities possess a Risk Atlas; Toluca City in the State of Mexico is an example.

- *Insufficient realisation that disaster adverse consequences impact mainly the poor and vulnerable groups.*

SEGOB and CENAPRED explicitly acknowledge that poor and vulnerable groups are more prone to disaster than others, but this is not actually reflected in policies. This must to be recognised by governments, decisions makers, and the population-at-large. The main targets of policies are meant to be such groups. If this is to happen, I argue that it must be reflected in disaster prevention and civil protection programmes through acquaintance with the progression of vulnerability that places such groups at risk in the face of potential hazards, and by knowing whether the ‘target groups’ are those that are vulnerable or whether, contrariwise, these are not located under specific unsafe conditions. It is thought that this can be coupled with promoting a self-protection culture, with the aid of technical and financial resources (*i.e.*, adequate application of FONDEN guided by a cost-effectiveness and cost-benefit approach; implementing the Risk Atlas that truly integrates vulnerability to hazards, etc.)

- *Weak articulation between scientific research and SINAPROC.*

According to SEGOB (2001), research outcomes (e.g., those of CENAPRED) are required to inform policies and therefore be disseminated within the entire SINAPROC. It is generally assumed that scientific knowledge and the prevailing scientific and technical knowledge of hazards are always meaningful to policy makers and people to

trigger the 'expected' adequate responses. Thus, one of the main goals of NPCP is designed to address physical vulnerability through evaluating infrastructure vulnerability and enforcing building regulations.

- *Lack of systems for monitoring natural hazards and geographical information.*

Despite the importance given to scientific and technical knowledge in framing disaster, it is acknowledged that current monitoring and geographical information systems are insufficient to characterise hazards and to estimate risk throughout the country. Therefore, another important goal of the National Programme of Civil Protection is to strengthen applied research to develop or improve technologies for mitigating risks. The naturalist view of disaster risk, as discussed in Chapter One, is reinforced by calling for more funds and research on forecasting and monitoring natural hazards. This policy-technical response relies in the assumption that disaster can be known and controlled.

- *Few financing resources allocated to address and prevent damages.*

Additional funds must be invested in natural hazards research and forecasting and disaster impact research. It is believed that the pay-off for investing in prevention lies in the less negative consequences that may arise if disasters are reduced. In this respect, two goals are to be achieved, namely, to identify and improve knowledge on threats and risk at community level, and to strengthen applied research to develop or improve technologies for mitigating risks. A Disaster Prevention Fund (FOPREDEN) was created to finance local disaster risk-reduction initiatives.

- *Informal sectors are not protected by the Fund for Natural Disaster.*

Informal sectors are defined as those that are outside legal frameworks. By 2008, illegal settlers who have no rights over land and housing are not entitled to receive compensation grants from FONDEN once the disaster has taken place and from FOPREDEN to preventive measures. For less favoured groups, it is less likely, or impossible, for reconstruction to occur. This has been recognised by SEGOB as a very important issue to be addressed; thus, FONDEN implementation rules are being reviewed.

3.2 Research on disaster and technological projects 2000–2006

Because knowledge production and its relation to the policy-making process is a central issue in this thesis, review of the research agenda and outcomes provides insights to show the current orientation of disaster research on Mexico, especially in CENAPRED. Thus, discussion of the CENAPRED research agenda for the 2001–2006 period follows. This is due to three reasons. First, CENAPRED is the official research centre that provides scientific and technical information to federal ministries and State governments; second, it is linked to other institutional research agendas, in which it exerts an important influence in setting the research agenda, and third, interviews with policy makers indicated that the knowledge CENAPRED produces is a continuous reference upon which policy arguments are built, let alone the public funds required to maintain its staff and work facilities.

Thus, the objective in this part is two-fold; to underscore the knowledge selected to define the agenda and projects, and to identify the key conceptual issues chosen to frame disaster as an object of ‘scientific study’. It is important to mention that CENAPRED is not the only centre that studies disaster, but it is indeed the most important at the national level. SEGOB affirms that “from SINAPROC’s origins, one of its priorities has been the production of knowledge and the analysis of risk-generating conditions as the most available way to plan and organise strategies and actions to protect populations” (SEGOB, 2001, a: 76). In this vein, the *National Atlas of Risks* was elaborated, in addition to the *Diagnosis of Dangers and Risk Identification in Mexico*.

In relation to risks diagnosis, CENAPRED planned to increase the number and scope of studies covering disaster-prone zones involving academic institutions during the 2001–2006 period. In this respect, GCCP and CENAPRED makes recommendations to universities to educate students in disciplines such as hydrology, meteorology, geophysics, seismology, vulcanology, and earth sciences with the aim of training, in the medium term, human resources to undertake scientific studies for proposing solutions.

Continuing with this effort, in 2001 CENAPRED (SEGOB, 2001, b) published the *Special Programme of Disaster Risk Prevention and Mitigation 2001–2006* (DRP). Sixty research, technological development, communication, and training projects were

thought to be have been implemented between 2001 and 2006 to integrate the DRP,⁴³ requiring the participation of several public institutions. DRP is structured in three parts. The first is focused on diagnosing the different types of natural phenomena, including geological, hydro-meteorological, chemical, and environmental, and their impact on socio-economic development. The so-called socio-organisative phenomena (by civil protection policy makers) –which refer to riots, mobs, and very large concentrations of populations–, are also mentioned, but in less detail. The second part lists the strategies of the National Plan of Development in Civil Protection matters and the cost-benefit significance of disaster prevention, and highlights the relevance of the new roles that technologies and basic and applied sciences play in recognising threats when pursuing disaster prevention and mitigating the consequences. The third part lists the objectives and the means to achieve these.

According to the Research Director of CENAPRED, ‘Mexican citizens-at-large’ participated in the DRP elaboration, reminding (us) that all Mexicans should be involved in disaster prevention and disaster risk mitigation. He claimed that an open consultation process permitted integration of different social and private sectors’ viewpoints. In the opinion of CENAPRED’s Research Director, this institution has played an important role due to the vast scientific experience of its researchers. Contributions from different ministries and public institutions were also integrated as well, as those from international organisms specialized in the matter (Interview undertaken with the Research Director at his CENAPRED office in April 2003).

CENAPRED notes that DRP was conceived of as the tool to develop and apply methods and knowledges to protect, *on an equal basis*, human beings from phenomena that cause disaster. In order to achieve its objectives, some previous conditions must be met, *i.e.*, all sectors and populations must share responsibilities, an accountable federalist system oriented toward sustainable development is also necessary, etc. The main DRP goal is to reduce the effects of natural and anthropogenic disaster. It is affirmed that, in the short term (unspecified), risks related to natural and anthropogenic phenomena will be reduced throughout Mexico if the DRP is implemented. Its objectives are set to contribute to:

⁴³ DRP has been elaborated as part of the National Plan for Development 2001–2006 (SEGOB, b 2001).

1. Identify and improve knowledge concerning threats and risk at the community level.
2. Reduce social and physical vulnerability of populations and of private and public sectors.
3. Achieve further co-responsibility, co-ordination, and communication among the three governmental levels, the social and private sectors, and populations.
4. Strengthen applied research to develop and improve technologies for mitigating risks.
5. Implement policies and to foment a self-protection culture.
6. Assist the most vulnerable groups (children, women, elderly people, and the handicapped).

A closer examination of DRP demonstrates that only three of the sixty projects explicitly involve populations' aspects:

1. Evaluation of the psychosocial effects caused by disaster in Mexico.
2. Measures to lessen disaster effects in vulnerable groups. This project is aimed at evaluating the socio-economic impact of disaster on poor people.
3. Study of the population's attitude in facing disaster. Attitude indicators to define suitable responses in the face of disturbing phenomena. Identification of population's responses regarding gender, age, educational level.

A core issue regarding many of the projects' outputs is that such outputs are, in fact, inputs for the elaboration of regulations and standards to be taken into account when implementing prevention measures. Questions concerning assumptions, framing, conceptualisations of nature, societies and their relationships, and the character of prevention are briefly discussed here.

What are the main assumptions identified?

The main assumptions identified in the DRP can be grouped into two sets of components. The first includes the functions that individuals, society, and public institutions should perform for preventing disaster, while the second clusters around the role nature plays in causing disaster and the nature of the disaster themselves. With regard to the first set of components, it is assumed that individuals can be capacitated to

act and protect themselves against natural phenomena/disaster once the following certain conditions are met:

- They are *aware* of the magnitude of the natural phenomena
- They understand and perceive such phenomena as threats
- They are prepared to act according to the information given
- They are able to follow instructions provided by specialised public institutions that know *how disaster are*
- They change their attitudes and behaviour to adopt a preventive culture.

Society, framed as a homogeneous unit, can develop a ‘prevention culture’, which will enhance its own capacities for reducing risk and avoiding any kind of disaster. This can be achieved only if a ‘preventive’ attitude is developed. Prevention is defined as a rational action that can be honed through the use of scientific information and technical tools. Thus, scientists provide accurate information to lay people. The latter group would be then ‘educated’ to respond. Disaster effects can be anticipated and tragedies can be avoided with the aid of scientific information. Prevention and mitigation are observed as cost-benefit activities that could promote development. Vulnerability is not associated with socio-economic structures that marginalise poor people, exposing them to risk. It is never assumed that risk prevention might be related to reducing poor people’s vulnerability.

In relation to the second set of components, disaster is closely tied to the notion of nature, of nature as a *force*. Nature is framed separately from society in material and symbolic terms, and is seen as “...a capricious entity with its own will that, over the centuries, has manifested its fury” (SEGOB, 2001, b). Following the constructionist approach adopted in this thesis, images and symbols not only shape reality, but also create it. It is interesting to note that on the DRP document’s cover, the map of the Mexican Republic is drawn and some small images are depicted. Photographs of a volcano, of a satellite, of a hurricane, of a building destroyed by an earthquake, and two photographs of a computer room are shown. Below these, the following phrase appears: “A safer population in the face of disturbing phenomena”. No photos of populations or humans are linked to these images; thus, this might be interpreted as a manifestation of the naturalist bias of research and policy.

3.3 Civil Protection Programme of the State of Mexico 1999–2005

The Development Plan of the State of Mexico 1999–2005 establishes the need to strengthen a ‘participatory civil protection process’ to guarantee the safety and protection of the State of Mexico residents. According to the Government of the State of Mexico, the Civil Protection Programme of the State of Mexico⁴⁴ 1999–2005 (CPPEM) is the main policy of the Civil Protection System of the State of Mexico (CPSM) and intends to follow the framework and guidelines of the SINAPROC. The objective of the CPPEM is “... to turn the CPSM into a preventive-oriented system, strengthening social participation and mitigating the impact of natural and man-made disaster” (Gobierno del Estado de México, 2001).

This is intended to be achieved by designing and implementing normative and operative frameworks in agreement with those at the national level, namely, the Federal Law of Civil Protection and the National Programme of Civil Protection. Before analysing the main components, orientation, and scope of the CPPEM, it is noteworthy that the reading of the document was not easy because of the lack of proper usage of Spanish grammar and syntax. Ideas and sentences are unclear, and arguments are incomplete. Nevertheless, in general it is assumed that the CPPEM is the main policy document meant to guide and coordinate the functioning of the CPSM.

The CPPEM contains the following sections: 1) introduction; 2) diagnosis both of the civil protection public policy in the State of Mexico of the CPSM and of the risk conditions of the State of Mexico; 3) mission; 4) vision; 5) objective; 6) strategies; 7) actions, and 8) annexes. It is assumed that the implementation of the CPPEM takes place through the operation of three ‘sub-programmes’: Prevention; Relief, and Restoration. In fact, these ‘sub-programmes’ have been placed in the ‘actions’ section. The Prevention sub-programme includes issues of communication, capacity-building, the elaboration of a ‘Risk Atlas’ and advising municipal authorities on construction of the municipal Risk Atlas, promotion for the founding of municipal systems of civil protection, promotion of a ‘civil protection culture’, and elaboration of proposals for changes in civil protection rules and laws.

Relief sub-programme includes all activities oriented toward planning and providing emergency aid (health services, goods provision, etc.) to affected people and areas in coordination with other federal ministries, and social and private organisations,

⁴⁴ Published in November 2001 in the Official Newspaper of Mexico (*Diario Oficial de la Federación*).

operation of early-warning systems and damage assessment. The Restoration sub-programme is meant to plan the coordination of restoration actions and the use of external resources targeted to the worst affected. The successful implementation of CPPEM relies on three conditions: a) establishment of municipal units of civil protection enabled to design b) municipal plans of civil protection and c) internal programmes of civil protection inside the institutions' facilities and buildings. In addition, the CPPEM underscores four groups of problems as the most important to be solved if a preventive-oriented system is to be achieved. A brief analysis of these problems may shed light on how disaster and policy responses are framed. The groups of 'problems' are situated under the following issues: 1) Civil protection planning; 2) Financing for civil protection; 3) Education, capacity-building, and training, and 4) Information and communication.

1) Civil protection planning

CPPEM states that it is of paramount importance to consider disaster prevention as part of development planning to reduce vulnerability and regulate human settlements. Nevertheless, and despite the fact that a civil protection policy forms part of the Development Plan of the State of Mexico, to date, nearly no municipalities have set up their own civil protection planning and consultation processes. Consequently, social participation has been low, and the 'desired' targeted budgeting to civil protection has been barely able to be perceived. Thus, according to the General Direction of Civil Protection of the State of Mexico (GDCPEM), development of the CPSM has been disarticulated from the State of Mexico development policy.

2) Financing for civil protection

As a result of the previously mentioned occurrences, the CPSM has over the years lacked a budget to correspond to the civil protection planning process. According to the General Direction of Civil Protection of the State of Mexico, this situation has prevented the CPSM from developing a 'real' preventive system, and taken place happened in 'reality' is that funds are only allocated to emergency aid once disaster has occurred. To address this shortcoming, during the Montiel administration (1999–2005), former Governor Montiel drove the –the topic of civil protection for consideration in

on-going co-investment schemes between the State and the municipalities, as it has been for other issues such as social development. At the same time, other investment schemes were studied, such as the formation of trusteeship.

On the other hand, FOPREDEN –as mentioned in part 2.4– is the national policy to fund risk-reduction actions. Since its inception in 2003, it has granted funds for a number of actions throughout the Mexican territory, such as improvement of knowledge of hazards and risk, promotion of physical vulnerability reduction, promotion of the participation of all development sectors, and development of technology research to be applied to mitigate risks and the promotion of a self-protection culture (FOPREDEN, 2003). The CPSM concludes that what is needed is the permanent allocation of financial resources to civil protection.

3) Education, capacity-building, and training.

In the CPPEM, it is stated that the final aim of education is to consolidate a ‘culture of civil protection’ which can be achieved through disaster awareness at individual and collective levels. This requires ‘complex’ education processes that facilitate the development of ‘new’ attitudes and capacities. This assumption is related to the ‘experiential knowledge’ that people are required to possess as a result of having been exposed to previous disaster. In other words, it is assumed that the risks to which people are exposed on a daily basis can be reduced by acquiring preventive’ behaviour, for instance, while driving a car, adequate use of electric appliances, public and individual health promotion, and consumption of healthy food, to mention a few. This ‘new’ behaviour would capacitate people for protection against hazards and therefore, would enable them to reduce disaster risk.

4) Information and communication

In the CPPEM, it is assumed that ‘useful’ information (scientific and non-scientific) for civil protection complements the education process. In this, the mass media plays a central role by disseminating preventive messages to the public. However, this has not been the case to date. Previous assessments of the messages impact on populations showed that information has not been sufficiently meaningful to trigger the expected behavioural changes. People scarcely remember the messages’ content’ or are ‘unable’

to ‘understand these. In addition, the information contained in the Risk Atlas both at the municipal and state level was communicated with the aid of pamphlets, leaflets, and posters, but this did not evolve into a permanent strategy.

How are disaster framed in the CPPEM?

Thirteen million people live in the State of Mexico, and 71 percent of these are concentrated in municipalities adjoining Mexico City, such as Chalco Valley-Solidarity. State of Mexico residents are exposed to a broad range of hazards that range from floods, volcanic eruption, earthquakes, landslides, and low temperatures to hazardous industrial wastes. The CPPEM contextualizes the State of Mexico’s disaster problematic considering the linear causal relation between high exposure of people and infrastructure to natural and industrial dangers (labelled as disturbing agents, DA). Disaster are framed in terms of the disturbing agents; thus, when ‘preventive’ actions are contemplated, emphasis is placed on reducing exposure via land use planning and law enforcement, controlling the hazard when possible through engineering works.

Conclusions

An analysis of the conceptual basis of the SINAPROC showed that there is a significant physical geographic determination with regard to disaster framing. Within SINAPROC, disaster is defined in terms of ‘natural’ agents known as ‘disturbing agents’. Human population is conceived of as a homogeneous component and is known as the ‘affectable/affected’ agents. This has had important policy implications because, in Mexico, it has been thought that scientific and technical knowledge of the physical processes is sufficient to identify ‘natural’ disaster causes in order to prevent them and avoid human casualties.

In the next two chapters, I analyse the extent to which the policy conceptualisation of ‘natural’ disaster is rooted in scientists’ and policy makers’ arguments and discourses. I seek to identify and explain how this conceptualisation shapes ‘natural disaster causality discourses, which are the main argumentative components. I address some key issues that were discussed in this chapter and in the previous Chapter Four, such as the different meanings of disaster among policy makers, scientists, and affected people, the type of ‘valid’ knowledge identified to justify

specific policy responses, and the manner in which the evidence is constructed and utilized to support the knowledge claims. I also explain how scientific knowledge and evidence are used and transformed when it enters the policy realm at a time that policy decisions must be made in emergency and flooding episodes. In this vein, I seek to explain how 'natural' disaster discourses construct risk objects, policy targets, affected people, and, to a lesser extent, 'vulnerable' people.

CHAPTER SIX. CHALCO VALLEY'S FLOODS AS A DISASTER POLICY PROBLEM: THE DISCURSIVE CONSTRUCTION

Introduction

As discussed in Chapter One, disaster are usually understood and explained as a cause-effect relation between nature and society. The spectrum of disaster discourses regarding causality varies from natural hazards to social aspects such as technical solutions, institutional capacities and vulnerability root factors. The analytical framework developed in Chapter Two (Figure 1) is employed here to examine 'natural' disaster causality as a policy problem. The case of Chalco Valley's floods illustrates the discursive construction of 'natural' disaster in three social domains: a) disaster governance, b) science and disaster management, and c) local coping responses. The relevance of considering these three domains was discussed in Chapter Two, section 2.

In this chapter I explain how disaster causality in Mexico is framed by the policy relevant subjects to persuade the interviewer. In other words, I examine the language mechanisms and type of discourses used to portray Chalco Valley's flooding as a 'natural' disaster. In particular, I focus on the arguments assembled and used by scientists, policy makers, local government officials and operators to show that Chalco Valley flooding was hardly a 'natural' disaster, as it is often asserted. Moreover, I argue that the tendency to define and explain disaster as 'natural' has several policy implications, notably that of disregarding people's vulnerability.

Furthermore, by doing argumentation analysis I examine three components of claim-making process, notably a) the claims content, b) the claim makers and c) the claim-making context -already explained in Chapter Two, section 3.2. This examination will allow me to clarify how and why arguments to give account of the same phenomenon vary – depending on the source, the nature of the evidence and the warrants used to support the claims and the intended objective of the claim. Interviews with scientists, policy makers, implementers and operators are the main data sources used in this chapter; secondary information such as official reports issued by the CENAPRED, CAEM, CNA were also analysed. More details about the sources of information used in this analysis are provided in the methodological Chapter Three.

Therefore, the purpose of this Chapter is to show how 'images' and representations of causal agents, their interactions and consequences are constructed.

Analyses of interviews will hopefully show how the production of knowledge by ‘using’ and ‘constructing’ factual evidence operates. In sum, the ultimate intention of this Chapter is twofold, to explain and highlight the rhetorical and discursive power of disaster causal stories in constructing reality of Chalco’s Valley’s floods and to understand the inundations causality as a contested policy problem.

1. Conceptual and methodological considerations

The core questions analysed here are related to the following aspects: 1) what happened in Chalco Valley the first of June, 2000; 2) what were the floods’ causes and consequences and 3) the proposed policy solutions. These questions correspond to the first group of questions of part VI of the fieldwork questionnaire that addresses the issue of Chalco Valley’s floods and the policy makers’ interpretations. The intention of this part of the questionnaire was to link the aforementioned aspects with the data and evidence given by the interviewees themselves. It was also set to understand the warrants and backings that legitimise the interviewees’ claims.

In this research I analyse how policy makers, implementers and other policy relevant actors like local operators try to persuade the interviewer about the truthfulness of their accounts. For that reason I opted for the argumentation analysis approach. For more details about this approach see the methodological chapter. Fischer (2003, a: 181) states that “...argumentation is the form employed to persuade an audience that something ‘ought’ to be the case: that is, a particular action should –or should not- take place, that an event should be interpreted in one way rather than another, and so on” so “(...) it is the argument that constitutes the basic unit of the real world policy analysis’.

The analysis of the disaster causality was carried out as follows:

1) In each interview, I identified explicit or implicit aspects related to disaster conceptualisation and inundations causality. Previously coding of the Spanish version of the interviews⁴⁵ with the aid of the qualitative analysis IN VIVO software was done to facilitate the organisation and handling of the information. Linguistic material was drawn from the answers to both theoretical and empirical questions and was then arranged according to the following issues of interest: a) causality claims of Chalco Valley’s floods, b) the types of actions and consequences, c) issues of blame and

⁴⁵ Interviews were transcribed Verbatim

responsibility, and d) knowledge production of evidence and warrants. It is important to note that interviewees' answers differ in many ways; arguably because interviewees had different professions, job positions and interests, but notably – I should argue – because institutional contexts differ.

2) The first layer of analysis was done as follows. I deconstructed the interviews first by identifying the main arguments of the aforementioned issues of interest and then breaking them into their constituent parts. The Toulmin-Gasper model (Gasper, 2000) was used for this purpose because it helps organise, describe and analyse the structure of the arguments, in particular the main claim(s) and its connections with the argument components throughout the whole text of the interview. The Toulmin-Gasper model is presented in the form of a table that contains four to five columns which corresponds to the main claim(s), the claim evidence or data, warrants and backings and sometimes rebuttals (The Tables of deconstructed interviews are presented in Appendix I). Depending on the richness and depth of the interviewee's answers, in some cases I found only one central claim whereas in others more than one.

Arguments were translated from Spanish into English half way through the deconstruction of the interviews. Such data processing allowed me to build a complete and detailed 'argumentation table' for each interview. The table was used to find as wide a range as possible of arguments in each interview. Mapping out the arguments within the interview helped me both to collect dispersed parts of the claim in one continuous text and to identify possible connections that might have been hidden in the text. The table was found to be also a useful tool in comparing interviews in order to arrive at the 'upper level' of analysis, to the discourse. These activities, in fact, can be conceived as the textual practice of the discourse. The textual practice of the discourse, as stated by Fairclough (1992), attends to the way the text is organised and to the attitude (and intention) of the agent that produces it. Table 3 is one example of the argumentation tables produced.

Table 3. Example of an argumentation table of Chalco Valley's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] Well... in general...it is a lesson we all know.</p> <p style="text-align: center;">↑ vs. ↓</p> <p>[2] It was a surprise [Floods] for those who live there and finally [they] realised that there is a 'living' river.</p>	<p>We, the people who live in Mexico City, since ancient times, (know) that this is a flooding zone... and we have tried to control [past] inundations by any means...</p> <p>It is nature and the fact that people are not aware of the geographical and natural conditions when settling in a place is what puts them at risk.</p>	<p>[Assumption] Aguayo refers to the role of contextualized and experienced knowledge in perceiving inundations and shaping policy responses.</p> <p>Risk perception in explaining the disaster and the image of the affected people as victims of their own actions.</p> <p>[Assumption] It was a foreseen consequence that was ready to occur; the fate of the inhabitants that sooner or later would come.</p> <p>CNA had told them (to the affected inhabitants) that there was a 'living' river</p> <p>They (affected people) are to be blamed for not paying attention to the information provided by CNA and not being aware of <i>the</i> risk.</p>	<p>Settlers liked to be here and to live that way [being exposed to flooding risk]. We have increased [the population size] and have tried to control inundations by various means.</p> <p>We have not to forget that the natural condition of that zone is for the river to be there, it has always been there and will be.</p> <p>The river is old and [during the flooding event] it <i>recognised</i> its own ancient riverbed</p>

Aragón (2006) adapted from the Toulmin-Gasper model (Gasper, 2000)

3) Further on a second layer of analysis followed. I interpreted the main arguments and key issues brought up by the interviewees. Particular attention was given to the institutional context and to the way warrants and backings were assembled to guarantee the evidence. As part of the interpretation, rhetorical analysis was undertaken because it implies the analysis of the persuasive nature of the argument. To do so, I looked at the three main components of the rhetorical analysis: *ethos*, *logos* and *pathos*.

Leach (2005) states that *ethos* is about the establishment of the credibility of the author or speaker. For instance, scientists have '*ethos*' to make stronger claims than other authors. *Pathos* is another form of persuasive argument and is the appeal to emotion of the speaker and *logos* is about how logical arguments work to convince us of their validity and to shape or construct certain worldviews.

Moreover, identifying the use of rhetorical devices – such as metaphors – and rendering explicit their function in making the argument persuasive and legitimate were central aspects of the analysis conducted. Yanow (2000:43) has noted that “often metaphors acquire a prescriptive aspect and they not only present new insights into the situation they describe: they also suggest possible action in response to those situations.” For instance, I intended to make more explicit the way natural hazards were used as rhetorical tools to advance policy claims and governmental actions. A text for each interview was elaborated and served as the basis for this second level of analysis.

This second level of analysis, in fact, corresponded to the discursive practice of the discourse. Martin Rojo (2003) notes that the discursive practice of the discourse describes the relation between the text and its context, giving meaning to social action. This led me to give attention to the institutional and policy contexts where disaster are interpreted in specific concrete disaster situation, i.e., Chalco Valley's floods of 2000 and the varying institutional contexts where policy makers, implementers and operators are placed. The discursive practice allows the realisation of other social practices such as judging, convincing and informing. In sum, this deconstructionist method was then set to make evident the variety of floods causality claims and their relation with 'discourses' contexts' and 'subject's identities' and 'interests'.

4) And finally, a third layer of analysis was produced by comparing previous findings to establish similarities and differences between and within the aforementioned three social domains, namely the domains of disaster governance, science and disaster management and local coping responses regarding the causality of Chalco Valley's floods of 2000. Findings were contrasted with the typology of causality proposed by Stone (1989) (presented in Chapter Two) because '*disaster causality*' can be explained in terms of actions (unguided and purposeful) and consequences (intended and unintended). This was done in order to group the varying arguments in different causality discourses such as inadvertent, accidental and structural. Through the analysis, it was possible to find struggle over disaster' problem claims even within the same interview -and between interviews of the same social and other domains. So there might

be the possibility of finding a move in disaster causality discourses from a strong position (accidental or structural causality) to a weaker position (inadvertent or mechanical causality) as a next-best option. The outcome of this third layer of analysis is the written text of the following two sections of this chapter.

Thus, this chapter is structured in two sections: 1) causality discourses of Chalco Valley's floods and 2) rhetorical elements of the problem constructions. The discussion is structured around these two foci as it was necessary first to understand how the genesis of the causal ideas of Chalco Valley's floods gave rise to different disaster discourses at the policy level in order to, later on, identify and explain how the case of Chalco Valley's floods is constructed as a policy problem. Once I had interpreted the disaster discourses I could identify and examine four problem constructions along with their rhetorical elements that arose out of the discourses.

Therefore, Section 1, Causality Discourses of Chalco Valley's floods contains the following subsections: 1.1 Discourse of Inadvertent Causality with two sub-types - inadvertence by ignorance and inadvertence by carelessness; 1.2 Discourse of Accidental Causality and 1.3 Discourse of Structural Causality. At the end of each subsection a table characterises four discourse elements, namely, a) subjects, b) objects, c) system of meanings and d) system of statements according to Parker's definitions (1992) which are the following:

- a) Subjects. The category of subject refers to the type of people discussed and allowed in the discourse and how the text locks them into a certain world of representation. Discourses construct social identities and relationships.
- b) Objects. Discourses work to generate objects, to enforce and mobilise certain constructs of knowledge and ideology, therefore it is important to detail how certain objects of knowledge are built up.
- c) System of meanings refers to how the objects and subjects 'constructed' by the discourse are arranged together to make certain regular patterns of meaning; what the framework of interpretation and understanding is. A discourse comes with a related set of rationales and rhetorical strategies.
- d) System of statements is about the regularised statements made within the discourse; how it becomes a 'regularizing collectivity'.

In Section 2, I analyse the four constructions of the Chalco Valley's floods problem: 2.1. Ignorance of hazards and of unsafe conditions, 2.2 Failure of

infrastructure and sanitation system and inadequate monitoring of risk object, 2.3. Unforeseen accidents of nature and of man-made systems that disrupt human systems and 2.4. Exposure of vulnerable people to hazards as a consequence of socio-economic inequalities. The analysis takes into consideration the following five rhetorical elements which will be explained below in section 2: 1) type of knowledge evidence, 2) appeals and warrants, 3) images of Chalco Valley people, 4) images of government and 5) images of hazards and La Compañía Canal.

2. Causality Discourses of Chalco Valley's floods

This section examines the discursive construction of Chalco Valley's floods causality. I argue that the different disaster discourses found at policy level are shaped by how causal ideas of disaster are assembled and made persuasive in the three social domains of disaster and risk. Causal stories, as pointed out by Stone (1989), are important both for researching how specific problems reach the 'systemic agenda' -that is the set of issues up for general discussion in a polity and in the formulation and selection of alternative policy responses because they locate the burdens of reform very differently.

The deconstruction of arguments presented in Annex 2 allowed me to identify in the interviews three different types of disaster causality namely: inadvertence, accidental and structural, already discussed in Chapter Two. These types are analysed below. This helped both to identify the differing systems of arguments that construct the causal agents and their images including issues of blame and responsibility. It is important to say that the three above mentioned types are rough categories with fuzzy boundaries so in reality it is possible to find a combination of them within the same interview elements of other 'causalities'. However, each type may show clear and distinctive traits and components that prevail in the argumentation structure. For analytical reasons the interviewee's arguments are grouped under one of the three categories, acknowledging possible connections with the others, that is, potential coalitions. The final aim is to explain how claim makers employ certain discourses to construct policy problems and how these are characterised empirically. This is done in section 3 of this Chapter.

2.1 Discourses of Inadvertent Causality

Discourses of inadvertent causality are defined in terms of unintended consequences of willed human action that are predictable but still unforeseen, consequences that sometimes can be understood as the harmful side-effects of well-intentioned policy. Stone (1989) states that in general in social policy two types of inadvertence can be found: 1) inadvertence by ignorance and 2) inadvertence by carelessness or recklessness. In inadvertence by ignorance consequences are predictable by experts but unappreciated by those undertaking the actions, whereas inadvertence by carelessness refers to those cases where managers, technicians and/or operators are aware of the potential threats but do not or cannot monitor and control the system that may pose risk and cause damage.

2.1.1 Inadvertence by ‘ignorance’

Under this discourse, which illustrates the behavioural paradigm (discussed in Chapter One), disaster are constructed as a problem when people do not understand the harmful consequences of their wilful actions; in the case under analysis, this refers for instance to the unforeseen negative side-effects of urbanisation in the flooding-prone areas of Chalco Valley. As it was comprehensively described in the contextual Chapter Four, chronic flooding in the Chalco Valley was the result of a complex interaction between illegal urbanisation in an ex-lacustrine area, permanent ecological deterioration and ground subsidence, poor sanitation, inadequate policy responses and political corruption. This can be seen as a case of inadvertence by ignorance despite the long term nature of the process because, as explained before, the federal government’s objective was to raise through PRONASOL the living standards of the most impoverished by, among other things, providing drinking water and sewage systems without foreseeing flood risk generation over time (Aragón-Durand, 2007).

Four interviewees tell the story of Chalco Valley’s inundations as the result of an education problem:

- A. Head of the Department of Rural Programmes and Social Participation of the Regional Administration of the Valley of Mexico of the CNA (GRAVAMEX) of the National Commission for Water (from now on Head of RPSP),

- B. Coordinator of Capacity Building of CENAPRED,
- C. Director of Civil Protection of the State of Mexico,
- D. General Coordinator of SINAPROC

Analysing the policy claims, I wanted to look at the kind of subjects the interviewee ‘allowed’ to appear in his/her explanation of the events and how these subjects were portrayed in terms of their knowledge capacities to ‘understand’ the situation and to act. This is with the intention to explain to what extent the local inhabitant’s ‘ignorance’ *vis à vis* ‘expert’ knowledge of inundations has shaped this type of causality regarding Chalco Valley’s floods. For that purpose I started examining the argumentation of the **Head of RPSP**⁴⁶ because his two opposing claims explicitly refer to the two different subjects found in this version of disaster causality, namely the ‘experts’ and the local inhabitants or ‘ignorants’ of the flooding risk.

The Department of RPSP is in charge of liaising with local residents to receive and respond to their demands regarding hydraulic works, water body maintenance, infrastructure provision and emergency assistance. The two claims of the **Head of RPSP**’s argument, which answered the question: what happened in Chalco Valley the first of June, 2000, are the following:

[Claim 1] “*Well... in general...it is a lesson we all know*”

↑
Opposing claim
↓

[Claim 2] “*It was a surprise [the floods] for those who live there [in Chalco] and finally [they] realised that there is a ‘living river’*”

The first claim is a conclusion of a ‘predictable consequence’ that the authorities were somehow expecting to happen due to past similar events. Thus, he frames the consequence as an (other) ‘lesson’. The metaphor *lesson* is powerful when it comes to signify the inundation as a ‘positive’ and empirical situation that is meaningful for experts and authorities. It can be inferred that he speaks from a standpoint where he could have foreseen the inundations in Chalco Valley, thereby reinforcing his moral authority to justify his position and to prove his knowledge to convince the interviewer to explain the flooding risk phenomenon.

⁴⁶ Interview undertaken in April 2003

The **Head of RPSP** places himself in the group of knowledgeable people (“*a lesson we all know*”). To him Chalco Valley’s inundations were not necessarily a surprising event given the fact that previous inundations actually happened before. In this vein, it could be assumed that inundations could be avoided through rational action based on the knowledge affected residents may have had of past events (“to learn the lesson”). The evidence that supports this first claim is about whom the subjects are and how those subjects acquire knowledge to evaluate the flooding-prone characteristics of the Chalco Valley basin and the type of response elicited:

[Evidence 1] “*We, the people who live in Mexico City, since ancient times, (know) that this is a flooding zone... and we have tried to control [past] inundations by any means...*”

The **Head of RPSP** argues that by the fact of being a Mexico City citizen and having lived there for many years, the person can be aware of the flooding vulnerability of the Chalco region and therefore is capable to act adequately. By using the personal noun *We*, he distances himself from the rest of the people living outside Mexico City who are not seen as knowledgeable or at least not aware of this historical situation and hence incapable of acting. *We*, is a linguistic resource used to define the interviewee’s discursive position before the ‘Others’ and therefore excluding other subjects’ potential counter-arguments: *we (know)* vs. *they (don’t know)*. This is meaningful in terms of policy design and implementation because, as he claims, since the *we* (CNA authorities) know how things stand (‘know the lesson’), they know what to do to cope with future inundations. Also from that same evidence it can be said that *they* are the immigrants who ignored the hazards and therefore populated Chalco’s Valley.

With the expression ‘ancient times’ he highlights the time frame from past to present, justifying the naturalness of the flooding proneness of the zone where immigrants ended up settling. So this evidence gives little room for counter-argumentation by employing a taken-for-granted fact of the ecological dynamics that has “remained unchanged” for many years and that should have been known by Chalco Valley migrants and residents. Interestingly by opposition, the second evidence reinforces the first one and allows *the ‘Other’ (they)* to appear as subjects in the discourse:

[Evidence 2] *“It is nature and the fact that people are not aware of the geographical and natural conditions when settling in a place is what puts them at risk”.*

People who moved to and settled in Chalco Valley’s region “ignored” its unsafe historical-natural conditions and for that reason they are implicitly labelled as the “ignorants”.

The data backing is about migrants’ agency to move and settle in a risk zone. The **Head of RPSP**’s interpretation of the situation appears to be that the image of affected people as victims is the result of their own decisions. That general statement can be found in other interviewees’ arguments such as those of the Structural Causality, i.e. the **Coordinator of Capacity Building of CENAPRED, Director of Civil Protection of the State of Mexico**. This is an element of discourse coalition. He asserts that settlers have the agency to choose where to live so they are the first groups to be blamed for having been affected by the historical recurring floods of Chalco Valley.

In the second claim he makes his own interpretation of affected people’s experience of the floods. He talks of the ‘Others’ while referring to the affected residents – “ignorants” – who were supposed to have expressed the claim that the local inhabitants were not aware of the river as a potential hazard until inundations occurred. The implicit meaning of this claim may be interpreted with the statement below:

“(…) for the first time, the inundations made the river appear before local people’s eyes”

– which reinforces the claim assumption that *inundations teach people*. This discursive construction reveals the origin and nature of knowledge that supposedly is useful for practical purposes. So it is argued that experiential knowledge of the floods is necessary to perceive floods risk but not sufficient. In his view, CNA information of inundations helped affected people’s perception of flooding risks:

“Little by little affected inhabitants understood the explanation given by the CNA. As a result, people went out of their houses, realised where they were living and acquired (technical) knowledge (of the danger) that they had not previously had...”

From the **Head of RPSP**’s claim it can be interpreted that possibly thanks to CNA explanations and warnings, affected people became aware of the hazardousness of

the river. It is by experiencing the inundations and by understanding the CNA technical information of the inundations' risk that affected people *can learn* and can relinquish their condition of “hazards' ignorants”. It is expected, then, that they will be more able to cope with future inundations. So this discourse defines and selects the `ignorants` as the policy target population; in that way, the desired action to achieve inundation prevention should be to teach them how to perceive “the real” risk in order to `avoid` future floods. This issue is analysed in Chapter Seven, section 7.1.

It is worth noting that the second claim introduces another important discursive object: *living river*'. During the interview the **Head of RPSP** never mentioned the word canal or its actual name, *La Compañía*. He called it a *living river*'. This natural element, not portrayed as a hazard but as a natural resource, is used as a rhetorical tool to construct the claim as a neutral conclusion and possibly distracting the attention from the hazardousness of the canal – which is part of a man-made system over which the CNA has been undertaking maintenance works for several years. In a way, I can assume that for the **Head of RPSP** one political function of the *living river*' is to avoid being blamed for the failures of the La Compañía Canal and the `mistakes` committed by the CNA (specifically by GRAVAMEX)

So far, the analysis of the two claims explains who the subjects are, how they are portrayed, who might be seen as the target populations of the policy, and what that means when it comes to perceive (or not) an historical situation characterised by chronic flooding. The CNA authorities, Mexico City inhabitants and experts can predict the floods because, as stressed by the **Head of RPSP**, they already knew the historic ecological problematic of that particular zone that is prone to inundations whereas Chalco Valley's immigrants (who became residents) did not appreciate that situation when they moved there.

The argumentation of the **General Coordinator of SINAPROC** also portrays inundations causality as inadvertence by ignorance but introduces other element related to structural factors, namely, the socio-economic conditions of poor people and political corruption as the driving forces for illegal urbanisation. She claims that those structural factors that made poor people move to Chalco Valley contributed to some extent to the occurrence of inundations to the same extent that poor people were not aware of the hazards.

Like in the **Head of RPSP**'s claim, the **General Coordinator of SINAPROC** elaborates the argument by contrasting two different subjects: the experts and the poor.

The former are capable of perceiving inundations' risk whereas the latter are not. She identifies herself with the first group by implying that risk avoidance and disaster prevention are a simple matter of knowing the 'real' threats in order to act accordingly:

"...it is very easy to realise that those places are unsuitable to live in..."

(General Coordinator of SINAPROC, 2003)

But the argumentation of the **General Coordinator of SINAPROC** differs from that of the **Head of the RPSP** in the sense that inadvertence is not only about cognitive capacities, a product of 'ignorance', but also a collective process determined by their social condition (poverty) and constrained by structural forces, in particular by political corruption schemes that promoted urbanisation without any planning. This is backed by the first and second warrants:

[Warrant 1] *"...it is very easy to realise that those places are unsuitable to live in; ... even despite the lack of sanitation infrastructure and (urban) services politicians disregard that fact and 'arrange'⁴⁷ social commitments with poor people and allow them to settle there and grant them deed titles..."*

[Warrant 2] *"...poor people are forced to live there and they are not aware of risk that is why they ended up settling there...and at the end of the day, politicians have to accept that situation and tolerate those people because they are unable to evict them... that happens everywhere"*

The evidence she uses to support this claim is a linear causal relation between poor people migration and the inadequate environmental conditions of Chalco's Valley — where they were not supposed to have settled. According to the **General Coordinator of SINAPROC**, poor people were 'forced' to settle in Chalco Valley because they could not afford buying or renting urban land elsewhere. In this case the role that knowledge of hazards may play in risk perception is mediated by the social position of the subjects and their historical circumstances.

Nevertheless for her, perception of disaster' risk is a rational, universal and objective capacity that should be acquired by all subjects regardless of their different historical and socio-political contexts. In terms of policy responses and following this

⁴⁷ In Mexico, the word 'arrange' can be understood as a trading act in which politicians get money or votes from people and they allow people to settle illegally in prohibited places providing deed titles and even urban services.

argument, if those `poor` migrants change their behaviour, their exposure to inundations risk would be reduced and floods prevention measures will succeed. This could be achieved by educating them in order to share the same common risk perception regardless of their social position and therefore avoid unsafe places.

In the **General Coordinator of SINAPROC** `s view, policy intervention is mainly an education task (policy intervention is analysed in Chapter Seven, section 7.2):

[Backing 1] *“So that is why policy has to be designed in terms of convincing people to live at risk, otherwise prevention cannot be achieved”.*

Moreover, her interpretation of risk as an objective and universal conception gives no room for taking into consideration the knowledge the other subjects have and the varying meanings that could be attached to their notions of inundation risk. This `objective` notion of risk has also important policy implications in the sense that it closes potential interaction while formulating policy responses with affected people`s experiential knowledge.

Besides, the notion of inundations risk is used by her as a key strategic weapon for pushing the problem of the Chalco Valley`s floods out of the realm of accident into the realm of inadvertence. Floods risk serves this function in two ways. First when the harms are seen as suffered by populations, the association of harmful outcomes with human action is accepted as a demonstration of a cause-effect relationship. Illegal settlers who happened to be poor people were forced to settle in insecure places due to their socioeconomic condition; they disregarded their exposure to flooding risk and were affected by the Canal overspilling of waste waters.

Second, as explained with detail in Chapter Four, corrupt public officials turned the blind eye to the fragile ecological conditions of Chalco Valley and benefited from promoting the illegal selling of plots where, by the end of the 1970s, there was no sanitation system in a context where land planning was absent. In this discourse `poor` migrants are portrayed as victims of their own `ignorance` and of the authorities` actions and corruption schemes. So, inadvertence by ignorance is also somehow determined by government authorities because illegal settlements pay them off in terms of political clientele gain.

Another important issue becomes evident here: subject`s positionality. In this case, the subject`s position is defined by the relation between the subject and the natural

phenomenon and knowledge about the evolution process of the phenomenon determines the subject's position. Those who are able and are also entitled to know about disaster emerge as subjects in this discourse. To the **General Coordinator of SINAPROC** subjects who possess (scientific) knowledge have the agency to act or intervene.

On the other hand, the process of constructing natural hazards gives identity to the subject. It is an identity that is worthwhile investigating, by finding out how it is constructed and the social interaction with the so-called vulnerable or target people. The social nature of the hazard locates the subject in a position of advantage before others who cannot be constructed as subjects because they lack the scientific and politically legitimised and meaningful knowledge for policy purposes, stated in advance by some of the policy makers who are entitled to talk and make policies and also by legislation.

At this point it is important to remember that part of the intention of this analysis is also to make explicit how the choice of words and linguistic tools reveals a strategy to 'put things in a certain way' that is convenient from the interviewees' perspective. The way the **Head of RPSP** and the **General Coordinator of SINAPROC** make sense and 'tell the story' of the flood is important because they construct not only their own personal position, but that of their institution and the image of the desired policy target populations.

Under this problem construction, subjects' identity depends on the knowledge capacities they possess to define what could be the causal factors of the inundations and risk and the agency they have to develop such capacities under concrete structural conditions. In sum, the discourse of Inadvertence Causality by "Ignorance" constructs the following system of statements, subjects, objects and system of meanings:

**Box 2. Discourse of Inadvertence
Causality by “Ignorance”**

System of Statements	Disaster are: <i>Lessons to be learnt by ‘ignorants’</i> <i>Predictable consequences</i> <i>‘Surprise’ for migrants and residents</i>
Subjects	Authorities (‘teachers’) vs. residents and illegal immigrants (‘ignorants’) Target populations = ‘risk ignorants’ ‘Corrupt’ authorities
Objects	La Compañía is a ‘living’ river Nature is a ‘given’ static entity which rarely changes. Ecosystems remain unchanged over the years
System of meanings	‘Living at risk’ “Lesson” as a metaphor Disaster are events explained to distinguish the subjects “We” from the “Others” Floods in Chalco Valley were a “learning experience” for the affected people

2.1.2 Inadvertence by ‘carelessness’

Under this discourse, disaster problem is ‘constructed’ when managers and operators ‘perceive’ the hazard but do not provide full control and adequate maintenance to the system or device that may pose the risk. In this type of inadvertence the definition of disaster cause focuses mainly on the technical aspects of man-made systems and of natural hazards. Social agents and target populations remain hidden. In this case, the solutions proposed are centred on the quality and quantity of scientific-technical information either of the La Compañía Canal or the characteristics of the weather, heavy rains, increase of waste waters level, etc.

Seven interviewees tell the story of Chalco Valley’s inundations as it was mainly a technical problem that was not adequately addressed and solved:

- E. Head of Research on Socio-economic Impact of Disaster of CENAPRED
(thereafter ‘Head of Socio-Economic Research of CENAPRED’),

- F. Director of Hydraulic Infrastructure Maintenance and Inundations Risk Reduction of the Water Commission of the State of Mexico (thereafter 'Director of Inundations Risk Reduction of CAEM'),
- G. Head Representative of the State of Mexico Government in the Environmental Metropolitan Commission (thereafter 'Head of Enviro Commission Edo Mex'),
- H. Representative of the State of Mexico Government in the Metropolitan Commission of Civil Protection (thereafter 'Head of Civil Protection Commission Edo Mex'),
- I. Head of the Environmental Protection Department of PEMEX (thereafter 'Head of Enviro PEMEX'),
- J. General Director of Environmental Policy and Planning of SEMARNAT (thereafter 'General Director of Environmental Policy of SEMARNAT') and
- K. Head of the Decentralised Body of Drinking Water, Sewage System and Sanitation of the municipality of Chalco Valley-Solidarity ODAPAS (thereafter 'Head of ODAPAS').

The **Head of Socio-Economic Research of CENAPRED** claimed that Chalco Valley's inundations could have been foreseen by hazards forecasting and thus the impact could have been avoided.

[Claim 1] *It is a **typical case**...It could have been foreseen by monitoring the [waste] water levels...and how that could be affected by forecast rainfalls and by [evaluating] the canal walls [its physical condition]...evidently, isn't it? **It was simply a lack of precaution**...*

To him this was a typical case (*un caso típico*) that could be extrapolated to other disaster explanations. Implicitly is the idea of knowledge of hazards and previous inundations. His claim is built in terms of what could have been done and he explains what "really" happened in terms of the impact of heavy rains on the "vulnerable" walls of LCC. Thus he asserted that prevention is a combination of monitoring the functioning of the water flows (he never used the word canal) and forecasting the

natural hazard that could have impacted on the canal walls. Prevention is a technical endeavour based on technical framings.

The technical framing of the floods causality is warranted by the CENAPRED legitimacy for undertaking disaster impact assessments. It is worth recalling that CENAPRED's duties are on the one hand monitoring and forecasting hazards and on the other, evaluating damages in terms of infrastructure and economic losses. The scope of CENAPRED's activities delimits in a linear fashion the boundaries of the link between causes and consequences. His argument is politically neutral and simplifies the complexity of the social-technical-natural relations - I assume - in order to portray the event as understandable and amenable to human intervention. Nevertheless, blaming and the attribution of responsibility are ambiguous and no actor or institution is clearly identified. The second warrant is a disclaimer for avoiding institutional blame and responsibility:

[Warrant 2] *“CENAPRED is not in charge of the canal maintenance... [only of disaster impact evaluation]...”*

So in his last warrant the blame is put on nature:

[Warrant 3] *“Let's accept that nature manifests itself in extreme variations...”*

The backing underpins CENAPRED's reliability on disaster impact evaluations and on the idea of how planning and prevention measures could reduce losses. Technical framing of disaster causality by carelessness is also exemplified by the **Director of Inundations Risk Reduction of CAEM**. The **Director of Inundations Risk Reduction of CAEM** elaborates on his argumentation more with two inter-related claims that are intended to explain in specific technical terms the chain of causation. The first claim emphasises the extremeness of the storm that outran the canal coping capacity while contributing to the deterioration of its walls which by then were already weakened by the prevailing ground subsidence. The second one is a more detailed technical explanation of the deteriorating condition of the LCC and the impact caused. However in his argumentation, he makes no detailed reference to the social consequences of the floods.

[Claim 1] *...An extraordinary storm generated a massive volume of water flow higher than the riverbed coping capacity of 43 m/sec and... [it took place] in the transition zone where the terrain is sinking...*



[Claim 2] *...leaks in one of the (canal) walls...here... (he shows a drawing) the canal curves and because of the storm and the leaks the wall weakened and couldn't cope with a high hydraulic pressure and ...the wall failed and a lot of water spilled and affected many people*

As it was in the **Head of Socio-Economic Research of CENAPRED's** argumentation, the institutional context and job 'expertise' of the **Director of Inundations Risk Reduction of CAEM** determine the elements used to frame disaster. It could be inferred that the way he constructs the claim is related to his work, responsibilities and institutional scope for putting into place concrete measures. He denied the possible failed intervention of CAEM in guaranteeing safe conditions of *La Compañía Canal*, therefore overruling carelessness as a causal factor.

[Warrant 1] *"...the official assessment reported that..."*

is the premise used to legitimise technical explanations and to exclude other people's accounts and counter-explanations that might contest and construct the problem causality on different grounds other than those provided by the water authority in the State of Mexico (CAEM's policy makers). It can be interpreted as a way of underscoring the authorities' knowledge as the valid one since it is supposedly built in neutral and uncontested terms and hence seeking for the truthful version of 'facts'. The second warrant shows how natural hazards can be used as a rhetorical tool to justify the scope of government institutional responses and the failures attributed to them.

[Warrant 2] *... "It is impossible to blame someone when it comes to extraordinary hydro-meteorological phenomena since many times there are no feasible [technical and economic] solutions...institutional response capacity for providing definitive solutions is constrained by the economy"*.

By accepting the limits of solutions that the Water Sector (CNA and CAEM) can provide to prevent inundations, nature is blamed. It is as if any new responses from the

government would also fail to cope with natural threats despite the advancements of technologically-based solutions of a technologically-defined problem because in the end, 'nature's power is bigger than human coping systems'. This warrant is backed by appealing to the power of nature in transforming man-made systems. It is interesting to examine how he also identified 'permanent solutions' as constrained by the economy.

To justify CNA and CAEM lack of attention and precaution responses, the **Director of Inundations Risk Reduction of CAEM** brings to the fore the claims of affected people with regard to government carelessness in inspecting and eventually providing proper maintenance to the LCC. He appeals to past events when nothing happened, apparently in order to be excluded from any blame.

[Backing 1] *...It is said that in past times leaking (through the LCC walls) had occurred and were even noticed by local people but that has passed unnoticed by the authorities, nevertheless I can tell you that the same kind of situation had occurred and nothing serious happened then...*

The **Head of Enviro Commission Edo Mex** frames the inundations as another example of inadvertence by carelessness, but this time he puts them in the context of the unequal relation between the State of Mexico and Mexico City, unveiling the socio-economic and political imbalance. Despite the fact that he was not fully informed about the concrete event of Chalco Valley he went on to explain what occurred. During the interview he used a disclaimer by saying that he lacked technical information regarding the LCC infrastructure.

[Claim 1] *Even though I have little information about hydraulic infrastructure... For sure... It was a problem caused by the lack of maintenance, of sediments accumulation that reduced the riverbed along with an extraordinary storm that loaded the river and this provoked the breakage...and of course all problems regarding social inequalities in that zone arose, we all know...*

His argumentation contextualizes the idea of carelessness (lack of adequate maintenance of the LCC) at regional level and that can be interpreted as the means (or even an excuse) to talk about the linkages between Mexico City and the State of Mexico. He highlights the regional impact of the inundations on the discursive context in the sense that flooding - once again is a process that unveils the problematic close

connection between the two administrative-political units, Mexico City and the State of Mexico. The former ecological conditions of the lake made Chalco's Valley a flooding prone region. Urbanisation and settlements disrupted the 'natural balance' and inhabitants became affected by the natural dynamics already by then radically transformed.

The **Head of Enviro Commission Edo Mex** blames former President Salinas's administration and the national development policy that was launched in Chalco Valley which eventually promoted 'chaotic' urbanisation. Even though he is neither a scientist nor a technician he did not hesitate in putting the blame on the infrastructure failure and the fact that it rained a lot during those days.

The claim backings are constructed around the idea that the urban-environmental problems of the State of Mexico are caused by its relation with Mexico City in particular with regards to the chain of causation: migration→urbanisation→bad planning→services provision.

[Backing 3] *A national policy has, for a long time, favoured Mexico City needs providing it with more resources than the State of Mexico, disregarding the urban and regional dynamics of the neighbouring municipalities of the State of Mexico. That has contributed to the migration increase into the State of Mexico. The State of Mexico depends on the federal government with regards to those problems (solutions).*

With this view, Chalco Valley's inundations represented a good opportunity to highlight social inequalities. He portrays the State of Mexico as a "victim" of the failure of national development policies that is manifested in the migration patterns that have followed and in the impact migration to the State of Mexico has provoked in the environmental deterioration of the peri-urban interface. To him, analysis of the problematic of the whole State of Mexico, LCC included, has to integrate this kind of connections.

Like the **Head of Enviro Commission Edo Mex**, the **Head of Civil Protection Commission Edo Mex** constructs the claim with reference to the LCC in terms of a simple cause-effect relation:

[Claim] *Canal breakage and inundations...housing is built under the Canal level, waste waters and hence a disaster occurs.*

But what it is important to analyse here is the evidence she puts forward to tell the story. She contextualizes the LCC failures within the process of urbanisation and service provision, putting special emphasis on the relation between two subjects: the government and the people. In general she blames the government for not properly inspecting and maintaining the LCC and not responding to affected people's complaints regarding the canal fissures and she also blames local people for dumping rubbish into the LCC and therefore reducing its carrying capacity. Moreover, the **Head of Civil Protection Commission Edo Mex** goes beyond the inundations causality and raises the issue of the social demands and political costs and commitments that emerge between government and affected people as a result of the inundations.

[Evidence 3] *“Government doesn't provide services because (people are) located in high risk zones. When disaster happen people get upset and demand housing and plots...”*

The **Head of Enviro PEMEX** elaborates on two claims which are related to the La Compañía Canal; the first one referred to the causes and the other to the consequences of the canal breakage

[Claim 1] *Inundations' main cause is the oversight of the canal...the [lack] of a good management (programme) of an open air canal...*



[Claim 2] *... The canal brakes and floods a lot of people with waste waters with the high likelihood of causing health problems...*

The first claim clearly establishes the carelessness of an unstated actor or institution for not having provided the adequate monitoring and maintenance. He talks implicitly about a culprit even though he does not label the person as such. It is worth noting that when asked to mention who could be blamed for the inundations he was reluctant to specify any person or institution. The evidence that refers to a hypothetical culprit points to two unnamed subjects, the government that allowed the urbanisation and the people who moved to the zone putting pressure over the unsafe land.

[Evidence 1] *Chalco Valley is an example of the worst sanitation management of waste waters in an open canal under very difficult conditions...besides, the canal is above (the ground).*

[Evidence 2] *Trying to find the culprit is very difficult... when the canal was designed many years ago, there was no one living in Chalco Valley...what happened is the result of the lack of land use planning and uncontrolled settlement.*

The claim warrant centres on the importance of risk awareness for inundations prevention. It is understood that risk awareness can be realised through the undertaking of *any* risk analysis of the sanitation system.

[Warrant 1] *“Any risk analysis would indicate that a huge problem would come up...Risk could have been foreseen ...Nobody cares about the high risk it may eventually pose”*

By using the qualifier *any* risk analysis he is assuming that it had been easy to estimate the danger of the sanitation system failure; it is like appealing to common sense. By defining the cause as a technical one the warrant is also thought to be of a technical nature so risk analysis of infrastructure is emptied of any concrete image of actor or institution. When providing evidence of the canal rupture, the cause is framed as a technical-managerial failure and hence allows the speaker to compromise and prevents him from mentioning who to blame. Moreover, the image of the so-called potential culprit falls on common places such as lack of land planning or the designer of the canal, both of them located in very past times. Calling for the past is a rhetoric resource to prevent the speaker from mentioning a living culprit. Nevertheless, in another part of the interview he is clear enough about the government sector in charge of rivers, dams and open air canals, the CNA. He was very cautious about that fact. *“Nobody cares about the potential risk”* is a strong sentence that points to recklessness: people were aware of the hazard but were unwilling to act in order to prevent the inundation.

The **General Director of Environmental Policy of SEMARNAT** puts forward his argument with two claims of a different nature which are related to each other:

[Claim 1] *It was a terrible **misfortune**... [I was driving back to Mexico City from Puebla City when I got stranded for six or seven hours and at that time I didn't know what was going on...] and then I came across information that it was this canal (LCC) rupture and this inundation and that the population was flooded by shit; it is a shame that We have rivers of shit...*



[Claim 2] *There was no (LCC) maintenance, It was not a natural disaster...it was a misfortune, a disaster but a man-made (artificial) disaster as far as I can see...*

The first one is the conclusion of the personal situation the policy maker experienced when he got stranded in the Mexico-Puebla highway during the Chalco Valley's inundation of 2000. The second is a claim about the possible factors that could have caused the floods – the lack of sanitation infrastructure maintenance. In the first claim he summarises the happenings as a terrible misfortune not only for the population that got flooded but also for himself – in fact terrible disgrace is word loaded with a moral meaning –*tremenda desgracia*, in Spanish.

So the knowledge the **General Director of Environmental Policy of SEMARNAT** had about the situation was not primarily expressed in policy or scientific terms – as it might be expected because he is an ecologist and was working as a policy maker at the time of the interview – but as an affected person. That is why he uses colloquial language to appeal to emotions and he concludes that the event was a man-made disaster. Besides he extrapolates this crude characterisation of the river to the rest of the rivers in Mexico: “...*we have rivers of shit*”, putting the blame in someone unspecified.

With regards to the claim evidence he mixes evidence of two sorts: his normative interpretation of the water policies in Mexico with the employment of the word [*shit*] that condenses the quality of the water that inundated the Chalco Valley's region and that serves to provide a much closer (and sensitive) dimension to the misfortune. It is interesting to note that a more sophisticated explanation of the flooding risk of the region elaborated on ecological grounds is the warrant for asserting that the current state of water and sanitation policies in Mexico is – like the floods – also a disgrace.

[Evidence 1] *“The water and sanitation management in Mexico is so bad that we are going to get flooded with shit...”*

[Evidence 2] *“As far as I know it was not because of heavy rains because it didn't rain extraordinarily, nor did Mexicans make more shit than any other day...”*

A technical warrant legitimises a mundane evidence for supporting the claim. The urbanisation put into place in Chalco in past times reinforces the idea that the ecological transformation that created unsafe conditions for people was driven by humans serves as the second warrant to define the event not as a natural but as a more complex one.

[Warrant 1] *“We live in an enclosed basin which is prone to flooding so sooner or later it is going to get flooded...you don't have to be a genius to know it”.*

[Warrant 2] *“Water policies in Mexico are schizophrenic”.*

[Warrant 3] *“A great city, Chalco that it is already a municipality, and all this can be traced back to past times so it is going to get flooded...so there is no way this zone is not going to get inundated”.*

Continuing with the analysis of the technical framing a closer look at local level also reinforces the idea that the nature of the interviewees' job and the experience condition the answer. At the time of the 2000 Chalco Valley's inundations the **Head of ODAPAS** was a “common citizen” (as he described himself during the interview) that participated in aid emergency activities in his neighbourhood, a year after, he was appointed **Head of ODAPAS**. During that time, among other activities, he closely coordinated the surveillance of the LCC, especially during the rainy seasons. So his accounts are the result of his personal and work experience as it was with the **General Director of Environmental Policy of SEMARNAT**.

The first claim of the **Head of ODAPAS** is a detailed account (in time and space) of the importance of the well functioning of the LCC at regional level as a rainfall and waste water open sewage canal and the impact of the LCC rupture at local level. His second claim is an unstated conclusion about the impact of both the LCC walls break and the bad sewage system of Chalco Valley on the *colonias*. Unlike other interviewees that explain the inundations in terms of inadvertence by carelessness he constructs the warrants according to what the affected people witnessed and said.

He gives importance to affected people's accounts about what `really` caused the floods and to the impact the floods had on organizing the local people to cope with

future contingencies, i.e., to an “Inundations Contingency Plan”. Besides, in order to go further in explaining inundations causality, he focuses in the pumping system upon which several *colonias* of Chalco and Chalco Valley municipalities rely for evacuating their waste waters. This is the only evidence he uses to frame the solution even though while describing the `facts` he made reference to other causal factors like ground sinking. What seems to be clear is that in his argument, framing Chalco Valley’s inundations is reduced to the issue of the `unreliable` sewage system, in particular the performance of the two pumps.

[Evidence1] *“Two pumping stations are not enough and due to their characteristics they cannot cope with such volume of both rain and waste waters...One of the pumps relies on electricity so when the energy is cut the diesel pump starts working... it is not a reliable system...Imagine if the energy is gone for two hours, waste waters would spring up through the house drains...”*

The backing underpins that evidence:

[Backing 1] *“Chalco Valley is a saucepan... it is a Valley like a kind of...saucepan and all waste and rain waters are pumped into the La Compañía Canal and from there to the Gran Canal that is why we have a lot of problems because even though the sewage system works...we can't say that it works perfectly but it can't cope with when there are also heavy rainfalls... Discharge fee is not covered by the households”.*

This, again, can be explained because his framings of facts and solutions are embedded within his personal and work experience and his own concerns on making the sanitation system work. In sum, the discourse of Inadvertence Causality by Carelessness constructs the following system of statements, subjects, objects and system of meanings:

**Box 3. Discourse of Inadvertence
Causality by Carelessness**

System of Statements	Disaster are: <i>Result of lack of precaution</i> <i>ie final outcome of the chain of causation: migration-urbanisation-bad planning</i> <i>ick of maintenance of La Compañía Canal</i> <i>Oversight by operators and public officials</i> <i>Misfortune</i>
Subjects	Managers/Operators Government and the people (State of Mexico's residents) Government allowing settlements in unsafe places and irresponsible' people Affected and (unstated) 'hidden' local people State of Mexico is 'victim' of Mexico City's bad and 'inadequate' development national plans in late 80's
Objects	Man-made systems/ sanitation La Compañía is a 'canal' Nature is a hazard/ Heavy Rainfalls
System of meanings	Natural balance "disrupted" by urbanisation and lack of development planning Disaster causality is what the subject is able to do to control the natural hazard that poses the risk

2.2 Discourse of Accidental Causality

The so-called 'natural' disaster are commonly portrayed as accidents of nature. Accidental causality is defined when phenomena are the result of unguided actions with unintended consequences or when machines run amok. This is the realm of no human intervention or intention; it is the realm of nature. The argumentation of the following five interviewees can be grouped under this type of causality:

- L. General Director of SINAPROC
- M. Former General Coordinator of SINAPROC
- N. General Coordinator of Water Provision and Sanitation Projects of Mexico Valley-CNA (thereafter 'General Coordinator of Water and Sanitation of CNA in Mexico Valley')
- O. General Director of Infrastructure Protection and Emergency Attention of CNA (IPE-CNA)(thereafter General Director of IPE-CNA)
- P. Operations Manager of GRAVAMEX-CNA

The **General Director of SINAPROC** argues that Chalco Valley's floods were a natural process. His claim underlines the naturalness of the disaster causality: the combination of the heavy rain falls, the ongoing sinking process of the ground and unstated technical aspects.

[Claim 1] Heavy rain falls, mainly heavy rain falls were the causes; of course with the natural leakages, the sinking process the Valley has undergone for many years and also because of the technical aspects that are explained there [in the official report]

By showing and reading an 'official' report elaborated by his office (the General Direction of Civil Protection) he avoided explaining details of the event. His argumentation is quite simple and is supported by the act of reading and forcing the interviewer not to make any interruption. Even though he was asked to go further seeking causes-and-consequences he refused to run the risk to be contested by the interviewer. The backings are centred on the idea that what matters is to respond by providing solutions to problems.

[Backing 1] I think that when a natural disaster takes place and causes a critical situation...one has to look for solutions instead of culprits. I don't dare to say...I am not a researcher nor would like to judge; In my work I have to provide solutions, to make solutions work...I don't seek culprits.

By refusing being labelled as a researcher he intends to show a neutral position in case he is asked to find culprits. To him, disaster and Chalco Valley's inundations are about emergency aid and civil protection. In fact his job position is about coordinating prompt responses to avoid casualties and mitigate consequences. The official report gives him 'authority' to justify the claim. This can be considered an authoritative warrant and the way he talks and reads the document, the reliability of source seems to be presented as incontestable.

The **Former General Coordinator of SINAPROC** during the time of Chalco Valley floods reproduces this causality discourse that gives prominence to the natural cause:

[Claim 1] *Well... what I can say is that the canal couldn't stand a high volume of water flow, it broke and part of Chalco got flooded.*

Accounts of past socio-ecological characteristics of the lake constitute the discursive context that serve as the evidence to conclude why the canal could not cope with the high water flow. By stressing the fact that Chalco Valley has always been naturally prone to flooding, the happening can then be understood as a natural consequence, hence people who moved there encountered an unsuitable ecosystem to settle in.

The meaning of the claim is contextualized in a framework that accounts for the historic and 'natural' ecological characteristics of the region and that context excludes previous or current failures of policy measures that may eventually have been used to explain the flooding as a man-made disaster. High volume of water flow and heavy rains are natural components of the ecosystem of Chalco Valley and the *colonias* are conceived as neither normal nor natural for that context.

(Evidence 1) *"Let us remember that Chalco is a lacustrine zone, it was a lake...people used to travel by ships and boats during the XIX and XX century then [it is still] a flooding area..."*

(Evidence 2) *"...it is a lacustrine zone that naturally gets flooded...with the aid of the canal management water has been (rightly) diverted ...therefore settlements should have never existed there... and what happened is that it got flooded there and many blocks inundated..."*

(Former General Coordinator of SINAPROC, 2003)

It is worth mentioning that he never frames his evidence in terms of an institutional-technical failure, let alone recognition of the role that CNA might have played as the governmental body in charge of the canal monitoring and maintenance. He excludes any kind of responsibility or blame. By saying *"...the canal couldn't stand a high volume of water flow..."*, he implicitly defines the conclusion considering the relation between the canal and nature's forces that have been present in the region for centuries and that have determined the hydraulic dynamics of Chalco Valley. The uncontrolled urbanisation that sprawled adjacent to the canal is an element that is also interpreted within that framework but as a pressing demographic force that changed the "balance of nature" therefore catalyzing the inundation.

According to the interpretation of the **Former General Coordinator of SINAPROC** it could be understood that when it came to respond in the aftermath, he was prepared and provided adequate assistance, whereas when it came to recognising their role in the disaster causality, he blamed nature and the infrastructure failure excluding institutions and civil servants (*funcionarios*) in charge of risk reduction tasks like those of SEGOB. The inundations claim is based on his personal experience in coordinating emergency responses. His accounts of the floods and how he frames the causality are influenced by what was done during the emergency stage in order to fix the mechanical problem of the canal and to cope with the seriousness of the situation.

The **General Coordinator of Water and Sanitation of CNA in Mexico Valley** centres his argument on the changing context of hazard awareness. LCC was being monitored and no potential damage to its structure was foreseen. Even though evidence of the deterioration of the LCC walls due to the sinking ground was reported it was not thought that something serious would happen. Hazard awareness remained concealed before the inundations thanks to the implementation of a *normal surveillance* of a situation that was characterised as adequate.

[Claim 1] No, but there was no awareness about the severity of the situation in certain segments (of the LCC)... these walls that were damaged by the sinking underground and then....suddenly a failure (fault) occurs eh...? A fault occurs because the ground sinks, (canal walls) crack and the disaster takes place, no?

[Claim 2] Perhaps it was not foreseen, nobody could have imagined that that could happen but very good emergency aid was provided and since then the follow up with (prevention activities)... the problem was diagnosed, studied and it is (now) obviously clear.

Within the context of this evidence the claim framed the inundations cause as a sudden failure of LCC that CNA operators did not expect and for that reason he labels them as an accident. The warrant refers not to past causes of the inundations but to the current situation where hazard awareness is thought to have been raised as a result of a closer surveillance of the walls, monitoring of the waste waters volume and of course of the floods' impact both on the canal and the people. By appealing to scientific knowledge in framing the problem the **General Coordinator of Water and Sanitation**

of CNA in Mexico Valley tries to convince the interviewer that nowadays the problem (of the LCC) has been diagnosed, known and controlled.

It is interesting to note that even though he assumes that after the inundations more hazard awareness through scientific means was raised, problem framing is still the same as before the floods: ground sinking due to overexploitation of the aquifer and growing urbanisation causes the LCC to move in the two axes (vertically and horizontally), therefore being prone to breakage. According to him, disaster causal problem is constructed in terms of an accidental narrative. In the same vein when it comes to proposing solutions the inundations problem is located in the realm of unguided actions with unintended consequences. He employs the metaphor of the illness (“...*the ill person has got AIDS...*”) to illustrate the impossibility to solve the structural causes that are prevailing where only mitigating actions are being carried out.

When talking about blame, no subject is identified even though implicitly he blames groundwater over-exploitation. But this version of accidental causality is somehow triggered by human action. This is a notable difference from the argument of **Former General Coordinator of SINAPROC**. That is illustrated by the following claims that connect humans and nature:

“...nature behaves the way we force it to do...”, “...we (humans) make nature behave like that...”, “...so in this sense yes, there is a culprit”, “and since we are over-exploiting groundwater we are provoking sinking and therefore the wall cracks”

He refers to the government as if he does not work for it. His identity is different from that of the policy makers and government officials; he sees himself as a water technician, not a government bureaucrat.

The claims of the **General Director of Infrastructure Protection and Emergency Attention of CNA (General Director of IPE-CNA)** are the result of two intertwined processes that are framed as natural.

[Claim 1] *“...and then an extraordinary water current of 22 m³ arrived...The night before it rained a lot in that zone and around 22 m³ in the river basin that includes San Francisco river and another one I don't remember right now...and then that created...”*



[Claim 2] *A big hole that had not been detected before and due to the heavy rain falls and the river current... the water level*

raised very fast and it went out through the cracks and since the hard structure (of the canal) is above the soft clay...that created the breakage ...it was a hole in the wall and that is why many measures were implemented...

Again, as in the arguments of other policy makers (analysed above), the way the evidence is constructed and used reveals how the explanations of natural causes in technical terms tend to divert the attention from the human intervention and hence to exclude any kind of responsibility and blame. One key element in this is the image of the LCC as a “river”:

[Evidence 1] *“What happened is that the river was... full of sediments; it had only 25% of its carrying capacity.*

[Evidence 2] *“The river’s capacity was insufficient to cope with the increasing water flow...and because of the quality of the walls material... it (the water) encountered a little geological fault that, in this case, was a fissure and that provoked the river damage...”*

[Evidence 3] *“But that is quite different from saying that any kind of direct responsibility can be attributed to someone...of course not...because CNA was doing their business, inspecting (the LCC) once in a while, due to this problem that kind of task was being undertaken more often ...That means sometimes nature show us what we should have prevented, I repeat it once again it is a river that because of its geologic characteristics it is a complicated river that has threatened us...It is a treacherous river”.*

Nevertheless he recognized the “mistakes” made by an (unstated) actor or institution when heightening the LCC walls with clay and then building an unstable and unsafe infrastructure.

[Warrant 2] *“A mistake was committed: the river walls have been heightened, heightened and while doing that the walls become heavier and cannot hold their weight... they lack a reliable structure...”*

But the argument was constructed upon a general backing that reinforces the idea of the naturalness of inundation’s causality.

[Backing 2] *“In fact there is no one to blame, it is an extraordinary event that nobody could have foreseen...since many years ago no similar event had taken place”*

The argumentation of the **Operations Manager of GRAVAMEX-CNA** builds also an accidental narrative. In explaining the inundations causality, his claim points to a problem of the ‘river’ *La Compañía*. The ultimate causal agent identified by him was the heavy rainfalls that provoked the increase on the water flow breaking the wall. Attached to this idea of causal agent is the extraordinary nature of the hazard. The image of *La Compañía* is that of a river with walls, not of a canal. The combination of ground sinking and the heavy rainfalls constitute the evidence.

A new element is introduced: the adjective *extraordinary* to qualify the rainfalls. In this sense, he supposedly recurs to a pluviometric history record of the region to assert that for many years it had not rain the way it did when the floods occurred; *extraordinary* also in the sense of unusual event with high volumes of water. It can be assumed then that there is no civil protection system capable of adequately coping with such extremeness. The evidence provided to support the claim is primary information of the changing dynamics of LCC and ground sinking generated by the CNA; they are in charge of monitoring the river structure and behaviour and this information system warrants the validity of the evidence to support the claim.

[Evidence 1] *Mainly that (floods) happened as a consequence of the ground problematic in that zone and the extraordinary heavy rainfalls...and that combination was what caused the wall to break.*

[Evidence 2] *There is evidence of previous assessments (but since then (after the floods of 2000) the (monitoring) system was set up and it detected that that (La Compañía river and adjacent areas) is a high risk prone zone...(and also because of the fact that the river is in the transition zone of two geologic structures: soft – that of the clayed ground – and hard – that of the ‘Elephant hill...but yes, we have evidence...).*

The technical evidence is underpinned by the warrant:

[Warrant 1] *We (CNA) have set a monitoring system [to detect changes in the inclination and behaviour of the structure (of the LCC)], that is why we have evidence (of what happened)...the ground settlement is measured...to see whether the walls slope*

or not ...how walls deform... and this [is because] obviously to the quality of the ground and soils in that zone.

The discourse of accidental causality constructs the following system of statements, subjects, objects and system of meanings:

Box 4. Discourse of Accidental Causality

System of Statements	Disaster are: <i>Accidents caused by nature</i> <i>Disruption of the `balance of nature`</i> <i>A situation that demands action/solution</i> <i>A sudden failure of La Compañía Canal provokes a disaster</i> <i>Unforeseen/ extraordinary event</i> <i>“Ill person” with AIDS</i>
Subjects	Nature “behaves” according to man`s impact CNA (“We”)
Objects	La Compañía Canal Chalco Valley ground and topography Ecological dynamics of the region
System of meanings	Floods as natural accidents Human devices have limits when it comes to confronting natural forces

2.3 Discourse of Structural Causality

Constructions of social problems that blame root causes like economic inequality and poverty belong to this type of causal discourse. Interviews of the following can be grouped into the structural causality:

- Q. Research Director of CENAPRED
- R. Coordinator of Capacity Building and Training of CENAPRED
(thereafter ‘Coordinator of Capacity Building of CENAPRED’)
- S. Director of Civil Protection of the State of Mexico
- T. Undersecretary of Ecology of the State of Mexico
- U. General Director of Disaster Management and Urban Planning of SEDESOL (thereafter ‘General Director of Disaster Management of SEDESOL’)
- V. Director of Emergency Aid of CARITAS

Two claims are found in the argument of the **Research Director of CENAPRED**:

[Claim 1] the weakening of the wall, water excess in the LCC.



*[Claim 2] Finally, we got an inundation, in a flooding zone
“known to be a flooding zone”.*

The first claim is related only to the canal and is elaborated in technical terms to explain the causes of the canal break. No data are provided to give evidence to the claim. He is very careful not to provide evidence regarding to what extent the weakening of the canal walls and the impact of the water excess is the result of illegal urbanisation in high risk zones; that is left as an implicit assumption. What is important to highlight in this claim is the warrant that gives validity to it. The report elaborated by Ramón Domínguez, an engineer expert on hydraulic and sanitation issues of the UNAM, in which Cenapred also participated, and that was provided to the CNA for explaining the canal breakage, serves as the warrant.

[Warrant 1] “...we know what was published, what happened...There is a report elaborated by the Institute of Engineering in the UNAM, Ramón Domínguez (the expert)...we participated in the elaboration of the assessment of this...and we sent it to the CNA...”

Warrant 1 is an affirmation that directs the attention to the importance of his position at CENAPRED and therefore of his capacity for having the knowledge to explain what went wrong. Also the warrant directs the attention to the validity of the source and is presented as *the* official report that represents the rules of the legitimate knowledge to give account of the floods causality. This is in great part due to the social and institutional authority the Institute of Engineering of the UNAM has in Mexico as the main official source of knowledge with regards to hydraulic infrastructure.

The second claim is presented as the consequence of a social process that led to (illegal) urbanisation in an unsafe place; and therefore it has political content. In the evidence provided the *authorities* emerge as the subjects responsible for promoting or at least allowing people to settle.

[Evidence 1] “Despite the fact that there was a land use plan, illegal settlements populated Chalco; authorities allowed this to happen to avoid social uprising and problems; what they do is

to pave roads, provide electricity; and at the end we have this zone inundated; it was known that Chalco was a flooding area”.

Law enforcement and land use planning are invoked as the warrants for the idea that corruption and illegal urbanisation in the form of urban services provision constituted part of the flooding root causes.

[Warrant 2]”There are laws and regulations concerning land occupation that people have to obey and endorse. One serious negative obstacle civil protection has to face is the lack of law enforcement...”

The first claim treats the canal as an isolated object from the social and political context the second claim details. So in the explanation of the Chalco Valley’s floods it is not clear whether the problem was caused by the canal failure or other factors. In short, causal explanations rely on socio-political grounds whereas solutions are proposed as merely technical.

The **Coordinator of Capacity Building of CENAPRED** responds without hesitation to the question of what happened in Chalco Valley the 1st June 2000 by mislabelling the LCC as the *Bordo de Xochiaca* which is another canal located elsewhere in the State of Mexico. At first sight the main cause appears to be only a technical failure of the LCC. She focused in very technical details though in an inaccurate way due to her lack of updated information and professional background – she is an organizational psychologist and her job is capacitating civil protection personnel, she is not a technician or physical scientist. No reference to damages to people is mentioned in her claim.

[Claim 1]. “... [t]he overspilling of the Bordo de Xochiaca, It got damaged, it got cracks on its walls and that provoked the floods in a vast area of Chalco Valley, an area I don’t remember how vast it was...”
[she mistaken the name of LCC by Bordo de Xochiaca which is another canal not located in the Chalco region.]

That claim is supported by data of a long explanation of causal factors (presented as facts) of two types: 1) a spotted and concrete problem in the physical features of the LCC; that means a lack of a maintenance programme considering the

‘real’ resistance of the LCC walls for coping with wastewaters flows; according to her interpretation that was what ‘really’ caused the inundations; and 2) tolerance (by local and State authorities) of large settlements adjacent or close to an hydraulic infrastructure that was not meant to support water peaks without having an ‘adequate’ maintenance programme.

With regards to the evidence she presented two implicitly intertwined data evidence. If there had been a good maintenance programme for the LCC, it could have eventually withstood the impact of heavy rain falls and therefore settlements would not have been affected by the waste water overspilling. Inundations would never have occurred if the ‘balance’ between settlements and LCC’s resistance would have been achieved. Causality is framed as an issue of “balance”; it means that if hazards are successfully controlled, even illegal settlements were to be allowed to exist in those ecologically fragile areas, no inundations would have ever occurred having put into place the adequate technical solutions.

How did the **Coordinator of Capacity Building of CENAPRED** arrive to this claim from the information available? According to her, technical and social reports were drafted by official institutions after the floods, explaining on the one hand the reasons for the LCC walls technical failure and on the other the exceeding population growth occurring in that zone without land use planning — that represents a national phenomenon that can be identified in other states of the Mexican Republic. These reports are presented by the interviewee as the warrants that legitimise the explanation of the process of floods causality in an ongoing population growth and uncontrolled urbanisation.

Two references illustrate the above. ‘The case of Chalco’ is a chapter of the book *Impacto socio-económico de los principales desastres ocurridos en la República Mexicana en el año de 2000*⁴⁸ (CENAPRED, 2001), in which Chalco Valley’s floods are framed as a result of the failure of La Compañía Canal. It is a brief explanation of the ‘behaviour’ of La Compañía Canal and the engineering works proposed to ‘definitively’ solve the problem. Besides, a leaflet issued by GRAVAMEX (2001) to inform Chalco local residents and the public at large explains the ‘problematic’ in terms of the effects the settlements have on the ground sinking and how they triggered the cracking of the canal walls. Short and medium-term solutions are presented, namely the

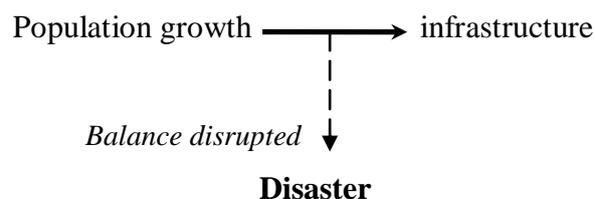
⁴⁸ “Socio-economic impact of the most important disasters occurred in the Mexican Republic during 2000”

reinforcing of the LCC walls and the construction of little dams to regulate the water flow of the LCC, and in the long-term the piping of the waste waters of LCC. In the backing she frames the main cause in terms of the relation between migration and land use. She affirms that *what* has really caused the problem was the pressure exerted by migrants over the peripheral land in the interface between State of Mexico and Mexico City

[Unstated Backing 1]. The relation between population growth-migration into the State of Mexico neighbouring municipalities and a lack of adequate policy responses.

In that sense, authorities reacted to population growth by allowing land occupation in unsafe areas through corruption and lack of planning. The **Coordinator of Capacity Building of CENAPRED** defines this way of policy making and implementation as a *mending act*: reactive policy responses after problems occurs – CNA and the State of Mexico authorities have been responding to similar problems in this way for more than 40 years; so according to her interpretation, disaster are embedded in a socio-political context and are the result of a way of doing politics during the policy process.

In short, inundations causality in particular and disaster causality in general are framed by her as events that could disrupt the balance between population pressure and infrastructure coping capacity: This can be expressed in the relation



The **Undersecretary of Ecology of the State of México** did not express any specific claim with regards to the flood events so it is assumed that he was not well acquainted with the Chalco Valley's floods. Nevertheless, he presents general evidence that could be used to frame other types of urban-environmental problems. The evidence focuses on matters of resource management and planning in a basin context and it might be interpreted that, above all, disaster occurrence are the outcome of inadequate ecosystem management policies.

He calls for the personal interpretation of the interviewer to be recognised as a policy maker with authority and therefore giving validity to evidence: “...*the things that...you know...were present for inundations to take place...*” This also can be interpreted as a way of justifying how he uses the evidence to explain the disaster whose causes he ignores. The backings are of two types. The first one is about the lack of integration of ecological constraints into mainstream land planning. In the second backing he imagines a hypothetical situation and puts himself in the position of a local inhabitant. He invents a monologue that condenses the relation of complicity between the government and the settler that, to him, characterises the political culture of clientelism that at the end was the root cause of the inundations:

“...ah, let’s see...it is an illegal settlement, isn’t it? So I want you to provide me with paved roads, electricity, sewage system...give me deed titles. OK I vote for you but you have to be very good with me...” [A hypothetical local inhabitant].

In the warrants, politicians and policy makers are the subjects that, by pursuing their own interest, contribute to ecological deterioration and disaster. At the time of the interview the **Undersecretary of Ecology of the State of México** was holding that post but due to his professional background as an ecologist he tries to present himself as a neutral scientist and distances himself from politicians and policymakers whom he blames.

In the argumentation of the **General Director of Disaster Management of SEDESOL**, inundations causality is not circumscribed to the hazard impact. A type of structural causality is put forward because he frames this inundations causality as the historic result of socio-economic inequalities that have forced poor people to settle in risk prone areas. In this sense it is very difficult to point to a specific culprit. It is more about a complex chain of actors and institutions’ actions and programmes that along the years have created unsafe conditions regarding the LCC-Chalco Valley’s system. The concrete triggering factor that caused the floods is the LCC overflowing of wastewaters due to an increase in the level and magnitude of rain; however this discursive element is not sufficient to explain how and why inundations in Chalco Valley’s occurred.

His argumentation structure relies on his main assumptions about the supposed ecological transformation of the valley driven by human action, by the pressure over natural resources exerted by unidentified people and decision makers.

[Backing 1] “*Society can be blamed...*”

[Backing 2] “*But you’ll have to find out why the LCC flooded, where did it originate... and I don’t only mean in terms of physical failures but it can be traced back to decisions made 50 years ago... in those days there was nothing...only one little stream and over the years things evolve and you let them happen...*”

[Backing 3] “*....Who is the direct culprit, perhaps a government employee who didn’t care about it [LCC]. You can always find culprits who are not really culprits...You cannot point to the culprit when a water pipe on the street gets broken...a driver with his car passing by and stepping over the pipeline...or the guy who installed the water pipe... I should say there are no culprits or everyone is culprit...*”

[Backing 4] “*Who is the culprit? Who knows...Who are the culprits for the world’s problems... and I can say since Adam and Eve the problem mess started...*”

[Backing 5] “*Corruption culture (as a way of doing things in Mexico) allowed illegal settlements in risk areas and no control over land market is exerted*”.

Calling for past processes of change is a rhetoric move to avoid naming who or what to blame. It is assumed that since he was not very well acquainted with the Chalco Valley’s floods case – by the time of the interview, the **General Director of Disaster Management of SEDESOL** had just taken over that position – the evidence and the warrants to support the claim are of a general character and not clearly linked to the main conclusion. However, it gives the idea that regardless of the severity of the causality problem, one can talk about issues not quite related to the claim but to other problematic that can be used to construct other arguments and problems such as the need to allocate more resources to urban development planning *vis à vis* social development policies.

The **Director of Emergency Aid of CARITAS** constructs the claim as a hypothetical definition of disaster that – according to his interpretation of the inundations he experienced – was proved to be true with the example of Chalco Valley’s inundations. He challenges the metaphor of *spontaneous generation* to ascertain that disaster in general does not spontaneously emerge but is a man-made product. Taking advantage of the question he responds using Chalco Valley’s case study by listing a number of conditioning factors that led to disaster.

[Claim 1] *[Not referring to the particular case]: “...disasters develop, they don’t arise spontaneously, and they are the total sum of risks, vulnerabilities, threats that turn the equation...into a disaster, isn’t it?”*

[Claim 2] *Unstated conclusion [canal] walls breakage.*

Regardless of the concrete empirical evidence in this particular case, the check list of all factors are of general nature and represent almost all possible situations he might have remembered that could have triggered the impact. It is clear that he has ‘lived’ and ‘situated’ information of the inundations impact on people since he was part of the personnel of the NGO *CARITAS* that participated in the emergency aid in the aftermath of Chalco Valley’s floods. In that sense, the data that support the evidence are worded in conditional mode.

The **Director of Emergency Aid of CARITAS** talks about the inundation not in technical terms but in social ones. He portrays the inundation conditions in terms of what he assumes to have happened, and of what an ex-post evaluation of the past event and the conditions he thinks led to it were.

[Warrant 1 unstated] Experienced knowledge of the inundations by the affected people appears to be the basis of the warrant.

[Warrant 2 assumption] No regulations and adequate land use planning were put into place since the inception of the communities in the Chalco Valley’s region.

The warrant gives importance and legitimacy to memories and locally situated knowledge about the LCC unstable material condition and the symptoms it has shown to people (walls cracks) over the last years. Experienced knowledge is shaped by hazards awareness and this in turn is used by the interviewee to guarantee the disaster definition recurring to conditional tense by using the word IF for every supposed condition that may have happened. *When* is the temporal adverb that delimits the timeframe of the backings and it appeals to past times, past events of past policy failures and corruption. It is assumed that there was a beginning, a middle and an end; an end that culminated in a disaster. So a teleological chain of processes are thought to have happened in which unstated actors- labelled as a *bunch of culprits* – are to be blamed. It

is worth noting that these backings are general statements that could be applied to the construction of other urban problems. By recognising the participation of past actors, current and recent past authorities are excluded from the involvement of inundations generation.

[Backing 1] *This disaster that [had] developed 30 years ago when communities settled there, when that infrastructure was designed, when regulations were not observed/enforced or there were none... then the total sum of those factors resulted in [what we know]... current administration is not to be blamed nor the former one...[this problem origin] has many years of development, negligence and a bunch of culprits that should be legally punished because of [no action] made them accessories of one thing that originated from the beginning...*”

The argumentation of the **Director of Civil Protection of the State of Mexico** shows elements pertaining to both inadvertent and structural causalities. For this reason I placed him at the end of the discussion. It is interesting to note that his argumentation appeals to the three rhetorical elements, ethos, pathos and logos when trying to convince the interviewer about his position, responsibilities and the truthfulness of his accounts of the Chalco Valley floods of 2000. When he was asked about Chalco Valley’s floods, he starts with a disclaimer:

“I was not working in that position at the time the floods occurred but I had the information”.

This disclaimer rhetorical function is to protect him from criticism and to allow him to keep a distance from those events that took place years before he took over that position (that he still held in 2008). It is like he is implicitly saying, *“I am not to be blamed for it, but I know what really happened”*. By stating *‘I had the information’* he offers a *‘preferred reading’* indicating the way the argument should be interpreted and how things *really* were. He also implies the existence of just ONE description of events, *his*.

The argumentation of the **Director of Civil Protection of the State of Mexico** touches upon various issues in a sequential chain of events, all related to La Compañía Canal deterioration and rupture within the context of industrialisation-urbanisation of the State of Mexico. The claim can be split into four sub-claims. The first sub-claim defines the LCC as a very old canal.

[Claim 1] “That happened because La Compañía Canal (LCC) is a very old canal...” (Stated conclusion)

Recalling the age of the canal is a rhetoric resource to both bringing the socio-historical and environmental context of Chalco Valley region and its connections with the central basin of Mexico Valley into the discussion and to implicitly justify any problem that may have arisen with the canal as a result of the deterioration process it has undergone. He constructs and uses this sub-claim and the historical evidence that supports it to distance himself from the inundation’s causes and therefore to try to convince the interviewer that the problem was not new and had rooted causes situated in the past.

[Evidence 1] “(LCC)... is located in an ex-lacustrine region where the Chalco, Zumpango and Texcoco Lakes existed... then at the beginning of last century (XX) the lake was drained...an hacienda (La Compañía) was set up and used the river (which turned into the LCC) to get rid of its waste waters”.

In the second and third sub-claim he focuses specifically on the segment of La Compañía Canal that has shown cracks and leakages and in the actions taken by his office.

[Claim 2] “...a section of the canal is especially problematic; it is 7 km. long between the Chalco Valley and Ixtapaluca area...”



[Claim 3] “-...what happened is that once in a while (LCC walls cracks) and (wastewaters) used to leak through it..., so we have to constantly inspect it and if we detect one of those leakages, we fix it immediately...”

This may be with the intention of justifying the previous works undertaken by the CNA in order to fix the walls and to prevent any potential breakage: “...what happened is...so we...”

So far the three claims not only depict the problem but also place the **Director of Civil Protection of the State of Mexico** in it with the aim to persuade the interviewer that the day the inundations occurred leakages were not previously detected. The first warrant “*I have the information*” can be interpreted as a way of imposing one reading of the events. This says something about the reliability and authority of the source from which the data are drawn. In the policy sphere it is common to find that policy makers

of lower ranking accept the information sources of the top official authorities as valid and legitimate. This can be understood as an authoritative statement which is commonly found in a hierarchical policy sector like the Civil Protection in Mexico. The second warrant explains the events in a more neutral way.

[Warrant 2] "Technical reports of the topographic and ground sinking process and the LCC canal capacity in that region. (...led to affirm that the event was the result of a combination of natural forces and the historic ecological deterioration of the zone and the low resistance of the LCC...)"

In the third (unstated) warrant he is very cautious to make any statement because as he says, he was not working in the CP of the State of Mexico at that time. Since the canal is a riverbed administered at the federal level by the CNA, Civil Protection of the State of México cannot be blamed. His fourth warrant supports this statement

[Warrant 4] "CNA did not detect the leakage and may partially be blamed".

More information found in other parts of the interview helps situate his explanation in the context of the industrial development of the State of Mexico and the linkages the State of Mexico has with Mexico City. Disaster explanation is shaped by the 'problematic' imposed by the industrial development of the State of Mexico. He recalls that there are thousands of plants and industries spread along the territory of the State of Mexico which inhabitants have to co-exist with. This relationship is what seems to determine the way he frames disaster and elaborates plans and programmes to deal with those circumstances, so the main idea that underpins prevention measures is that of 'living at risk'.

Thus, disaster is somehow framed by the need to promote the economic development of the industrial sector and at the same time to persuade residents to accept the costs of living in a hazardous environment. In a way he is accepting that despite the 'unlikelihood' (as he affirms) of future impacts of hazards, State of Mexico's residents have to realise that they live in a unsafe place and they have to adapt to that situation. To keep on explaining why some people are exposed to risk, he recurs again to the issue of migration-industrialisation-urbanisation.

He blames Mexico City's migrants for having settled in the State of Mexico exerting more pressure to land, resources and increasing the likelihood of risk exposure. That illustrates the 'clash' between those two different states that has been going on for quite some time. In term of ecological deterioration, Mexico City causes the problems, 'sends' the people and dumps the pollution into the State of Mexico's river banks and orchards.

It can be interpreted that the **Director of Civil Protection of the State of Mexico** embodies the *ethos* of the State of Mexico and portrays himself and the 'original residents' as the victims of Mexico City's migrants who are framed as responsible for the 'bads' of Mexico State; the blame clearly is put on Mexico City and the environmental impact it poses on the State of Mexico. One can say that this part of the argumentation illustrates Chalco's floods as a structural causality.

But, on the other hand, he states that the lack of hazard awareness of the State of Mexico residents and Mexico City's migrants of the 'real' causes and consequences of environmental degradation is a determinant factor in exposing people to current risks. An inadvertent cause very similar to that of the **General Coordinator of Civil Protection** (discussed in part 2.1 of this chapter) can be identified in terms of not having foreseen the side effects of urbanisation and industrialisation and the lack of development planning. As seen above, according to Stone's typology, inadvertence is due to ignorance; the consequences are predictable by experts but unappreciated by those taking actions; in this case, as the **Director of Civil Protection of the State of Mexico** notes, migrants are also 'ignorants' and lack hazard awareness.

Moreover, according to his account, the government that could not plan urban growth or was not willing to do so, or lacked 'the adequate knowledge', played an important role in participating in the problematic. Nevertheless, in some cases, though the government of the State of Mexico has realised the 'real' causes, and despite its efforts to

“...make a lot of things, a lot of programmes, campaigns, information, research...” (Quoted from interview to Director of Civil Protection of the State of Mexico, 2003)

goals are not achieved because society is ignorant and unwilling to take action. The discourse of Structural Causality constructs the following system of statements, subjects, objects and system of meanings:

Box 5. Discourse of Structural Causality

System of Statements	Disaster are: <i>Foreseeable events</i> <i>Issues of imbalance between nature and society.</i> <i>Result of illegal urbanisation, corruption and lack of law enforcement</i> <i>Socio-economic inequalities</i> <i>Issue of natural resources management</i> <i>Improvement in technical responses will help in coping with future extreme hazards.</i> <i>Imbalance between State of Mexico vs Mexico City.</i>
Subjects	Authorities responsible for allowing/promoting illegal urbanisation Corrupted politicians and policymakers Unnamed actors / “bunch of culprits”
Objects	La Compañía Canal Chalco Valley ground, topography and natural resources Ecological characteristics of the region
System of meanings	Disruption of balance between population pressure and infrastructure coping capacity

In this part I showed the utility of argumentation analysis in examining the different disaster causality discourses within the three social domains of disaster in Mexico. The way causal ideas of disaster are assembled evidenced how disaster is constructed. This in turn explains how policy problems are constructed. I analysed three general types of disaster causality, namely inadvertence, accidental and structural within which four different arguments about Chalco Valley`s floods problems were identified.

In the next part of this chapter, I focus on the symbolic images contained in the four problem constructions. The intention here is to elaborate short narratives that best describe how the story is told around the main ‘characters of the play’, namely, images of the government, Chalco Valley people, hazards and La Compañía Canal. The added value of this analysis is to identify the qualities of the images according to the values and beliefs most commonly found in the interviewee’s claims and how these values are embedded in the problem construction. This part of the interpretive analysis serves as bridge between the discourses of this Chapter Six and the analysis of policy responses of Chapter Seven.

3. Problem constructions

I have shown that discourses of Chalco Valley's floods is not uniform amongst all scientists, policy makers and implementers and depends on the claims content and how claims are assembled and used to 'portray' the floods as 'facts' and particularly on the images of causal agents and the emergence of advocacy coalitions⁴⁹. I explained how the four types of causality discourses can be identified and the way they differ on the basis of who the main subjects are, what or who is to blame for the Chalco Valley floods and the objects deemed to pose inundations risk or being contributory factors.

The four discourses differ also on the way the system of statements and meanings interviewees used to characterise the images of the whole Chalco Valley's inundations scenario. This is a function of both the argumentation mechanisms and the rhetoric employed by the policy makers and implementers and of the nature, use and destination of the evidence. In each case the problem is labelled according to the main claim(s) of the interviewees grouped under the type of discourse discussed. Thus, the four problem constructions are the following:

Box 6. Four constructions of the Chalco Valley's floods problem

1. Ignorance of hazards and of unsafe conditions.
2. Failure of infrastructure and sanitation system and inadequate monitoring of risk object.
3. Unforeseen accidents of nature and of man-made systems that disrupt human systems.
4. Exposure of vulnerable people to hazards as a consequence of socio-economic inequalities.

Table 4 below summarises five rhetorical elements of the four problem constructions of Chalco Valley's inundations arisen from the discourses. All but two of the rhetorical elements considered here consist of symbolic images that are tied to ontological assumptions about Chalco Valley people, the Government, the hazards and La Compañía Canal. These images serve as backing for claims about the nature of Chalco Valley's floods and are woven into a meaningful narrative intended to persuade

⁴⁹ According to Sabatier (1993) an advocacy coalition consists "of people from a variety of [public and private sector] positions . . . who share a particular belief system-that is, a set of basic values, causal assumptions, and problem perceptions-and who show a nontrivial degree of coordinated activity over time."

and inform. Their appeals, the values they elicit and the warrants are treated together as rhetorical elements distinct from the images that serve as backing. Such appeals (as Linder (1995) notes in his example of the social construction of electromagnetic fields) may entail the invocation of political sympathies, social norms or moral commitments.

In each instance, their purpose is to provide a socially acceptable basis for justifying claims about problem construction and, at the same time, to imbue these claims with the proper sense of weight and legitimacy. Knowledge evidence refers to the different nature of data used to prove and convince the audience that the framing chosen by the interviewee is the 'real' source of truth about 'truthful events'. The evidence selected by the interviewee to talk about Chalco Valley's floods is very important in the sense that it gives also validity and legitimacy to the claim because, as most of the time, the scientific and technical data used to 'explain' the floods problem were on 'neutral' grounds.

Table 4. Rhetorical elements of four constructions of the Chalco Valley's floods problem

Causality Discourses of Chalco Valley's floods	Inadvertence by ignorance	Inadvertence by carelessness	Accidental	Structural
	Problem Constructions			
Rhetorical	Ignorance of hazards and of unsafe conditions	Failure of infrastructure and sanitation system and inadequate monitoring of risk object	Accidents of nature and of man-made systems that disrupt human systems	Exposure of vulnerable people to hazards is consequence of socio-economic inequalities
Type of knowledge evidence	`Expert´ and experienced knowledge of natural, man-made hazards and risk.	Data of infrastructure capabilities and failures; operators technical expertise as practical knowledge	Scientific data of natural hazards, ecological dynamics and faulty man-made systems as well as institutional responses.	Socio-economic and political processes of development and technical knowledge of ecological change
Appeals and warrants	Moralist	Objectivist	Paternal	Ameliorative
Image of Chalco Valley people	Ignorants and culprits and sometimes potential victims	Hidden subjects	Passive subjects	Vulnerable
Image of the Government	Expert	Potential culprit when no action is taken	Protector	Planner/ illegal, land promoter
Image of hazards and La Compañía Canal	Threatening nature, `fixed´ ecological dynamics	Infrastructure as a constant danger	Potential natural and man-made danger `separated´ from society	Natural and man-made hazards transformed by and interacting with society

3.1 Ignorance of hazards and of unsafe conditions

The discourse constructing Chalco Valley's floods as a problem of `ignorance of hazards and of unsafe conditions...´ gives prominence to the authority and legitimacy of experts and policy makers´ knowledge in determining the risk object, the causal agent and defining who might be considered as the `culprit`. As I discussed in the previous section, frequently in this discourse, policy makers blame affected people because the

latter are seen as `ignorants`, `incapable of measuring the real risk` posed by nature. This is an issue other policy makers agree with even though their main claim regarding floods causality might be focused on other causal ideas like the accidental. For instance, according to Director of Inundations Risk Reduction of CAEM, there is

“... a lack of hazard awareness in the [local]people and when it comes to decision making [i.e. migrating into unsafe places]they don't think about the `real` risk they might be exposed to...”

The moralist appeal characterises this story and depicts actors and events as good or evil and leaves little room for mixed opinion or governmental mistakes. Thus, affected people (victims) are responsible of their own actions, perceived as the culprits, and are portrayed as the evil in the narrative. Opinions of local people found no echo in the Municipality of Chalco Valley-Solidarity or in the CNA operators' ears. Claims advanced by some affected people several years before the floods of 2000 in Chalco Valley are part of the evidence showing that they were aware of La Compañía Canal and this somehow contradict the very idea that Chalco Valley people are in fact `hazard unaware people`.

“Since more than three years ago, residents (of Chalco Valley) had addressed their claims to authorities because of the repeated fractures of La Compañía Canal walls, part of which collapsed... and affected thousands of persons and hundreds of houses...” “Despite residents warnings... nobody did anything to solve the problem and the misfortune arrived at the early hours of this Thursday morning”

(Quoted and translated from Velasco and Alvarado, 2000)

Local people indeed experienced previous inundations but their accounts are elaborated on different epistemological grounds and through different cognitive processes. Newspaper articles that collected on site declarations of affected people and the interviews I did with them highlight the issue of risk perception of local people and the difficulty they faced to advance their claims and obtain responses from the local and federal authorities. Two residents of colonia Avándaro, three of colonia El Triunfo, three of colonia Unión de Guadalupe expressed their concerns about living adjacent or nearby La Compañía Canal⁵⁰.

⁵⁰ Interviews undertaken between April and May, 2003

In that respect it is worth mentioning that there were even some water technicians of the CNA⁵¹ who recognised the fact that local people had indeed expressed their concerns about the walls cracks and waste waters leaking and, as stated by CNA, the same CNA responded by “properly” monitoring and controlling the potential source of risk perhaps with the implicit aim of concealing affected people’s claims and preventing a possible social uprising. Paradoxically I found in the CNA policy makers’ arguments⁵² that scientific-technical data are used as *contributory* to lay people knowledge because these are on a par with the experiential knowledge of local people.

“...all local people’s demands were adequately attended...”
(Interview to Operations Manager of GRAVAMEX-CNA, 2003)

This is illustrated by the role supposedly played by the technical information provided by the CNA for raising hazard awareness in local people living close or adjacent to La Compañía Canal, as it was stated by the Head of RPSP in the section of Inadvertence by Ignorance, section 2 of this chapter. Drawing from interviews with affected people by the Chalco Valley’s floods of 2000, experiential knowledge of previous inundations is useful to determine the risk object and to identify the process upon which people can obtain accurate information for announcing early warnings calls to their neighbours. A `rudimentary` early warning system was set up by El Triunfo’s residents. This system was meant to detect the increase of the waste waters flow in La Compañía Canal and when it reached its highest peak a manual alarm was triggered; word of mouth communication among some residents allowed them to contact local civil protection operators and firemen to assist them in case of emergency.

This `prevention` activity is part of the Floods Prevention Programme (2001)⁵³ coordinated by the Civil Protection Office of Chalco Valley-Solidarity along with ODAPAS. The main goal is to alert residents and to capacitate them to evacuate in case of waste waters level increase in LCC. Two commissions were thought to implement such programme: The Technical Commission “...coordinates prevention actions to tackle inundations during rainy season with the aim to protect people’s physical

⁵¹ Interview to Director of Inundations Risk Reduction of CAEM, April, 2003.

⁵² Interview to Head of RPSP (March, 2003)

⁵³ ODAPAS (2001) Floods Prevention Programme of Chalco Valley-Solidarity.

integrity...” while the Immediate Actions Commission “...provides emergency aid in case a major contingency occurs” (ODAPAS, 2001).

Having contrasted the two ways of making sense of floods risk, what I want to stress here is that there is apparently a selection process concerning what constitutes valid and legitimate information for decision making. This selection process is controlled by those who hold policy power: before policy makers` eyes, the experiential knowledge of lay people had no authority because – among other reasons I argue – is `unscientific`, whereas `experts` knowledge appears to be scientifically based and more “objective”.

This is meaningful in terms of designing socially sensitive policy objectives and implementation because if the causal agent supposedly were local people – not labelled as “ignorants” but vulnerable – policy makers should be aware of the fact that knowledge of floods risk may be negotiated between those who approach it from a technical perspective and those who interpret floods risk within their daily lives experience. In this sense, policy objectives along with the means and tools designed to achieve them should take into consideration these two risk epistemologies, the “scientific”-based, and the “experiential”-based. This discussion can be placed into the existing literature about the interaction of lay and scientific knowledge and risk (Wynne, 1996; Garvin, 2001; Irwin, 2001, 1995).

The rhetoric and discourse analysis of the problem construction of “ignorance of hazards and of unsafe conditions” identified two different forms of risk knowledge - Scientific and lay people knowledge- when framing flood causality and constructing the policy problem. This represents *per se* an important contribution to the constructionist analysis of risk and it is aligned to the Wynne´s discussion (1996:45) that underlies “the cultural nature of science and of the implications of fundamental indeterminacies in knowledge” and that advocates to the incorporation into the risk analysis the “excluded” lay public dimension. Wynne recognises the indeterminacies and intrinsically local nature of scientific knowledge construction and proposes the recognition of the more substantive intellectual status of lay knowledges than usually acknowledged. This chapter is a contribution to this epistemological development because it allows identifying the interaction of these knowledges when framing flood and risk and how the producers of risk knowledge interact.

The method employed in the analysis of this chapter exemplified how scientific claims can be deconstructed in order to understand their values and meanings and

rhetorical power. In this vein, this is an example of what Irwin (1995) calls a “sceptical approach to scientific statements and fact construction” and how it shows a particular value for our understanding of science in the environmental context. I deconstructed and problematised the claims of scientific institutions but also public responses to this ‘information’. As Irwin suggests, I tried to “destabilize” knowledge claims in order to assess their cultural and rhetorical underpinnings. Such an approach can also be adapted to the knowledge claims of non-scientific groups- whether local citizens or national organisations. Irwin asserts that from this perspective also, “scientific evidence must be skilfully marshalled and represented to particular audiences if it is to exert any persuasive power” (p.50). At the same time, audiences must make sense of these messages in accordance with their assumed needs and concerns.

A closer examination of how the relationship between scientific and lay knowledge on risk can be done by drawing from the work of Garvin (2001). She examines how knowledge is constructed and employed by the key players in risk – scientists, policy makers and the public. Garvin explores the nature of scientific, policy and lay knowledge, in particular how evidence is recognised and validated in order to explicate the different forms of rationality employed by the three groups: scientific, political and social rationality. In this thesis, with the aid of empirical information I could explain the rationale of scientists, policy makers and lay people when ‘talking’ about what could have caused Chalco Valley’s floods. I found that even though, as Garvin suggests, there are epistemological distances on risk construction and therefore the causal factors, some similarities were established according to the type of evidence used to portray the inundations. This thesis contributes to understand these epistemological distances the key risk knowledge producers should be aware of if policy is thought to be socially sensitive. Policy responses’ implication of this issue is further discussed in Chapter Seven, section one.

A less radical version of this problem construction was also found in the floods problem. This means that other contributing factors were mentioned in the discourse for explaining the floods causality, namely socio-economic and political factors such as poverty and corruption in the context of illegal urbanisation in the Chalco Valley. Due to their socio-economic condition, those poor people who were “obliged” to migrate to unsafe places were also unaware that those places were unsuitable for living. In consequence, people will have to be used to *live at risk*. This, in fact, constitutes an

element of a discourse coalition between inadvertence by ignorance and structural causalities.

This idea of *living at risk* is shared by other policy makers and civil protection authorities and under that view, prevention policy has to be designed. For instance, the Director of Civil Protection of the State of Mexico, the former General Coordinator of Civil Protection at federal level, and the Director of Communication of CENAPRED, state that the best way to deal with disaster is to accept that unavoidably people will live at risk and for that reason, the best policy option is to make them aware of that critical situation and to try to 'capacitate' them to have a "good co-existence" with 'natural' and man-made hazards.

3.2 Failure of infrastructure and sanitation system and inadequate monitoring of risk object

The discourse of inadvertence causality by carelessness constructs the Chalco Valley inundations as a technical and managerial problem. The common evidence that is put forward is related to infrastructure capabilities and failures, and the information necessary to deal with those problems is merely technical and of a practical orientation. Hydraulic and civil engineers and operators of water and sanitation systems (CNA and CAEM) are the 'experts' in charge of framing the problem. In general terms I could identify that both the evidence and the warrants underpinning the main claims take into consideration three elements: the extreme natural hazard, the sanitation infrastructure and the technical capabilities of operators and technicians. This can be illustrated by analysing reports and documents elaborated by CNA and CAEM.

For instance, with regards to the heavy rain falls, the climatological station of Chalco, State of Mexico, reported that 'extraordinary' rainfalls took place between 29th, 30th and 31st May of 2000, with 40.5, 3.2 and 29.2 mm of rain respectively. By comparing these figures with those of the previous historic maximum precipitations (2.2, 2.6 and 2.6 mm) CENAPRED (2001) concluded that 'atypical' and 'unpredictable' rainfalls occurred. CNA agreed with this description. The communication summary – released just after the collapse of the right wall of the LCC – of the emergency actions to be implemented in Chalco Valley (GRAVAMEX/CNA, 2000; CNA, 2000) pointed to the "heavy rainfalls of the 31st May as the cause of an 'extraordinary' flow of 42m³ that

outran the capacity of LCC provoking the rupture of the LCC walls in the municipality of Chalco Valley-Solidarity”.

Regarding the sanitation infrastructure, several reports (GRAVAMEX/CNA, 2000; CENAPRED, 2001; CNA, 2000) put emphasis on the technical failure of the LCC walls as a central contributing factor to the floods and on the immediate and short-term solutions (with high technical detail of the engineering works) like the blockage of the rupture, rehabilitation and the reinforcement of the LCC walls. In addition, concerning the technical capabilities of operators and technicians, the ‘adequate’ maintenance of the LCC undertaken by GRAVAMEX/CNA operators to decrease the chances of an ‘accident’ was mentioned by some policy makers as a permanent activity to prevent any potential casualty (interview with the engineer resident of CNA in the Chalco Valley region, 2001; interview with the former General Coordinator of Civil Protection, 2003).

In apportioning the blame there is a shift from unknown human agent or natural phenomenon such as rainfall to unnamed CNA or CAEM staff, either the bad quality of the sanitation system, La Compañía Canal, its low resistance to the impact of heavy rain falls and the lack of attention and precaution responses are the elements that were used by the interviewees. Chalco Valley people were not mentioned and remained ‘hidden’ in the policy maker’s` arguments. Interviews with affected people may support the hypothesis that Chalco Valley’s floods were not an accident but the result of lack of adequate maintenance,

“(The floods) took place because they (unnamed authority) did not provide maintenance to the (LCC) walls; for 4 years no maintenance was provided (including taking out rubbish and dragging the canal bed); it was not because of nature”.

(Two female residents of Avándaro, Chalco Valley-Solidarity, 2003)

But a counter-story line was found in an affected resident’s account of the causes. There is even a much more radical interpretation of the floods that contrasts with the “failure of infrastructure...” problem. A male resident of El Triunfo was convinced that a plot was behind the rupture of the LCC wall:

“...To be honest, to me it was not because of the (high volumes of) water but someone with ill will...(..) The type of hole in the wall...only a bomb could have done it...” Perhaps someone from EL Molino wanted to divert the flow of water from not

flooding El Molino...and for that reason (he/she) provoked the explosion in the right hand side wall... ”

(Male resident of El Triunfo, 2003)

In the “failure of infrastructure and sanitation system and inadequate monitoring of risk object...” problem, an objectivist appeal displaces political values altogether in favour of a basic shift in the presumption of sovereignty at least of technical issues. As it is in other studies (Linder, 1995) faith in the capacity of science to establish uncontested truth and to remedy problems relegates both government politics and the public to passive, supporting roles. Objectivity is the main criterion upon which technical responses are put into place.

It is assumed that more and better scientific and technical knowledge about how to cope with the fragility of La Compañía Canal is the best way to prevent future inundations and at the same time to calm down local people’s demands and worries. As discussed in Chapter One, when it comes to ‘preventing’ disaster engineering works to isolate the risk object is the common policy response found in Mexico. The floods problem is reduced to its technical components, isolated from the socio-environmental context. With regards to this, one of the policy measures for containing future extreme high flows of waste waters was to construct a dam upstream LCC in the village of San Marcos Huixtoco to regulate the increase of the flow especially during rainy season.

Besides, the effects of the rainfalls on the sanitation system of Chalco Valley’s and La Compañía Canal have to be further researched in order to improve both monitoring systems and reinforcement techniques. As a result, it was announced⁵⁴ in 2006 that the Federal government (CNA) and the State of Mexico government agreed on a deal to invest in a high scale project to pipe the La Compañía Canal despite concerns over its technical suitability in a fragile ground.

3. 3 Accidents of nature and of man-made systems that disrupt human systems

This problem construction exemplifies the view of disaster where causality is attributed to accidents of nature that impact ecological and man-made systems. Under this view the impact of extreme hazards changes the ‘balanced’ relation between nature

⁵⁴ “Former President Fox and the governor of the State of Mexico, Enrique Peña publicly announced the ‘kick-off’ of the works to build a ‘tunnel’ to pipe La Compañía river ... the estimated total cost will be 1 423 millions of MX...it is expected the works will conclude in July 2008”. (June 20, 2006) Ferrer, Gladys, Reforma.

and society. Two notions of nature are conceived: on the one hand nature is kind, generous and at the same time might be a potential 'victim' of humans' actions and on the other, nature can threaten society in an unexpectedly way, sometimes as a result of uncontrolled human-driven action. Nature is the landscape where human activities develop and from which resources can be taken. This problem framing is reduced to diagnosing the hazard and the potential impact. There is the assumption that knowing hazards is enough to trigger behavioural and attitudinal change in people in order to prevent disaster. It has been analysed above that interviewees' claims frequently construct inundations causality in technical terms either by describing the material-structural capacity of the La Compañía Canal or by detailing the ground sinking problematic of the Chalco Valley region. Here the social dimension is defined in terms of public reaction and organisation schemes to provide relief.

Even though this accidental narrative, in general, avoids putting the blame on specific agents but only on unforeseen natural forces, there is subtle evidence (expressed by some interviewees, i.e. Director of Emergencies and Disaster Prevention of CNA) that blame and responsibility can be assigned to some unnamed authorities for the mistakes committed while providing inadequate maintenance to La Compañía Canal. This idea is somehow close to the causal narrative of inadvertence by carelessness. It is interesting to note that in some parts of the same response the focus of the causality shifts from 'accidental' to inadvertence by carelessness.

Because the image of the government is that of a protector, the common appeal is paternalistic. Here it is worth recalling that the image of disaster prevention is widely framed in Mexico as civil protection. In the Mexican Constitution, the Civil Protection Programme at federal level (2001-2006; 2007-2012), and at state of Mexico level (2001-2005; 2006-2012) and the Civil Protection Laws, it is stated that the Mexican State has the duty to provide protection to all citizens. That idea prevails in all sectors of public administration and for that reason the civil protection sector is seen as the one and, quite often, the only in charge of designing and implementing disaster prevention programmes and plans. Chalco Valley people are conceived as passive subjects that receive information and directions from government mainly in emergency situations. In some cases, Chalco Valley people were alluded to implicitly when referring to the impact imposed on ecosystems and ground water extraction, and urbanisation is to blame for environmental degradation. The image of La Compañía Canal is that of a constant threat to residents.

3.4 Exposure of vulnerable people to hazards is a consequence of socio-economic inequalities

In this floods problem construction, the explanation of the technical details of the sanitation system and La Compañía Canal failures to cope with waste waters and rainfall is put in a historical and social context. Root causes such as socio-economic inequalities made poor people migrate to unsafe places where they were exposed to the hazards. An ameliorative appeal shifts the focus from harm to the good that might be done through government action. Tougher law enforcement for combating corruption in housing developments, better land use planning in the light of unequal exposure to hazards, poverty alleviation, enhancement of family self-protection strategies to reduce their vulnerability to cope with future threats and maintaining household's assets are expected to be contributing processes to achieve risk reduction.

In all this the government is mentioned to play a fundamental role through integrating civil protection with social, urban and environmental policies. Since causal factors are both technical and socio-historical, the scope of government participation to remedy the problem is expected to be larger and more complex than the other policy solutions discussed above. That might be the reason why elements from other 'problem constructions' mix together with this one creating 'discourse coalitions'. I can identify at least three causal storylines that mix with this floods problem:

- *Bad socio-economic conditions make people move to unsafe places.*
- *Development inequalities between State of Mexico and Mexico City.*
- *Technical solutions are constrained by the economy.*

Local people that were somehow "forced" by circumstances to migrate and live in Chalco Valley region are seen as vulnerable because of the unsafe places and hazards, in particular the chronic flooding. The image of the government has two faces. On the one hand, it is seen as a positive and necessary agent to carry out land use planning (by the 'good agent', the planner) according to both the ecological aptitude of region and meeting people's needs, and control people invasions and, on the other hand, it is perceived as the evil in the story since thanks to past governmental corruption, illegal and 'uncontrolled' urbanisation took place in an unsuitable, fragile ecological region.

Perhaps the characteristic that illustrates best this problem is the role social processes play in constructing inundations in the long run. Unlike the three previous problems, interviewees see floods beyond natural hazards and technical failures and recognise how human agency is constrained by a number of structural factors. That is why, perhaps, this narrative has shown strands that coalesce with the other narratives. It is at the interplay between nature, science, technology and society that floods causality can be better understood. This narrative coincides in some elements (e.g., vulnerability is a socio-historic outcome) with the explanation of the progression of vulnerability presented throughout Chapter Four. The purpose of this narrative allows thinking about the chances of transforming the other three narratives towards a more socially sensitive policy making thanks to the actual coalition with them. It could be expected that the structural discourse along with the narratives that support it can gain 'policy space' in the struggle of meanings and beliefs of disaster causal factors.

Conclusions: multiple discourses, contested problems and discourse coalitions

In this Chapter I demonstrated that the social construction of "natural" disaster at policy level can be unpacked by analysing arguments and discourses of disaster causality. This was illustrated with the case of Chalco Valley's floods. Different disaster causal stories construct policy problems in different ways. The discursive approach adopted here evidenced the variety of floods causality claims and their relation with discourses contexts, subject's identities and institutions.

I argued that the four different disaster discourses found in Mexico at policy level, namely inadvertence by ignorance, inadvertence by carelessness, accidental and structural causality, were shaped by how causal ideas of disaster were assembled and made persuasive. The argumentation approach allowed me to analyse the claims and their components. One key element in shaping the argument is the type of evidence and how it is used by the interviewee to support the claim and convince the author of this thesis. Even though it was stated by scientists, policy makers and implementers that Chalco Valley's floods were "real facts", the differing manufacture and use of evidence –which are loaded with values, meanings and contesting beliefs – showed that the moment disaster causality 'enters' the realm of policy the explanation is subject to the policy maker's own interpretation, and is context-dependent and value-laden.

Evidence to support and legitimise causality claim ranges from cognitive processes of local affected people by the floods, technical data of heavy rain falls, to more complex interactions between socio-economic aspects, illegal urbanisation and the lack of land use regulation. Warrants are also fundamental in making arguments compelling and give validity to the use of evidence to support the claim. In this, the subject's power position was important in terms of justifying why specific data or information was chosen to be valid for 'depicting reality'.

By analysing the variety of claims and counterclaims I demonstrated that risk floods and the floods themselves were not "objective" situations or events but the result of a complex process of claim making. In this, the construction of "nature" and "natural hazards" played a relevant role when excluding blame and responsibility from human action and sometimes to advance hypotheses about government actions. This was seen in the technically-based claims that intended to portray the floods causes as neutral or even more clearly in the case policy makers explain them as accidental events.

Different systems of statements characterise different discourses and can be understood as the differing storylines that condenses the argumentation structure in order to make it intelligible to the interviewee while trying – apparently – to "tell what really happened" and convince the author of this thesis. In the case of the discourse of causality by ignorance the disaster is framed in terms of what the 'ignorant' can do to cope with future inundations, whereas in the case of causality by carelessness the role of operators and water institutions in providing adequate maintenance for La Compañía Canal is highlighted. Thus, blame is shifted from affected people (portrayed sometimes as victims of their own actions) to water technicians that embody the CNA and CAEM. In general, statements of accidental causality put the blame on "nature" and the "disrupted balance of nature".

The statements that shape the discourse of structural causality are more radical in putting the blame and in assigning responsibility to a single actor or institution and construct the story more as the outcome of macro processes or root causes such as illegal urbanisation, political corruption and ecological degradation. Different discourses construct problems differently. This was explained by doing rhetorical analysis of the four constructions of the Chalco Valley's floods. The appeals, warrants and images of causal agents vary amongst the four constructions even though some similarities were found, in particular with those related to natural and man-made hazards.

By trying to make an argument compelling, each problem construction appeals to different values and these appeals serve a similar discursive function of building support and legitimacy for their accompanying claims; i.e. from moralist (‘who was the evil in the story’) and objectivist (‘technical assessments concluded that...’) to paternal (‘government protects people...’) and ameliorative appeal (‘the problem will be solved...’). Shared characteristics of the images made it possible to classify the causal agents according to the type of problem construction. The government is perceived either as expert, culprit, protector or planner whereas Chalco Valley people could be depicted either as ignorant, vulnerable or a victim. The constant role of La Compañía Canal as chronic hazard was found in all problem constructions with slightly differing traits and weight in the floods causality.

Advocacy coalitions emerged when recognising the interaction between structural causality with elements pertaining to the other causalities such as differential risk exposure due not only to inundations but also to people’s coping capacities, regional inequalities and differential risk exposure. Technical solutions for La Compañía Canal problematic are constrained by the economy, and the imbalance between Mexico City and the State of Mexico is the constant background when strands of one discourse merged with another one: inadvertence by ignorance with structural causality and inadvertence by carelessness with structural causality. The following chapter deals with policy responses’ elements of the four problem constructions. I will show how different problem framings determine different policy responses, in other words as suggested by John (2002:166), I will intend to explore “...the process by which ideas become important in structuring outcomes...”

CHAPTER SEVEN: POLICY RESPONSES TO FOUR CONSTRUCTIONS OF CHALCO VALLEY'S FLOODS PROBLEM

Introduction

In section 3.3 of Chapter Two I elaborated a framework to unpack in this chapter the argumentative construction of policy responses with regards to Chalco Valley's floods. The framework takes into consideration four policy-analytic elements: 1) policy objectives, 2) type of intervention, 3) policy instrument and 4) implementation. The main goal of this chapter is to understand how floods problem constructions at the policy level shape institutional responses. In particular, this chapter aims at demonstrating that people's vulnerability is not a relevant policy objective to be considered within the whole range of disaster policy responses in Mexico because – I argue – people's vulnerability was not constructed as a relevant 'problem' within disaster causality discourses.

Disaster causality discourses favoured explanations of natural and technical causal agents; therefore requiring technical solutions; explanations and policy solutions are embedded in the prevailing behavioural paradigm (BP). This could be the result – among other reasons – of the influence scientific-technical solutions has had on the policy process while formulating and implementing responses and to the extent disaster causality has been framed according to the internal logic of the institutions and the interests and beliefs of scientists, policy makers and implementers. The data for the analysis of this chapter come from different sources: interviews with scientists, policy makers, implementers, operators and affected people; policy documents and programmes of the SINAPROC, SEGOB, CNA, CAEM, ODAPAS, CENAPRED and reports of the institutional responses deployed before, during and after the Chalco Valley's floods of June 2000. The interviews data were drawn from the answers to the following questions – which in fact addressed the thesis central question number two (see Chapter Three, section 4):

- What are the goals of natural disaster policies?
- What are the means to achieve such goals?
- What are the main problems to be solved by those policies? Why?

These questions correspond to part III of the fieldwork questionnaire (see Appendix II) that addresses the issue of 'natural' disaster policy formulation and implementation. Answers were coded with the aid of INVIVO software and then sorted out according to the policy elements referred to above. For the analysis I proceeded deconstructing the interviewee's arguments using the same model applied in Chapter Six (Toulmin-Gasper, 2000) but this time considering the four policy responses analytic elements. The model helped me in identifying the policy objective and outcome (main claim) and the type of intervention which is the evidence or data given to validate the claim, in other words, the justification of the policy intervention according to the expected outcome and objective. I also took into consideration policy beliefs and values as warrants for the setting up of evidence.

Therefore the following discussion deals with how a policy problem main claim implies certain policy objectives and how beliefs and warrants justify and legitimise specific policy interventions to create the 'expected' outcomes or at least the 'belief' that the policy objective has been achieved. This chapter is structured in four sections that correspond to the analysis of the policy elements of each of the four problems constructions analysed in Chapter Six, namely: 1) Ignorance of hazards and unsafe conditions, 2) Failure of infrastructure and inadequate monitoring of risk object, 3) Accidents of nature and of man-made systems that disrupt 'normal' social functioning and 4) Vulnerability is a consequence of socio-economic inequalities with unequal distribution of opportunities and hazards (See first column on the left hand side of Table 5). Each section is made up of two subsections that correspond to the four policy-analytic elements: 1) policy objective and type of intervention and 2) policy instrument and implementation.

The four policy-analytic elements were discussed in Chapter Two, section 3.3. Below Table 5 summarises these elements of all four problem constructions which were identified and analysed during the coding and also during the deconstruction of arguments done in Chapter Six. It is important to mention that the storylines reconstructed by the respondents correspond to organisational surface storylines. In some cases, these do not represent the process whereby discourses are constructed.

Table 5. Policy responses elements to four discursive constructions of Chalco Valley's floods problem

Floods causality policy problem	Causal agents and their motives	Policy objectives	Type of intervention	Policy instrument and implementation
1. Ignorance of hazards and unsafe conditions	`Ignorants` moving into unsafe places and `corrupt` politicians who promoted urbanisation ; nature as hazard and `experts` who know the `objective` risk	Education of `ignorants` to enhance (common) risk perception and change behaviour to avoid hazards or `co-exist` with risk; to finally achieve a civil protection `culture`	Top-down risk communication with regulatory control and law enforcement and in extreme cases, eviction of affected people	Information campaign, practice of emergency drills, posters and guides to identify hazards, education programmes for promoting culture of civil protection
2. Failure of infrastructure and inadequate monitoring of risk object	Extreme natural hazards, heavy rainfalls, La Compañía Canal and `careless` government technicians and operators	Improvement of `natural` hazards forecasting and monitoring of the sources of risk to reinforce infrastructure	Scientific research for technical development; protection of lifelines and the people; public works to isolate hazards and reduce risk exposure	Contingency plans for protecting water and sanitation infrastructure. improvement of early warning systems and targeted funding for infrastructure development
3. Accidents of nature and of man-made systems that disrupt `normal` social functioning	Extreme natural hazards, heavy rainfalls, and ecological deterioration driven by human action	Emergency aid to save lives and protect people; evacuation of people from risk prone areas; mitigation of the damaged	Emergency management: preparedness and initial recovery; to foster coordination between public and private institutions of SINAPROC and civil society to improve participation	Emergency and `prevention` programmes; financing for mitigation: FONDEN, and operation of early warning systems
4. Vulnerability is a consequence of socio-economic inequalities	Extreme natural hazards interacting with people's vulnerability under unsafe conditions; government authorities allowing/ promoting illegal settlements	Socio-economic development and ecosystems sustainable conservation to reduce people's vulnerability	Mainstreaming disaster risk reduction into development policies and planning	Sustainable environmental management, poverty reduction and exposure limits to unsafe conditions; FOPREDEN

1. Ignorance of hazards and unsafe conditions

In this section I analyse the policy responses elements of the “Ignorance of hazards and unsafe conditions...” problem. Four types of causal agents were identified, namely, ‘ignorants’ – the supposedly target population –, government ‘experts’, ‘corrupt’ politicians and nature as hazard. The next discussion centres on how government policy makers set up a policy objective that seeks to change floods risk perception of the affected people, labelled in the interviews reiteratively as ‘ignorants’.

For this type of policy problem, labelling and constructing the ‘desired’ target population is a core issue in the establishment of the relation between policy objective and policy intervention. That is why, I argue, policy intervention is intended to work at the individual’s perceptual and cognitive capabilities on the basis of a supposed ‘objective’ risk that is communicated by ‘experts’, policy makers and other government authorities. The analysis in this section aims at unpacking the beliefs of policy makers regarding the fact that top-down floods risk communication can contribute to capabilities development of the ‘ignorants’. I found that policy makers rely on written and oral messages of different sorts produced by SINAPROC, such as posters, leaflets and short radio clips, to supposedly raise hazard awareness of local people. It is believed that ‘rational’ knowledge of floods risk underpins ‘informed action’. Below, I analyse that at length.

This section also shows how the professional background of the interviewee and the institutional context contribute to determining what ‘should’ be the best course of action. Moreover I analyse policy implementation as a rhetorical act. This is because many arguments put forward by policy makers contain various metaphors that facilitate the meaning transfer from the education realm to the disaster realm. The analysis of the meaning transfer from the use of education language to disaster policy implementation is done with the aid of the Civil Protection Programme of the State of Mexico (2001-2005) and the Family Plan of Civil Protection issued by the government of the State of Mexico. In particular, I focus on how three notions of the education language, namely ‘people’s education’, ‘learning’ and ‘capacity building’ are transferred into the disaster prevention implementation language through specific strategies and actions.

The interviewees identified for the analysis of “Ignorance of hazards and unsafe conditions...” policy problem are the following: the Director of Civil Protection of the

State of Mexico, the Head of Civil Protection Commission of the State of Mexico, the General Coordinator of SINAPROC, the Director of Information Communication of CENAPRED, the Head of Research of CENAPRED and the Director of Risk Atlas of the State of Mexico.

1.1 Policy objectives and types of intervention

To educate ‘ignorant’ people to ‘objectively’ perceive risks through top-down risk communication

Concerning the problem “Ignorance of hazards and unsafe conditions...” the main objective of disaster prevention policies is to ‘enhance’ common risk perception to change the behaviour of both affected people and, to a lesser extent, that of political authorities to avoid hazards or reduce disaster risk exposure. The main policy intervention as a result is to educate ‘ignorant’ people to ‘objectively’ perceive risks in order to change their attitudes and behaviour to act either to avoid hazards or to accept ‘living at risk’.

The metaphor “*learning/lesson*” and the education language perform the function of linking disaster policy objectives with action through a process of meaning transfer (as I analyse below in 1.2.1). This ideally could be matched with other instruments such as ‘adequate’ land use planning that would prevent ‘ignorant’ residents from settling in insecure places and combating political corruption associated to illegal urbanisation. Since structural and inadvertence by ‘ignorance’ causalities appeared to coalesce at discursive level in this policy problem – as discussed in Chapter Six – then it is expected that at the level of policy responses that does also occur. Thus some other policy interventions are found to complement each other in specific cases such as that of transforming people’s risk perception along with land use planning.

As discussed in Chapter Six, section 2.1.1, the prevailing assumption of this problem is that people can (and should) be capable of having the same risk perception of policy makers – who are thought to have the “right” risk perception – which will enable them to ‘realise’ that specific locations and situations are unsafe for living.

So, the policy belief (implicit Warrant):

Shared perception of ‘real’ risk is possible and necessary

of the expected policy outcome (the Claim):

that people have to develop a “self-protection” culture in their household and neighbourhood contexts because they live at risk

was expressed by a number of top-level policy makers such as the **Director of Civil Protection of the State of Mexico, the Head of Civil Protection Commission of the State of Mexico and General Coordinator of SINAPROC**, and less emphatically by the **Director of Information Communication of CENAPRED**. Now I shall proceed to compare the policy responses claims with the intention of examining the nuanced similarities and differences amongst them.

When talking about her position and responsibilities, the **General Coordinator of SINAPROC** emphasised the (important) nature of her position and role within this institution, stating that she was mainly devoted to promoting a shared, single risk perception amongst all people and the public sectors involved in SINAPROC. She reiterated that a single perception of risk is one of the main policy objectives to be achieved along with ‘showing’ to local people that they live at risk; she phrased the claim as a moral obligation:

{Claim A/ policy objective A}

“We have to share the same risk perception, the same information and besides, we all (people and the whole SINAPROC) have to know how natural phenomena develop...”

{Belief as warrant A/ policy intervention and outcome A}

We (at SINAPROC) know how to train people and we know how to make them aware that, as long as they take minimum precautions, they will minimise the destructive impact disaster impose on them and their goods...we’ll make an important progress towards preventing disaster...That’s what concerns us.

(General Coordination of SINAPROC, 2003)

Besides, the **General Coordinator SINAPROC** mentioned repeatedly the importance of achieving another goal which is of larger scope and dealing with the need to mainstream disaster prevention and risk reduction into development planning and policies. It is interesting to note that this goal is somehow related to the structural causality, and as a result a coalition can be derived from these two discourses leading to

supplementary policy objectives. She states that the current general objective of disaster policies should then be:

{Claim B/ policy objective B}

“...to strengthen the framework that guarantees the protection of human life. So public policies should seek that under an



{Belief as warrant B/ policy intervention B}

*‘integral vision’ of public administration and the law ...”
“Sharing that ‘integral vision’ would mean integrating preventive values in the ministries, their planning and actions, i.e., I will need to consider the impact of urban development in people’s exposure to risk...and law regulations will frame and facilitate that... all development sectors ideally would pursue (risk reduction) mainstreaming.*

(General Coordinator SINAPROC, 2001-2004)

Policy objectives A and B put forward by the **General Coordinator SINAPROC** are intertwined as it is believed that institutions can change people’s risk perception and behaviour through the law and planning commonly called ‘the culture of civil protection’ by disaster policy makers.

The claims of the **Head of Research of CENAPRED, the Director of Information Communication of CENAPRED and the Director of Civil Protection of the State of Mexico** share the general policy outcome that a ‘civil protection culture’ is needed in order to change people’s behaviour and values. Following the claim *that people have to develop a “self-protection” culture...*, for the **Head of Research of CENAPRED** if everybody is aware of risk that would lead to changes in attitudes towards developing a more preventive culture. He did not specify what a ‘more preventive culture’ means in this context. This in fact ratifies the ambiguity of some of the key concepts commonly employed by the ‘natural’ disaster administration in Mexico.

The **Director of Information Communication of CENAPRED** and the **General Director of Civil Protection of the State of Mexico** endorse this view but further elaborate the central argument by stating that it is ‘rational’ knowledge based on ‘informed action’ that really shapes people’s action. Both policy makers stated that the role of CENAPRED and the General Direction of Civil Protection of the State of

Mexico is to foster change in people's attitudes and behaviour in favour of, and based upon, more 'informed action'. Thus, I could interpret that the meaning of 'informed action' would be a rational protection action that is the outcome of the transfer of knowledge of risk into individuals' behaviour. However, in practice, the **Director of Information Communication of CENAPRED** notes that at community level there are several obstacles that need to be overcome to reach the so-called 'self-protection culture':

1) Religious beliefs, 'divine' acts and fate prevail in people's understanding of the world and this makes it difficult for them to perceive the 'real' risk posed by hazards,

2) Difficulty to communicate risk from CENAPRED to 'target' populations because it is hard to reach out to marginalised communities and besides it is even harder because some of them do not even know how to read or speak in Spanish,

3) It is a complex and difficult task to plan a meaningful communication strategy that really triggers the expected 'informed' action, and most importantly,

4) 'They (local people) are out of the development path', as he notes, and therefore they are not considered as beneficiaries of 'development' within government plans and programmes because they are marginalised. In other words, I argue, those people are not labelled as 'target populations' of policies and that may be one factor that contributes to their vulnerability.

In spite of the obstacles mentioned by the **Director of Information Communication of CENAPRED**, achieving 'informed action' is still seen as of paramount importance. 'Informed action' becomes one expected policy outcome that can be "sown" in people's heads through different instruments and actions such as practices of emergency drills and contingency plans; practical guides to help people identify hazards within their houses, schools, and neighbourhood; radio and TV spots alerting about dangers; leaflets, posters and short stories about how to evacuate during earthquake and fire emergencies.

With regards to this issue, for example, the Government of the State of Mexico through the General Direction of Civil Protection designed a poster to inform residents living near streams, rivers and sewage canals about the impact of dumping rubbish into the water bodies (See Box 7, below). 'Informed action' is expected to take its course since people – labelled as (rational) 'citizens' – are invited to respond to the directions because they are supposed to be 'educated' people and thus able and willing to

participate. The poster photo shows a sewage canal (perhaps it is LCC) with lots of plastic bags floating and other organic and inorganic wastes reducing the canal stream capacity. On the centre top of the image a headline reads: “That is why we get flooded”

Box 7. “That is why we get flooded”

THAT IS WHY WE GET FLOODED⁵⁵

Stop dumping rubbish in the water bodies!

And on the right centre of the poster a text reads as follows:

Rubbish blocks the sewage
“Like the citizens we are,
We have to be aware
and choose a (proper) site
for disposing the rubbish,
do collaborate with authorities,
and this will not be a problem anymore.
By undertaking these actions
You will make your community or municipality
a safer one because it will not be affected
by a sanitary risk or an inundation”
Remember your family comes first!

(Source: General Direction of Civil Protection, State of Mexico, 2003)

The **General Director of Civil Protection** told me that this poster was distributed to all municipalities of the State of Mexico and it was during the fieldwork in Chalco Valley that I double-checked that. In fact, I saw one of them posted on a wall of the Civil Protection office in Chalco Valley-Solidarity. When I asked a civil protection person on duty about the purpose of it, he responded by saying that that is one way to inform people about the risk they are exposed to and how they can contribute to the solution.

With regards to that, during the fieldwork I also dared asking affected people of Unión de Guadalupe and El Triunfo if they were familiar with that poster or other didactic material distributed by the government of the State of Mexico. They told me they did not know the poster and that was the first time someone showed them

⁵⁵ The version in Spanish reads as follows: POR ESTO NOS INUNDAMOS! YA NO TIRES BASURA EN LOS CUERPOS DE AGUA! La basura bloquea el drenaje. Como ciudadanos debemos tener conciencia y elegir un lugar para el desecho de la basura, participa con las autoridades para que esto no sea un problema. Con esto evitarás que tu comunidad o municipio se ven afectados por un riesgo Sanitario o una Inundación. Recuerda tu familia es primero!

‘something’ related to the LCC problematic. And when I asked if they considered this material to be of any help they answered:

“...yes that could be a practical way to get information on how to act and when”

(Three residents (one female and two male) of Unión de Guadalupe, 2003)

So, the answer of these three residents of Unión de Guadalupe might indicate that apparently this information could resonate in the affected people to trigger the ‘informed action’. To confirm whether this information is meaningful to affected people or not in order to contribute raising their hazard awareness, an evaluation of the impact of this didactic material is needed. However the evaluation is beyond the scope of the present research objectives.

The above enlisted instruments represent a repertoire of hazards awareness raising policy tools that, according to the **General Director of Civil Protection of the State of Mexico** and the **Director of Information Communication of CENAPRED**, are elaborated to promote the so-called “civil protection culture” in the population. So far I have discussed how the policy outcome matches the policy objective in terms of how local people are expected to respond according to the policy maker’s knowledge and beliefs of the floods risk. The reluctance of vulnerable people to move out of flooding prone places (already discussed in Chapter Six, section 2.1) is an obstacle to preventing disaster as claimed by the Director of Civil Protection of the State of Mexico. But what it is interesting to note here is that this situation in fact reflects differences between policy makers and vulnerable people with regards to the process of knowing and making sense of floods risk.

A constructionist explanation for this can be found in the existing differences between three epistemological frameworks of risk, namely, that of scientists, policy makers and the public (local) people (as proposed by Garvin, 2004, see Chapter Two). Local people make sense of risk from within their daily-life activities and risk perception (and hazards avoidance) is just another ‘problem’ they have to face and solve amongst many others like going to work, paying the commuting fare from Chalco Valley to Mexico City, feeding and raising their children, paying the rent, etc.

Unlike local people, policy makers and scientists attach meaning to floods risk from their professional background and job activities (CNA, CAEM and CENAPRED). They might never be affected by floods and they frame risk from within the institutions’

values they work for and not from within their daily-life concerns. Policy makers and scientists talk about the floods risk *other* people are exposed to. Meanwhile, local people have an experiential knowledge of floods risk because they already suffered floods impact in Chalco Valley in previous years.

For instance, interviewed affected people by the Chalco Valley's floods from *Avándaro* and *El Triunfo* talk about the chronic floods risk they live in and how the floods they have experienced have changed their coping strategies and assets for many years now (see Chapter Four, section 3). Nowadays they see themselves as better prepared for coping with coming flood events. In short, floods risk knowledge has different meanings according to the social domain of disaster, as it was discussed conceptually in section 2 of Chapter Two.

Policy change is also sought within public and private institutions by trying to integrate civil protection “inputs” into development planning; the integration of civil protection issues into the National Plan of Development of Mexico (PND 2001-2006; 2007-2012) is an attempt of that. This can be interpreted as the result of a coalition between inadvertence by ignorance and structural discourses. In the PND 2001-2006 under the chapter ‘Order and Respect’ (*Orden y Respeto*), objective five is to enhance the capacity of the Mexican State to regulate phenomena that affect population. This can be achieved by transforming the orientation of the SINAPROC from a ‘reactive’ to a ‘preventive’ system with the participation of the federal, state and municipal administrations, the population and social and private sectors.

For all this a number of tasks are identified as crucial, “identifying and improving the knowledge of hazards and risks at community level; promoting the reduction of physical vulnerability; fostering the co-participation and communication between the federal, state and municipal administrations and the social and private sectors; implementing a self-protection policy and culture; developing technical tools and raising funds for mitigation and restoration and giving the highest priority to vulnerable populations.” (PND, 2001-2006:144)

In particular, the **General Director of Civil Protection of the State of Mexico** emphasises more the idea of “living at risk” as a way to cope with hazards. He stated that what matters for him in terms of institutional intervention is to train people to accept risk rather than to capacitate people to know how to evacuate during emergency drills or dangerous situations. This represents a breakthrough in policy formulation as is explained below.

While the latter belief is the best common understanding of how the government has to act with regards to past events, the former is a 'recent' normative view of how to deal with existing threatening hazards that may eventually disrupt "daily life". "Living at risk" is a storyline that brings the future into the present. This is an important issue for him and for the Civil Protection of the State of Mexico as a whole. In other parts of the **General Director of Civil Protection of the State of Mexico's** interview, he reiterates that the main goal is to develop a good co-existence with hazards of all sorts:

{Claim C/policy objective}

"We want (...) people to learn how to live with phenomena that surround us in a rational way, in a healthy way..."

(General Director of Civil Protection of the State of Mexico, 2003)

This idea is reinforced again at the federal level by the **General Coordinator of SINAPROC**:

{Claim D/policy objective}

*"The ultimate goal of a disaster public policy is to **teach** residents how to live at risk... (...) because of the geographical conditions of Mexico there will always be natural hazards"*

(General Coordinator of SINAPROC (2001-2004))

Regarding the socio-geographic context of 'living-at-risk', the **General Coordinator of SINAPROC's** justification of this policy objective might be found in the evidence that (according to him) Mexico is one of the few countries in the world exposed to almost all types of natural hazards, whereas the justification of the **General Director of Civil Protection of the State of Mexico** might be sought – at lower geographic scale – in the socio-economic development of the State of Mexico as the main driving force of change.

Some other policy makers of the Government of the State of Mexico like the **Director of Risk Atlas** agree with and repeatedly mentioned that there is an "unbalanced" relation between Mexico City and the State of Mexico in terms of population pressure and economic activities due to migration flows from Mexico City to the State of Mexico and to the increasing growth of the industrial sector within the State of Mexico's adjacent municipalities to Mexico City such as Naucalpan and Tlalnepantla. The following statements, used as evidence to legitimise claim C and claim D, illustrate that:

{Evidence A}

“One has to understand that calamities occur also because of migration...The population growth of the State of Mexico increases (at a rate of 350) thousand people per year, out of it two thirds is the result of migration to the state of Mexico...”

(General Director of Civil Protection of the State of Mexico, 2003)

{Evidence B}

“...there are municipalities like Neza⁵⁶ where half the population are of Oaxaca⁵⁷ origin and they have not adapted to the State of Mexico despite living here; many of them work and shop in Mexico City but demand services from the State of Mexico... and they have settled in risky zones, in lacustrine zones...”

(General Director of Civil Protection of the State of Mexico, 2003)

{Evidence C}

“In some way, industrial and population growth has created conditions for disaster to take place in the State of Mexico, mainly in the neighbouring municipalities with Mexico City where almost all hazards are present...”

(Director of Risk Atlas, State of Mexico, 2003)

That has transformed the socio-environmental dynamics of the territory of the State of Mexico making it more prone to floods risk. According to the **General Director of Civil Protection of the State of Mexico** the whole repertoire of natural and man-made hazards are likely to occur in the State of Mexico and the State of Mexico's residents have to get used to it even though they might not be aware of this reality. For the **General Director of Civil Protection of the State of Mexico**, the `living at risk` approach can be applied to explain situations when people are exposed to risk either by natural or man-made hazards: 1) immigrants who were allowed to settle illegally in the industries buffer zones (Mexico City-State of Mexico interface) are exposed to potential `accidents` so they have to accept that situation and 2) rural indigenous communities living close – since ancient times – to the Popocatepetl volcano are used to witnessing volcano activity because they have `been living at risk` for centuries.

⁵⁶ *Neza* is the short name that alludes to the Netzahualcoyotl municipality which is another neighbouring municipality of the State of Mexico to Mexico City

⁵⁷ Oaxaca is an state located in the southeast of Mexico

According to the interpretation of the **General Director of Civil Protection of the State of Mexico**, the Government of the State of Mexico allowed immigrants to live where they are now so they have to learn how to co-exist with risk:

{Claim D/ policy outcome}

“what we want is to learn how to co-exist with risk...”

(General Director of Civil Protection of the State of Mexico, 2003)

The two different interpretations of the same situation can be also understood by paying attention to the claim of the **General Director of Civil Protection of the State of Mexico** about causal agents and potential victims, i.e., social actors who should or should not stay in insecure places and therefore be exposed to hazards. What he may mean implicitly is that man-made hazards are the by-product of the industrial sector whose promoters and defenders can claim their right to develop their economic activity whereas natural hazards simply occur without any intended cause.

I argue that – in the argumentation of the **General Director of Civil Protection of the State of Mexico** – the social nature of ‘natural’ hazards serves as a way to dilute potential conflicts by ‘neutralizing’ the storyline ‘living at risk’ depending on who the subjects involved are. He took a totally different example and used it to validate his argument: the Popocatepetl volcano located in *La Sierra Nevada* (see Chapter Four for an explanation of the geography of *La Sierra Nevada*). Popocatepetl volcano has been portrayed as a chronic geologic hazard whose lava eruption may pose risk in varying degrees to the neighbouring State of Mexico municipalities with Mexico City and even Mexico City residents. Since Popocatepetl volcano cannot be blamed or held accountable for any accidental cause in those rural communities where settlers near the Popocatepetl volcano are exposed to eruption risk, in urban settlements ‘hazards generators’ can be liable for causing damage to urban residents living near industrial sites.

To avoid or resolve potential conflicts between the residents and the industry ‘promoters’, the storyline ‘living at risk’ is legitimised by looking at who the hazard generator is. It can be interpreted implicitly in the warrant of the **General Director of Civil Protection of the State of Mexico** that industrial development should face no obstacle in the State of Mexico territory, hence residents living near industrial facilities and potentially exposed to chemical hazards have to accept that situation.

In the interview of the **General Director of Civil Protection of the State of Mexico**, he implicitly made reference to the 'right' of industry plants to pollute and generate hazardous wastes because industry plants 'arrived' before the migrants did. The following warrant D of claim D illustrates this:

{Warrant D}

"industries were engulfed by urban settlements... industries arrived to the State of Mexico before the people (current residents)"

(General Director of Civil Protection of the State of Mexico, 2003)

According to three of the Government of the State of Mexico's policy makers (**General Director of Civil Protection of the State of Mexico, Head of Civil Protection Commission of the State of Mexico and Director of Risk Atlas**), there are thousands of plants and industries spread along the territory of the State of Mexico with which inhabitants have to co-exist with. For instance, the municipalities of Naucalpan, Tlalnepantla, Cuautitlán-Izcalli and Ecatepec are the most industrialized of the whole State of Mexico. By 2000 Cuautitlán-Izcalli housed six industrial parks, whereas Ecatepec, Naucalpan and Tlalnepantla one respectively. These nine parks amounted for almost half the industrial parks (9) in the whole bordering North-East of Mexico City region (a total of 21). In terms of the number of industrial plants, in Ecatepec there were 8,000 industrial plants, in Naucalpan and Tlalnepantla, 4,000 each, and Cuautitlán-Izcalli, 1,800. (Secretaría de Economía, 2003)

I argue that this socio-demographic contextualisation is what seems to influence the way the General Director of Civil Protection of the State of Mexico discourses and consequently the way he sets up and justifies the policy goal of enhancing common risk perception and change the behaviour of affected people, and the civil protection programmes based on the idea of 'educating people' to deal with that situation.

This disaster conceptualisation and therefore policy's objectives are to a great extent determined by what the Government of the State of Mexico is doing to promote industrial development *vis à vis* mitigating hazards generation. In short, context matters.

Regarding this interpretation, another contextual issue emerges: that of contrasting Mexico City with the State of Mexico, as it was examined in the inadvertence discourse in Chapter Six. This illustrates, in some way, the political struggle between those two different states that has been going on for quite some time. According to the **General Director of Civil Protection of the State of Mexico** in terms

of ecological deterioration, Mexico City causes State of Mexico's problems by 'sending' migrants and dumping pollution into the State of Mexico's river banks and orchards.

My interpretation is that the **General Director of Civil Protection of the State of Mexico** appears to 'embody' the State of Mexico's 'interests' and concerns and he portrays state of Mexico's residents as the 'victims' of Mexico City's migrants who are labelled as responsible for the State of Mexico's bads; the blame is put on Mexico City and the environmental pressure it exerts in the State of Mexico. The 'living at risk' storyline synthesises the whole problematic of the State of Mexico and a way to cope with hazards within the context of increasing risk generation and economic development; it can be regarded as a 'realistic' and practical way of 'managing' risk and its meaning.

This 'living at risk' storyline can be linked to Beck's notion (2000) of risk and may explain the change in the discourse ('the breakthrough') in the sense that what we might be witnessing is a transition from the industrial to the risk society, a transition where consequences of industrial society were seen as a 'natural' outcome and were not the subject of public debate to a stage where hazards of industrial society dominate public, political and private debates. As Beck states,

“...now the institutions of industrial society produce and legitimate hazards which they cannot control.”

(Beck, 2000:27)

1.2 Policy instruments and implementation

Education programmes for promoting a civil protection culture: disaster policy implementation as a rhetorical act

As discussed in the previous sub-section the expected policy outcome is to 'teach' local people on how to live at risk and for that reason policy implementation means risk communication and education. In this section I analyse implementation as a rhetorical act. This is because I want to expose the persuasive and value-laden nature of the actions which were expressed by the policy makers as the interventions needed to achieve the objective of educating local people to 'live at risk'. To do so I focus on the meaning transfer from the education realm to the disaster realm. I undertake a metaphoric analysis of the Civil Protection Programme of the State of Mexico (CPPSM 2001-2005) and the Family Plan of Civil Protection (issued by the Government of the

State of Mexico in 2002) to examine how these instruments embody metaphors and how metaphors operate in prescribing specific policy actions.

The metaphor *learning/lesson* was found throughout the CPPSM 2001-2005 and in interviews with policy makers of the State of Mexico. Below I explain how the education language in Mexico and the characteristics of the *learning/lesson* notion (the metaphoric “source” or vehicle) can be used to examine the metaphoric ‘focus’, namely civil protection policy implementation. I undertook the metaphoric analysis as suggested by Yanow (2000). Firstly, I identified implicitly the metaphor ‘*lesson*’ as a repeated notion and the expressions ‘training people’, ‘learning’ and ‘capacity building’ of the education language in the policy makers’ interviews (see Chapter Six, section 1 and Chapter Seven, subsection 1.1) and in the CPPEM and other related State of Mexico civil protection policy tools like the Family Plan of Civil Protection (Chapter Five, section 3.3). Secondly, I proceeded to choose some metaphoric characteristics of “*lesson*” and its meanings in the discourse of ‘inadvertence causality by ignorance’. Metaphoric characteristics are “the entailments of the metaphor – the denotations and connotations of its source (that) must be grounded in the context (both in setting and time) out of which it grew.” (Yanow, 2000:44)

Thirdly, I compared the metaphor characteristics with the focus of the metaphor which is policy implementation for floods prevention. This was with the intention of identifying and explaining concepts or “labels” from the education language to describe the strategies and actions found in the CPPEM and eventually in other policy instruments. I focused on how those education language mechanisms reveal a particular construction of target populations as “*ignorant people that have to be educated*”. And fourthly, I tried to uncover how the metaphor ‘*learning/lesson*’ links thought to action in the CPPEM and other policy instruments.

Let us bear in mind that the ultimate goal of the CPPSM (2001-2005:3) is to induce ‘adequate’ self-protection behaviour amongst all to further a ‘civil protection culture’ in society. It is believed that this goal could be achieved with the aid of various technical tools like the Risk Atlas at State and municipal level, Municipal Plans of Contingencies and by implementing ‘Plans of Civil Protection’ in schools, public and private buildings to avoid casualties especially during fire and earthquake episodes

I proceed then to analyse this view of implementation and, in particular, the descriptive and prescriptive roles of the metaphor *lesson/learning* with regards to

CPPSM (2001-2005), its strategies and actions. I chose the CPPSM as the policy instrument⁵⁸ for the following five reasons:

1. It is the most important public policy document of civil protection in the State of Mexico of a normative and operative nature. It is the reference framework containing the main ideas and arguments that specify and delimit State of Mexico's government and society's actions in the matter. It embodies the 'discourse of inadvertence by ignorance'. This framework is in fact the 'umbrella' of several policy tools where educational metaphors are also found and thus a rhetoric analysis can be undertaken.
2. It reflects the government of the State of Mexico's view of disaster and the ideas policy makers have of (target) populations. It can be conceived as a "text" that embodies the language where three causal agents ('ignorant' people, policy makers and 'experts') and their actions 'show up' in the discourse and through which 'civil protection' in the State of Mexico is viewed and communicated. (as discussed above in section 1.1)
3. It addresses the issue of education, information, risk communication and capacity building that underpins the idea of 'a civil protection culture' which is the desired course of action to solve the *Ignorance of hazards and unsafe conditions* policy problem.
4. In the CPPEM (2001-2005) floods are conceptualised both as a natural and man-made hazard and also as a disaster policy problem. So floods have two policy meanings, as cause and consequence, which parallel the normative connotation of *lesson*, as means and as end.
5. The CPPEM frames the obligations and actions of disaster managers and policy makers and those of other civil protection operators.

CPPEM (2001-2005) was published in November, 2001 in Toluca, the capital city of the State of Mexico. CPPEM's objective is:

"To consolidate the achievements of the Civil Protection System of the State of Mexico by shifting it to a more preventive orientation, strengthening social participation and enhancing the mitigation of natural and anthropogenic effects"

(Gaceta del Gobierno, Estado de México, 2001:14).

⁵⁸ "Policy instrument is a tool governments use to implement public policy decisions." (John, 2002:205)

This objective explicitly highlights the component of social participation. It can be attained through four strategic groups of action for civil protection: 1) planning, 2) Financing, 3) Education and capacity building, and 4) Information and communication (Gobierno del Estado de México, 2001). I focus particularly on 3) and 4) because they encompass the policy actions “believed” to be the most adequate to solve the floods problem, as analysed above in section 1.1. I also focus on these two strategic groups of action because these two groups of action embedded, in fact, the concepts of ‘people’s education’, ‘learning’ and ‘capacity building’ which are the concepts from where the meaning transfer originates. A thorough description of the CPPEM was done in section 3.3 of Chapter Five.

As examined in Chapter Six, section 2.1.1, the discourse of inadvertence causality by ignorance allows the ‘emergence’ of two opposing subjects: the policy makers and authorities (**We**) and the affected and local people (**They**). From the analysis carried out in that section, I interpreted that the underlying general idea of the floods problem as ‘Ignorance of hazards and unsafe conditions...’ implies an ‘education problem’. Knowledge possession and ‘right’ perception of ‘real’ floods risk are the criteria to make the distinction between those two subjects. The policymakers whose discourse lies in ‘inadvertence causality by ignorance’ asserted that the ‘knowledgeable’ accessed the ‘right’ risk perception through witnessing and reporting previous inundations with the aid of technical information provided by CNA. In the case of Chalco Valley’s floods it can be interpreted that ‘*ignorant people learnt the lesson*’ by experiencing the floods and receiving ‘the’ pertinent (scientific-technical) information provided by the authorities to ‘really understand’ *the* situation.

In the *learning process* the expected outcome is the acquisition of new knowledge of the situation (enhanced risk perception) and a changed attitude and behaviour to carry out an ‘informed action’ to be better prepared (capacity building/civil protection culture) to cope successfully with future events (‘exams’ e.g. ‘living at floods risk’). This particular interpretation of policy implementation as a rhetorical act can be done by looking at the meaning transfer from the educational realm to the disaster policy realm in Mexico. Let us now turn to examining in detail the CPPEM to ‘reveal’ how the educational language is used to prescribe action within the disaster policy sphere. In the text of the CPPEM (2001-2005) I found the following concepts, strategies and actions that illustrate the education language and the channelling of

meaning into policy implementation through the metaphor *learning/lesson*. I arranged them in Box 8 below.

Box 8. Meaning transfer from education language to disaster policy implementation language in the Civil Protection Programme of the State of Mexico (2001-2005)

Education language		Disaster prevention implementation language	
Concepts	→ Strategies (means)		Actions (ends)
1. Training people	Implementation of programmes for civil protection within organisations, institutions and at home		Risk communication with the aid of civil protection programmes within organisations. Dissemination of a civil protection culture. Avoiding hazards or 'living at risk'
2. Learning	Developing new attitudes and abilities to prevent disaster Adopting 'adequate' behaviour		Implementation of the annual programme of civil protection for capacity building and training
3. Capacity building	Communication of basic knowledge for self-protection and self-care to avoid hazards Emergencies management		Implementation of emergency plans Operation of early warning systems Evacuations of unsafe places before hazards impacts

The notion of 'training people' is transferred into the disaster prevention language through the practice of civil protection plans within organisations and institutions. The meaning of training people and its transference into strategies and actions implies designing and putting into practice at institutional level, programmes of civil protection inside ministries, public and private institutions and buildings. It is believed that risk communication disaster prevention and emergency actions start at the work place and schools. In fact it can be affirmed that this is the notion of disaster prevention that prevails in Mexico. Disaster prevention implementation means evacuation from work place and schools when the hazard is about to hit; for instance when an earthquake is shaking the building, people who have been trained on the matter are expected to leave the building and escape from any potential damage.

The document entitled "Guías de Medidas Preventivas. Plan Familiar de Protección Civil" (Booklet of Preventive Measures. Family Plan of Civil Protection) is

the document that tells 'families' how to act in case of an emergency or disaster. It is a set of actions all family members have to put in place, in an organised manner, before, during and after an emergency. This guide indicates how to elaborate a Family Plan according to different disturbing (hazardous) agents: earthquake, forest fire, bombs and floods.

In case of floods, the document provides a list of preparedness actions to be put into place according to the emergency stage, whether it is before, during or after the floods. It is not really a preventive plan but a preparedness plan (See Box 9 below). For analytical purposes, the term 'preparedness' is taken from Lavell (2000:18) and refers "to educational, organisational, planning and logistical activities developed in the context of existing structurally determined risk scenarios that attempt to reduce possible loss during and after the onset of a damaging event. Preparedness contemplates a wide range of activities including the development of emergency operational plans and contingency planning, the establishment of emergency operations centres, public education schemes, stockpiling of resources, planning of evacuation routes and shelters, and early warning and alert systems".

Box 9. What to do in case of floods

Before:

1. Set up exit routes to unsafe safe places.
2. Clean the streets and your houses' drains of rubbish.
3. Store drinking water, clean clothes and food in safe places where they cannot be reached by floods; have a torch at hand, a portable radio and batteries.
4. Keep your important documents inside plastic bags to avoid deterioration.
5. If you are informed that floods are threatening and that they can impact the place you live, unplug electric appliances and gas installations.

During:

1. Above all, stay calm.
2. Be alert and tune in the radio because floods can reach places nearby. Obey all authorities' warnings.
3. Avoid being close to faulty or damaged electricity posts and cables; remember that water is a very good electricity conductor.
4. If your house is made of palm leaves, reed, clay or carton, look for a safer refuge building like schools, churches, Municipality building when these are not in danger.
5. Avoid crossing rivers and walking flooded areas even though the water level is low, it can rise suddenly which increases danger. Remember that water can drag trees, stones, vehicles and other things.
6. If your vehicle gets stuck, get out of it immediately and look for a safe refuge

After:

1. Carry out a visual inspection of your house taking into account the likelihood of things falling down. If you have any doubts about the physical condition of your house call the authorities and ask for support.
2. Do not get close to buildings and houses that appear to be threatening to fall.
3. Do not light matches and do not turn on electric appliances until you are sure that no damage has been done to the facilities.
4. Do not step over electric cables.
5. Clean immediately flammable or toxic materials as well as hazardous materials that might have spilled on the floor.
6. Stay out of flooded areas; you may be an obstacle for aid emergency actions.
7. Do not drink water or eat any kind of food that might have been in touch with water.
8. Do not try to move hurt people; report emergencies to authorities.

Source: Civil Protection of the State of Mexico (2008)

The meaning of learning

As the result of the transfer of meaning from the education domain to the disaster domain, the 'training' metaphor has made, in the disaster prevention language in Mexico, prevention to mean to 'be prepared to tackle hazards and withstand the impact'. For this reason, prevention actions include all sorts of educational means to learn how to be better prepared: to be informed about the 'natural' hazard, to be protected against it, to design ways of avoiding the impact, to look for safer places, to

minimize the danger and damage that could be caused by the impact of the hazard; in short, all mechanical actions to reduce floods risk exposure. All this might contribute to the belief that the more people – within institutions or houses – follow the steps of the plan and practice the actions, the more people are achieving a ‘civil protection culture’. It is interesting to note that no reference is made with regards to the above discussed socio-economic conditions that may impede or constrain the implementation of the actions prescribed in both the CPPEM and the Family Plan. So, vulnerability is not acknowledged as a constraining condition for the successful implementation. Now the analysis shifts to the notion of ‘learning’ which embodies two other characteristics of people, namely attitudes and aptitudes.

Transferring the concept of ‘learning’ to the disaster prevention language the focus is put on developing new attitudes and abilities to prevent disaster. So, I suggest that the meaning of the concept *learning* can be interpreted in various ways with the aid of one metaphoric characteristic, namely *learning* as a ‘positive process’. In Mexico, at the discursive level, one of the fundamental axes of the education praxis is the *learning process*. The Education Programme of Mexico (2001-2006 and 2007-2012) issued by the Ministry of Education (SEP, 2001, 2008) states that at all level of education the capacity to learn is one of the most important skills a student has to develop. The ‘learning’ word is expressed in a variety of ways to deploy a number of actions: ‘teaching should be centred in learning’, ‘learning is a human activity oriented to promote the development of capacities for life and work’, ‘learning is an education goal’, ‘education models and knowledge production should be centred in learning’, etc. In short, learning is a central concept in the Mexico education system.

Now I will identify in the policy implementation language of disaster prevention the ‘labels’ and meanings of the education language (enlisted above) in the strategies and actions of the CPPEM. The first paragraph of page 6 of CPPEM (2001-2005:6), in the section “Education, capacitating and training for Civil Protection”, reads as follows⁵⁹:

“Generating and consolidating a civil protection culture – understood as the individual and collective acquisition of a preventive conscience – should be a long-lasting task that can be realized through *integral processes of education* (italics

⁵⁹ It is important to say that in Spanish the sentence has a very bad syntax and for that reason the interpretation and translation was not easy to do.

mine) that facilitate (the development of) new aptitudes and the practice of new attitudes”

CPPEM (2001-2005:6)

It can be interpreted that the meaning of learning is transferred from the education language into strategies that target the individual to develop new attitudes and abilities to prevent disaster. Here, disaster prevention means an individual action that can be promoted when the subject experiences disaster, when the subject *learns*. The starting assumption found in the CPPEM (2001-2005:6) to explain why it is difficult to develop a ‘civil protection culture’ is that individuals are not aware of disaster risk since few of them ‘experience’ disaster during their life-time. The following question clearly frames the processes whereby individuals can achieve a ‘civil protection culture’ through a preventive behaviour:

“It is worth asking the following question: How many times is a person directly affected by a disaster...that provokes a huge impact in the person, his household, goods or environment? For most of the people a disaster is a remote event and people are aware of it through mass media communication, the images (of the disaster) get into the newspaper?, of something that occurs in other reality, in another planet, or in the best scenario, in another space distinct from that of being spectator”

CPPEM (2001-2005:6)

Thus, it is the obligation and duty of the Government (of the State of Mexico in this case) to implement programmes to ‘educate people’ about the matter. That is why the emphasis is put on the individual’s learning over other actions. This learning is ultimately furthered through the different daily life activities such as health promotion, education, food, public security, electricity consumption, driving a car, etc. In the end, according to the CPPEM, a disaster preventive behaviour can be developed only when the person’s attitude is preventive and acts in that way in all of the person’s social relations and activities.

The rationale behind the CPPEM is that people can acquire ‘preventive’ values that underpin a ‘self-protection’ behaviour. It is at the individual level that the whole protection action starts either at the public or private sphere. With new ‘enhanced’ aptitudes and attitudes the person would be better prepared to tackle disaster or avoid risk exposure. With regards to the person’s learning, it is very interesting to note that the

General Director of Civil Protection of the State of Mexico is convinced that, for instance, by integrating a 'module' of civil protection at all education levels and in professional careers, education on civil protection will take a big step forward.

And finally, capacity building means communication of 'basic' knowledge for self-protection and self-care to avoid hazards. Regarding the meaning transfer from 'capacity building' to strategies and actions, disaster prevention means also emergencies management. This issue is linked to the notion of training people. Bearing this in mind, it can be reinforced that implementation means education; but education as a mechanical action (training) oriented to manage emergencies where the operation of early warning systems, evacuation of buildings during earthquakes and fires, putting off fires, evacuation of flooding prone zones are the desired actions to be put into practice. Thus leaflets, posters and talks given by the General Direction of Civil Protection of the State of Mexico are centred on the idea of 'managing emergencies' in living at risk and eventually to avoid natural and man-made hazards, if possible.

Summing up, understanding how the meaning transfer from the education domain (with the aid of the metaphor *lesson* and other education concepts) to the disaster domain is done allows one to be aware that the characteristics and scope of the actions are 'logical' and 'natural' education tasks to prevent disaster. Implementation of disaster prevention actions are a set of decisions aimed at changing people's behaviour. However, it could be argued that public education is quite often the means to protect the *status quo* and fails to achieve the explicit goals of behaviour change for improving the quality of life of typically marginalised groups. The emphasis on education could also be understood as a way to portray learning as a tool that pretends to trigger social change as part of a disasters risk management process. In this sense, the changing role of the State in moving from paternal provider to facilitator is an important issue for further research. It could be argued that the effectiveness of disasters risk management may change according to the type of the State intervention with regards to directing people's behaviour.

The interpretation of disasters prevention as an education policy can contribute to the discussion of environmental governance and citizenship by considering the participation of people in reducing disaster risk as a citizenship right. In this regard, Castro, Kostler and Torregrosa (2004) propose linkages between people's participation and the governance of public services in risk situations, and in particular, people's awareness about 'fabricated uncertainties' in a 'risk society' (Beck, 1992) and the forms

citizen's rights can take. There are some issues that can be discussed in this debate and that this thesis contributes to. For instance, the assumption that risk reduction depends on hazard awareness and that risk subjects can be defined in terms of such awareness and perception. Therefore, risk society may imply the more sophisticated production and reproduction of social inequalities. Throughout this section it was stated that the 'adequate' policy response is to educate people to raise hazard awareness and then to be able to avoid inundations. By considering disaster risk reduction a citizen right it can be argued that education for preventing disasters might be a central task to mainstream in development policy.

2. Failure of infrastructure and inadequate monitoring of risk object

In Chapter Four I developed a narrative out of the different interpretations of the causal agents that are believed to have provoked the floods. In various degrees and forms, all interpretations of CNA, CAEM and ODAPAS' policy makers and technicians and affected people place the malfunctioning of LCC as an important source of risk. Moreover, as analysed in Chapter Six, the discourse of 'inadvertence by carelessness' constructs the policy problem of Chalco Valley's floods as a technical and managerial problem resultant of the combination of technical failures and human mistakes and negligence; in fact, LCC, 'careless' technicians and heavy rainfalls are the causal agents 'showing-up' in this discourse. Subsection 3.2, Chapter Six, characterised the rhetorical elements of this policy problem and concluded that, even though it was clear that a physical failure of LCC ultimately contributed to the floods, the blame shifted from an unnamed CNA or CAEM technician for not providing proper maintenance to LCC, to 'unpredictable' heavy rainfalls and the 'natural' limits of LCC to cope with extreme water flows.

In this section I analyse the policy responses elements of the "Failure of infrastructure and inadequate monitoring of risk object" problem. Even though the discussion focuses on how policy makers' claims about policy objective and intervention are constructed on technical grounds, the major interest of the analysis is to explain how these technical claims are justified by recurring to non-technical evidence and warrants such as the pre-existing solutions of institutions, the need to justify the existence of public institutions dealing with 'natural' disaster and the professional

background of the policy maker or technician. It is worthwhile mentioning that what is to be presented below is the surface story and that the dominant discourse is influenced by several factors and resources competition which require certain framing of policy agendas to gain support in this particular policy culture.

As I discussed comprehensively in Chapter One and Two in conceptual terms and in Chapter Four in empirical terms, in order to solve this type of policy problem, policy intervention is aimed at 'isolating' and controlling the 'natural' and man-made hazard to reduce risk exposure of local people. I found that there is a belief amongst policy makers and technicians that disaster prevention implementation is realised once the sources of risk are known, isolated from its context and even, in some cases, contained. To examine how the risk object can be tackled in terms of the capacities and limits of the technical actions. I review the ample repertoire of technical tools proposed to reinforce or improve sanitation infrastructure with regards to La Compañía Canal and Chalco Valley problematic.

In section one of this chapter where the policy objective was found to be more complex and detailed in terms of subjects' perceptions and cognition processes of floods risk, in this section I found that there was a simpler and more homogenous understanding amongst the interviewees of what the policy objective should be: to construct and maintain in good condition La Compañía Canal and the sanitation system to cope with the increase of water flows that run along LCC therefore avoiding future floods. This situation apparently may imply consensus from the data and warrants given by the policy makers and technicians to back this objective's main claim.

But interestingly, this is not the case as the following analysis shows. It explains how different justifications converge on the same objective. Hence, I argue that a common simple technical objective may imply evidence and warrants of different sorts in different ways. As in the previous section one, the analysis of this section reveals how the professional background of the interviewee, his/her position within the institution and the institutional context determine what should be the best course of action. So, in order to refine the analysis, the technical solutions are placed in their discursive and institutional context.

The interviewees identified for the "Failure of infrastructure and inadequate monitoring of risk object" policy problem are eight: the Director of Inundations Risk Reduction of CAEM, the General Director of CENAPRED, the Research Director of CENAPRED, the General Coordinator of Water and Sanitation of CNA in Mexico

Valley, the Head of Socio-Economic Research of CENAPRED, the Head of Enviro Commission Edo Mex, the Head of Environmental Protection of PEMEX and the General Director of Environmental Policies of SEMARNAT.

2.1 Policy objectives and types of intervention

Improvement of 'natural' hazards forecasting and monitoring of the sources of risk and reinforcement of water and sanitation infrastructure.

The two objectives are: 1) the improvement of hazards forecasting and monitoring of the sources of risk and 2) the reinforcement of water and sanitation infrastructure. These objectives focus on the LCC problematic because the problem's main claim requiring solution is connected to the failures of the infrastructure sanitation that caused Chalco Valley's inundations and the government's actions oriented to maintain in good 'physical condition' the LCC.

The proposed policy interventions are of a local nature and spatially circumscribed to what appeared to be the main floods cause: the failure of La Compañía Canal to function. The solutions proposed in this discourse exemplify the 'dominant view' of disaster, discussed in Chapter One, because Chalco Valley's floods cause are believed to be a single event 'isolated' from the socio-economic, historical and environmental context. In this sense, the problem "Failure of infrastructure and sanitation system and inadequate monitoring of risk object" 'allowed' the appearance and interaction of three causal agents as responsible for the floods: heavy rainfalls, La Compañía Canal 'bad' physical condition, 'careless' government technicians and operators. So consequently the policy objectives address those three causal agents in various ways as explained below.

The two causal agents, heavy rainfalls and La Compañía Canal, usually appear interrelated in policy reports and interviewees' claims because the commonly referred to explanation of the floods is based on the physical resistance of the LCC walls to the waste waters flows, the waste water peaks and heavy rainfalls, as shown in Chapter Four, section 3. For example, the introduction of the study entitled "First stage of the hydro-meteorological early warning system for the La Compañía river basin in the

municipalities of Chalco, Ixtapaluca and Reyes-La Paz, State of Mexico⁶⁰” emphasises the impact of heavy rainfalls on the current increase of the ‘river’ La Compañía and the impact these had on the LCC walls. The document is the technical basis for designing and setting-up an early warning system to avoid casualties in the Chalco Valley region in particular in the *colonias* adjacent to LCC.

It is interesting to note throughout this subsection the way objectives are justified and therefore to what extent they are formulated probably as an excuse to discuss other related issues and therefore to advance other type of claims. For example, when talking about the need to have an in-depth diagnosis of extreme ‘natural’ hazards to ‘really’ prevent floods, the relationship between scientific knowledge and policy making emerges as an important consideration to be discussed. This is because it was repeatedly stressed that policy has to be framed by rational and ‘objective’ scientific knowledge that seeks for uncontested and truthful accounts of floods.

The prevailing notion of ‘disaster prevention’ at policy level in Mexico, as analysed in Chapters Four and Five, focuses on the human-physical systems to control the ‘natural’ dangers. Thus, the type of policy intervention proposed here is about more and ‘better’ scientific research for the technical development, the improvement of monitoring systems of natural threats, and the construction and maintenance of public works to control extreme hazards to protect human populations. The early warning system (SIAT, stands in Spanish for *Sistema de Alerta Temprana*) designed by CENAPRED and the Institute of Engineering of UNAM in 2003 to detect high peak water avenues in LCC and to alert the Chalco Valley’s residents and the Floods Atlas of the State of Mexico is one of two examples of policy tools to facilitate this intervention (see later).

For the analysis, I firstly proceed with an examination of the justification of these objectives and the proposed interventions and the beliefs and warrants that support them by referring again to the second framework of the argumentative relation of figure 2, section 3.3, Chapter Two. Secondly, I go on to analyse the policy instruments and implementation by focusing on four groups of actions implemented in Chalco Valley by 2003: 1) scientific research for decision making, 2) technical reinforcement of public works to control floods, 3) contingency plans for protecting water and sanitation

⁶⁰ “Primera etapa del sistema de alerta hidro-meteorológica para la cuenca del río “La Compañía”, en los municipios de Chalco, Ixtapaluca y los Reyes-La Paz, Estado de México.”(2003) CENAPRED-Instituto de Ingeniería

infrastructure and 4) targeted funding for infrastructure development. The data sources are the interviews with both policy makers and scientists and people affected by the Chalco Valley's floods of 2000, and the official technical documents of CENAPRED, CAEM and CNA and the Institute of Engineering of UNAM.

To begin with I selected the interview of the **Director of Inundations Risk Reduction of CAEM** who conducted the coordination of the works implemented in the LCC several years before, during and after the Chalco Valley's floods (to my knowledge at least up to the time the interview was done in May 2003). I looked at the main argument which claimed that a diagnosis of hydraulic systems is of fundamental importance to plan preventive actions:

{Claim A}

“I think that a public policy oriented to preventing disaster has to have two objectives... diagnosis and prevention... And also the means to achieve such goals is technical diagnosis of hydraulic functioning of rivers, of sanitation infrastructure, to carry out studies... projects... to draw physics and mathematics models to understand the complexity in order to provide (information) for prevention”

(Director of Inundations Risk Reduction of CAEM, 2003)

According to the **Director of Inundations Risk Reduction of CAEM**, hydraulic diagnosis has to comprise studies oriented to ‘anticipating’ the occurrence of the floods, that is, to identify flooding prone places which could have already ‘experienced’ previous inundations and how the sanitation network coped with them. These studies are aimed at ‘feeding’ policy tools such as Floods Atlas of the State of Mexico with information of ‘natural’ hazards and dangerous zones and to inform the implementation of engineering works to control high volume water avenues and heavy rainfalls or even fixing the malfunctioning of the sanitation system. The warrants of these objectives are linked to the duties and obligations the CAEM has to water management and floods prevention issues in the State of Mexico:

{Warrant A}

“We, the CAEM, are engaged in two lines of actions, due to the CAEM's nature and characteristics. One line of action is about diagnosis and monitoring of hazards and works planning and the other is devoted to assist the affected infrastructure...” “... as it was in the Chalco Valley's floods

we had to get water pumps to evacuate the waste waters, for instance”

(Director of Inundations Risk Reduction of CAEM, 2003)

To my understanding the policy intervention proposed here was directly conditioned by the ‘experience’ of both CNA and CAEM had acquired as a result of Chalco Valley’s floods. Let us remember that just in the aftermath it was necessary to deviate and contain future increasing volumes of water coming from upstream LCC so a regulatory dam was thought to be one of the permanent solutions. As a result, in 2003 a small-sized regulatory dam was built by CNA in coordination with CAEM upstream LCC in the San Marcos Huixtoco area 1.5 km away from the point where the LCC collapsed. The **Director of Inundations Risk Reduction of CAEM** acknowledged that the local population was aware of the construction of the dams and how dams are conceived to reduce potential high levels of waste waters floods.

According to him, even though affected and other local people supposedly knew how CAEM and CNA intervened, local people were not totally convinced that that was the most adequate type of intervention because they did not see works being undertaken at the very site where the LCC collapsed. The **Director of Floods Risk Reduction of CAEM** was fully convinced that unless local people witness the piping of LCC they would still perceive floods risk and will not feel completely safe.

The statement that warrant this claim relates to the ‘traumatic’ consequences of floods local people have expressed to have suffered and for that reason they are sceptical of the well functioning of the dams. So, there is apparently a connection between the **Director of Inundations Risk Reduction of CAEM** and affected people in terms of the floods risk perception that the latter communicated to CAEM policy makers.

{Warrant B}

“Piping the canal (“entubar el canal”) is the solution we want; we residents of EL Triunfo have complained on several occasions and we are convinced that piping it is the good solution (the safest solution)”

(Male affected resident of EL Triunfo, March 2003)

The fact that the **Director of Inundations Risk Reduction of CAEM** quoted affected people claim about the feasibility of the LCC piping project indicates the existence of a

discourse coalition between the domain of disaster governance and that of local knowledge and coping practices. As established in figure 2, section 3.3, Chapter Two, a policy outcome may somehow condition the definition of policy objective, in this case, in terms of the institution's capacities to implement specific actions. In other words, institutions set up objectives beforehand according to what they have done previously, what they can do and how they can accomplish such objectives. That is why perhaps the **Director of Inundations Risk Reduction of CAEM** put so much emphasis on the engineering works undertaken after the inundations as the feasible and desired policy interventions because that is what they have been doing so far as the responsible government office for water and sanitation management in the State of Mexico.

This leads us to another issue that influences the construction of technical claims: institutional learning for floods risk management- this issue was analysed in the previous section 1.2 of this chapter. It could be argued that diagnosis of LCC (issued in 2003) got 'improved' thanks to the 'lessons' the failure of LCC of June 2000 brought about. Since then, monitoring of water flow peaks inside LCC (by Civil Protection of Chalco Valley-Solidarity Municipality and CAEM); dredging of the LCC bed and reinforcement of LCC walls were improved, as stated by **Director of Inundations Risk Reduction of CAEM** (see later in section 2.2).

It is interesting to note that the proposed policy intervention mentioned by the **Director of Inundations Risk Reduction of CAEM** centres on the LCC system (along with additional small dams that were planned to be built) and its resistance capacity to cope with increasing water flows and extreme heavy rainfalls. When asked about the main policy outcomes, he replied by enlisting all the works done: 1) just after the inundations waste waters were diverted to intentionally flood 'idle' fields and this contributed positively to reduce the affluent flow in the LCC system; 2) the network of sewage drains was enlarged to avoid high volumes of waste waters concentrating in few points which could have caused another rupture.

All this, he notes, fully convinced the CNA and CAEM that a permanent surveillance of LCC system was needed to guarantee its adequate functioning and to reduce uncertainty. According to him, there is still a need to do more in-depth scientific research to find a final solution to the whole problematic. This kind of floods risk management illustrates the 'risk industry' whose function is the management of public concerns over technological uncertainty. Regarding this Garvin (2001: 450) notes that

“this (risk) management entails three steps: 1) identifying the potential risk, 2) evaluating the potential harm and 3) managing the risk. These three steps...delineate a pathway whereby potential problems are assessed and evaluated by experts, the risk is determined by probabilistic assessments, and the concerns of a public are managed through effective risk communication”

The **General Director of CENAPRED** shares the view that one important policy objective should be “the improvement of hazards forecasting and monitoring of the sources of risk” but he focuses more on conceptual issues connected to the knowledge-policy making relationship. He claims that decision making regarding disaster prevention has to be based in scientific knowledge of hazards because that is the only way to get accurate information of *what* has to be tackled and solved. To the **General Director of CENAPRED**, unlike other previous federal administrations in Mexico,

“...the time when policy makers and politicians made ‘reactive’ decisions on the basis of ‘*multiple information*’ without having any reliable scientific basis of what was going on in ‘reality’ is gone...”

(Quoted from the General Director of CENAPRED, May, 2003)

That is why, he asserts, today and thanks to CENAPRED, policy makers are better prepared and informed to act and therefore to alert and evacuate vulnerable population from areas exposed to hurricanes, for example. This last statement and the next one seem to justify CENAPRED’s existence as ‘*the scientific centre for the improvement of disaster policy making in Mexico*’:

{Warrant A}

“...so, it is very good that there is a ‘translator’ (that is how he called CENAPRED) (between scientific knowledge of natural hazards and policy decisions) so to speak, because those very important decisions cannot be made merely on the basis of a ‘political criterion’, they have to be based on ‘real’ data, on ‘knowledge’ and above all on knowledge produced by experts, people that are devoted to the study, analysis and knowledge of different phenomena...experts are the most trustworthy to advise authorities”

(General Director of CENAPRED May 2003)

Both the existence of CENAPRED - as an institution that 'bridges' science with policy making - and the type of knowledge it produces to inform decision making are backed by an example given by the **General Director of CENAPRED**. According to him, the 'successful' implementation of 'preventive' mechanisms at state and municipal level proved good the use of monitoring instruments designed jointly by CENAPRED and the Institute of Engineering of UNAM. He referred to the case of the impact of two hurricanes that occurred in Mexico in 2002 (he did not mention the names) to illustrate the science-policy relationship:

{Backing A}

All this has been very fruitful for the country (Mexico). I would like to mention that two hurricanes provoked important (severe) consequences in material terms but human losses were quite few...and this was due to the use of instruments like early warning systems, and... a timely decision based on information that alerted potentially exposed population (to the hurricanes) and that facilitated the evacuation of people..."

(General Director of CENAPRED, May, 2003)

Unlike the **Director of Inundations Risk Reduction of CAEM, the General Director of CENAPRED** went beyond the simple use of diagnosis studies for tackling hazards and emphasised the relation between science, policy instruments and policy making for improving preparedness actions:

{Claim B}

"We (CENAPRED) cannot do 'prevention' unless we know what we are about to prevent, therefore the fundamental task is to carry out diagnosis, a diagnosis of risk. And this is very complex because a National Risk Atlas has to be elaborated, with lots of maps..., an integral information system..., a data bank that allow us to know at state, municipal and colonia level what is the risk level according to different phenomena"

(General Director of CENAPRED, May, 2000)

As it was discussed in this chapter, subsection 1.2 in the rhetorical analysis of implementation, 'prevention' also means 'preparedness'. Technical diagnosis of risk, somehow, reinforces this meaning of prevention and at the same time, is used for

establishing an accurate warning system to further hazard awareness and prepare people in case of evacuation from unsafe places. So technical diagnosis of risk performs two functions: rhetorical and practical. In short, preparedness is a shared meaning of prevention between two groups of policy responses discussed so far, “Ignorance of hazards and unsafe conditions” and “Failure of infrastructure and inadequate monitoring of risk object” and constitutes another argumentative coalition element, up to this point.

Under the ‘Failure of infrastructure and inadequate monitoring of risk object’ problem, policy intervention is a technical task that can be improved with more and better scientific research on additional aspects such as water basin ecology and climate dynamics, weather forecasting, hydraulic structures and engineering processes and materials. The above is synthesised below in the claim of the **Research Director of CENAPRED**:

{Claim C}

“Disaster risk reduction is about a simple equation...we aim at reducing the outcome of three multiplying factors...we cannot reduce hazards nor the exposure to them but we can intervene in reducing vulnerability. So (the objective is) addressing physical vulnerability (city’s lifelines) by reinforcing structures, (enforcing) new construction regulations...”

(Research Director of CENAPRED, 2003)

The technical measure proposed for floods prevention is sometimes referred to a future time frame within an ecosystem management framework for hazards planning. Thus for the **General Coordinator of Water and Sanitation of CNA in Mexico Valley**, floods risk reduction can easily be achieved by considering prospective studies (up to 30 years) and long term forecasting of water bodies and rivers within the Water Basin Management Framework (WBMF). WBMF helps to identify the natural flooding areas within a basin and therefore the hydraulic works that need to be built. All that is explained in the National Hydraulic Programme (2001-2006) and it was believed to be implemented by the CNA at the time of the interview in April 2003. According to him, at CNA there is a clear understanding of what needs to be done regarding preventive measures and avoiding risk exposure.

For the **Head of Socio-Economic Research of CENAPRED** policy intervention must entail mitigation works and studies of physical vulnerabilities to really understand where are the ‘critical’ (fragile) points of the man-made systems are in order to oversee

them and provide good maintenance. This can be coupled with a full diagnosis of the flooding prone places and regions. There is a need to have more and detailed information about that. It is not a difficult task, he says:

{Claim D}

“Engineers can easily and rapidly detect the deterioration of the materials of bridges... Risk assessments of engineering works are central in this. ...one of the obstacles to implementation is the lack of sufficient funds.”

(Head of Socio-Economic Research of CENAPRED, November, 2002)

Now I shift the focus of the discussion to the second policy objective, *the reinforcement of water and sanitation infrastructure*. CNA water technicians and operators' carelessness is thought to be another contributing cause of the floods, so the second objective of a disaster preventive policy points to the need to guarantee at the maximum the security level of water and sanitation infrastructure by enforcing adequate maintenance. To analyse this second objective I proceed to analyse the interviewees of those who were classified under 'inadvertence by carelessness' in Chapter Six. This is to verify if there is coherence between casual agent's blame and responsibility and the policy objectives. For example, the **Head of Socio-Economic Research of CENAPRED** asserted that “it was a lack of precaution” what caused the floods. Let us remember his claim I already analysed in Chapter Six, section 1.1.2:

[Claim 1]

*“It is a **typical case**...It could have been foreseen in advance by monitoring the [waste] water levels...and how that could be affected with forecast rainfalls and by [evaluating] the canal walls [its physical condition]...evidently, isn't it? **It was simply a lack of precaution...**”*

(Head of Socio-Economic Research of CENAPRED, 2001)

He privileged a technical failure explanation when framing Chalco Valley's floods along with human carelessness, so it was expected, in a certain way, to find a policy objective related to that causal claim. However when he was asked to answer the question, *what are the goals of natural disaster policies?* Surprisingly he recurred to the concept of social vulnerability and put it in a larger socio-economic context, in rather vague terms:

{Claim A}

“The first objective is to save human lives and then to avoid vulnerable groups (elderly people, kids, etc) being impacted by disaster”.

{Claim B}

“So, at (policy level) within the poverty alleviation programme there should be a connection with disaster attention...it has to address life conditions mainly housing (physical conditions) and also it has to be coupled with an ecological conservation programme”.

{Evidence A}

Because (in this case) there is a causal relationship between poverty and environmental degradation... this makes heavy rainfalls to be much more violent...”

(Head of Socio-Economic Research of CENAPRED, 2001)

So there is no apparent connection between the disaster policy problem he put forward in Claim 1 and the policy objectives of Claim A and B⁶¹. On the one hand, the **Head of Socio-Economic Research of CENAPRED** was convinced that lack of precaution could have caused Chalco Valley’s floods: on the other hand, to him, the policy objective has to do with larger socio-economic processes. Perhaps this apparent disconnection has to do with how the questionnaire was formulated. When the question is phrased in general terms so is the answer, whereas when the question alludes to a concrete and known fact by the respondent, the answer may be characterised by detailed explanations with the aid of empirical evidence, perhaps in order to prove to the interviewer that ‘he knows what he is talking about’. I found somehow the same situation with the next interviewee. **Head of Enviro Commission Edo Mex** framed inundations as causality of inadvertence by carelessness but proposed policy solutions pointing to other objectives.

{Claim B}

“The policy objectives would be on the one hand to address the (improvement) of people’s quality of life and on the other to prevent disaster to avoid wasting money in reconstruction... It is said that prevention pays-off, it is cost-effective; if you prevent disaster you will have economic benefits. It is said that

⁶¹ To differentiate the Chapter Six claims from the Chapter Seven claims I used numbers for Chapter Six and letters to Chapter Seven.

the ratio of prevention investment-economic benefits is 1\$US-5\$US, this means that if you invest one dollar in prevention you would reduce losses equivalent to 5 dollars.”

(Head of Enviro Commission Edo Mex, 2003)

The Head of Enviro Commission Edo Mex justifies the first policy objective by stating that since he is a social psychologist he gives a lot of importance to human life issues.

{Warrant B}

“How I see things depends on my professional background”

(Head of Enviro Commission Edo Mex, 2003)

There are some interviewees who locate the policy objective within his responsibilities and that of the institution he/she works for. For instance **the Head of the Environmental Protection Department of PEMEX,**

{Claim C}

“Our first goal is to guarantee people’s safety in the surrounding environment of PEMEX”

{Evidence C}

“PEMEX handles high risk products, oil, gas, chemical products that could harm society if not properly handled, if we do not implement cautionary measures...the last barrier there is between our facilities and society are the emergency plans that indicate us how to evacuate and protect people living near PEMEX facilities...”

{Warrant C}

“We take advantage of our capabilities and expertise to help (local) people in case of natural disaster... we support society...”

(Head of the Environmental Protection Department of PEMEX, 2003)

Placing the policy objective within the institution’s functions can also be applied to the argumentation of the **General Director of Environmental Policy of SEMARNAT**. He mentioned that the goal of disaster policy is to implement an integral ecological watershed management that will help preventing floods downstream.

{Warrant D}

“...you must have seen that... SEMARNAT has just launched a programme to manage forest, water, soil and biodiversity by taking into account a watershed approach...the very regional and environmental and you could connect a series of objectives that will benefit populations... I don't know if I am being too much of a demagogue...”

(General Director of Environmental Policy of SEMARNAT, 2003)

With regards to the issue of inadvertence by carelessness, no references were made in policy makers and managers' interviews regarding the professional performance of technicians and operators when it came to attributing responsibility and blame for the non-action taken or carelessness. Thus no single policy objective was openly mentioned that related to the abilities and responsibilities of technicians and operators in the mismanagement of the sanitation system of LCC, as it was voiced in the causality discourses analysed under section 1.1.2 in this chapter.

Nevertheless, as could have been expected, the issue of policy makers' carelessness was repeatedly mentioned by the affected people. Affected people were eager to put the blame on 'water authorities' for the inundations. Because, according to the affected people interviewed, when they brought their claims to the authorities the latter did not do anything to prevent the disaster. Here are three affected people's claims that illustrate this argument:

“As far as I know... before the floods (of June 2000)... eight days before there was someone who realised that there was a little fissure right on the point where the wall collapsed... and then some residents of my colonia addressed the problem to the municipality (of Chalco Valley) but we've got no response from them...”

(Female resident of El Triunfo, April, 2003)

“...before the floods, several letters were drafted and sent to the governor (of the State of Mexico) asking for responses regarding the canal (LCC)...I knew about colonia El Molino residents that they put pressure on the federal and state governments claiming that works were needed to be done beyond cleaning and dredging the canal bed...”

(Male resident of El Triunfo, April, 2003)

“... that year (2000) I heard that no maintenance to the LCC was provided unlike previous years when we saw 'machines' working...”

(Male resident of *colonia* San Isidro, April, 2003)

The following part 2.2 analyses how policy instruments and implementation address the previously discussed objectives.

2.2 Policy instrument and implementation

Scientific research for decision making, early warning system, contingency plans for protecting hydraulic infrastructure and emergency attention, and targeted funding for infrastructure development

The second framework of Chapter Two that establishes the argumentative relation between policy objective and intervention is used again, but this time to examine implementation according to the two objectives analysed above: 1) improvement of hazards forecasting and monitoring of the sources of risk and 2) reinforcement of water and sanitation infrastructure. These objectives are said to be achieved through four policy responses, namely 1) Scientific research for decision making, 2) improvement of early warning systems, 3) contingency plans for protecting water and sanitation infrastructure and 4) targeted funding for infrastructure development. The following is an examination of the programmes, works, and projects that have been grouped according to these policy responses.

2.2.1 Scientific research for decision making: Floods Atlas of the State of Mexico

The Floods Atlas of the State of Mexico is a policy instrument aimed at describing the places that are chronically flooded as a consequence of the rainy season. It is meant to provide scientific information to reduce floods risk in vulnerable areas of the State of Mexico. Floods Atlas is also a guideline to elaborate Risk Atlas at the municipal level. The Atlas focuses both on damages caused by extreme hydro-meteorological phenomena and on the actions state and municipal governments have to put into place to prevent future inundations. The ultimate goal is to contribute to the improvement of water and sanitation infrastructure.

The Floods Atlas consists of a series of topographic maps of urban and rural settlements in which flooding areas are identified on the basis of information from previous years. Floods causes are framed in terms of poor or lack of sanitation

infrastructure to cope with heavy rainfalls. Therefore, (emergency) actions are targeted at providing good maintenance or doing supplementary works such as paving roads, constructing or cleaning drains, etc. ‘Vulnerable population’ is mentioned only as part of the number of residents that are affected (see Table 6). These actions reinforce the argument that, on the one hand, technical solutions are constructed as *the* adequate policy actions and on the other hand that people’s vulnerability is reduced to numbers of affected people and vulnerable people are not described in terms of the wider socio-economic processes or sites of social identity.

Table 6. Floods recurrence in Rainy Season 2002-2006 in Chalco Valley Municipality and number of affected people

Colonia	Event	Number of affected population					Recurrence	Maximum population accounted
		2002	2003	2004	2005	2006		
San Miguel Xico 1a, 2a, 3a y 4a. Sección	Urban inundation	1050	1050	220	0	400	4	1050
San Isidro	Street ponding	0	1050	0	0	1050	3	1050
San Martín Xico La Laguna	Urban inundation	12	0	550	0	200	3	550
San Isidro	Urban inundation	30	0	120	435	0	3	435
María Isabel	Street ponding	0	0	0	0	0	3	0
Darío Martínez	Urban inundation	0	700	0	0	0	1	700
El Triunfo	Urban inundation	0	0	0	10	0	1	10
Darío Martínez	Street ponding	0	0	0	0	0	1	0
Providencia	Street ponding	0	0	0	0	0	1	0
TOTAL		1092	2800	890	445	1650		3795

Source: Floods Atlas, version 2008. Government of the State of Mexico, CAEM.

2.2.2 La Compañía Canal early warning system

According to CENAPRED and the Institute of Engineering of UNAM, previous water over spilling of LCC and flooding in Chalco Valley region for the 1975-1990 period indicated that inundations have been a chronic event reaching a critical point in June 1st 2000. So in the likelihood occurrence of more water over spillings of LCC due from future extreme storms in the area of the San Rafael and San Francisco rivers, an early warning system was thought to be a useful information tool for decision taking. Therefore, CENAPRED and the Institute of Engineering of UNAM designed in 2003 a hydro-meteorological early warning system (SIAT) for La Compañía River Basin⁶² that comprises three municipalities: Chalco, Ixtapaluca and Los Reyes-La Paz (CENAPRED, 2003). SIAT's objective is to provide a technical tool for measuring rainfall, water levels and water peaks of San Francisco, San Rafael and La Compañía Canal to trigger a warning alarm in case there is a risk of overspilling and a consequent inundation.

SIAT's implementation is planned to take place in three stages: the first stage is oriented to identifying hydro-meteorological phenomena that may strike populations within a two days period. That is done with the support of satellite images and forecasting information provided by the National Meteorological Service of Mexico. The second stage is activated when radar and satellite images show that extreme rainfalls will impact populations in less than 24 hours. And the third stage is triggered when rainfalls are actually occurring and may cause damage within the next few minutes. This is considered a sensitive system because it detects how the water level increases upstream so municipality authorities can handle reliable and 'accurate' information to make decisions and, should this be the case, evacuate populations from potentially flooding zones.

2.2.3 Contingency plans for protecting hydraulic infrastructure and emergency attention.

The Management Department for Infrastructure Protection and Emergency Attention of CNA (IPE-CNA) is in charge of the protection of hydraulic infrastructure and emergency attention to infrastructure. It delivers emergency plans (EPs) that comprise

⁶² CNA called the La Compañía Canal a river instead of a sewage canal.

the strategies and actions in case a hydro-meteorological phenomenon such as hurricanes, extreme rainfalls increase the water level of rivers, lakes or dams. The focus of attention is put on managing contingency events to avoid human casualties and infrastructure damage. EPs are handed to the civil protection operators and authorities for them to know how to act in case of floods. There are 10 centres and 32 brigades (one for each state) for emergency attention located throughout the Mexican territory. These centres are equipped with water pumps, water treatment plants to supply drinking water to flooded people. The brigades carry out diagnosis of the physical condition of the hydraulic infrastructure and, when needed, restoration works and protection. Protection is done by the Army because these are vital lifelines for society.

Similar in approach to risk management, as the one referred to above, the EP consists of forecasting and monitoring of hurricanes, evacuation strategies and emergency aid. It is interesting to note that here again prevention means preparedness. Even though the target of this response is the hydraulic infrastructure and the people that live close to rivers and canals, this Department acts like it were a civil protection agency specialised in hydro-meteorological phenomena.

“We⁶³ follow the hurricane trajectory at least 72 hours in advance and deliver this information to SENAPROC... They (SINAPROC) know how well we are prepared in terms of exit routes, damages that could be caused by this disturbing agent, the most vulnerable parts such as electric installations, drinking water provision, etc...”

(General Manager of IPE- CNA May 2003)

With the aid of EP, IPE-CNA warns inhabitants about the danger of being exposed to and living in flooding-prone sites close to rivers and open canals. What matters to IPE-CNA are the things that may constitute an obstacle for the well functioning of rivers and water bodies. According to the federal water law, nearby federal zones no population is allowed to settle near such zones. Besides, all hydraulic infrastructures are insured against vandalism and ‘natural’ accidents. To him, insurance is very important against disaster as a means to prevent them and restore people, lifelines and business to their original conditions. To him this rationale should be applied to all collective equipment and infrastructure in Mexico.

⁶³ The General Manager of the Department for Infrastructure Protection and Emergency Attention of CNA used the personal pronoun We to refer to the water sector in particular the National Meteorological Service that belongs to CNA.

According to the **General Manager of the IPE-CNA**, EP has been effective in monitoring hurricanes, evacuating people and protecting water infrastructure. He claimed that,

“Even though extreme heavy rainfalls occurred in the states of Tamaulipas, Veracruz and Tabasco in 1999, rate mortality decreased...we could monitor in advance and that allowed us to trigger the warning system and evacuate people...concerning material losses I cannot tell you but as far as human lives losses is concerned (mortality) has been decreasing luckily”

(General Manager of IPE- CNA May 2003)

And he kept on highlighting the ‘prevention’ lines of action they implement. The following claim, again, warrants the idea that CNA functions as a civil protection agency for hydro-meteorological hazards.

“It is about prevention issues...we implement structural and non-structural actions, the former are the actions that can be seen like water infrastructure facilities and the latter are the emergency plans, civil protection plans, and the meetings we had with people to inform them on how to proceed, and the regulations and laws”

(ibid)

IPE-CNA elaborates and implements EP for the most important rivers and canals of Mexico. A general reference framework is used for all EP⁶⁴. This framework establishes the actions that CNA has to implement *before, during and after* an emergency with the intention of reducing floods risk and minimising the impact. Actions are framed according the three stages cycle: *before, during and after* the event or emergency. The *‘before’ stage* is the ‘prevention’ stage and includes actions such as analysis of the hydro-meteorological conditions, up-to-date diagnosis of the river water flows and levels as well as information regarding dams’ capacity and exit routes for the surrounding human settlements, organisation and communication schemes between CNA and Civil Protection of the State and municipalities of the State, materials such as sandbags and other equipment and vehicles to provide assistance. This set of actions is in fact preparedness or warning actions. When a hurricane is approaching an alert is communicated to population and all public and private institutions and organisations.

⁶⁴ The information used to describe this part is taken from the “Emergency Plan for the Celio river” (Michoacán State) published by IPE-CNA in 2002 (CNA, 2002). As confirmed by the General Manager of IPE-CNA this reference framework is used for all rivers and has proved well for attending emergencies.

The *'during' stage* includes actions such as inspection of the water flows and level of the river and of the basic hydraulic infrastructure by giving more attention to the critical points where chances of overflowing are much greater. Alongside these actions a permanent monitoring of hurricanes and extreme rainfalls is undertaken by the National Meteorological Service. Populations are called to evacuate and move to temporary shelters, Emergency works (reinforcement and construction of containing walls) are undertaken at the critical points. Permanent communication concerning zones prone to be affected is established between IPE-CNA and the State Unit of Civil Protection. IPE_CNA's role is also to install water treatment plants to supply drinking water.

The *'after' stage* comprises the following actions: supplying drinking water and chlorination, evaluation of the damaged infrastructure, pumping water out of the flooded areas, checking the hydraulic and sanitation infrastructure. Comprehensive evaluation of the sources of drinking water is also done. The implementation of the EP is aided by the *Manual para la Atención de Emergencias*, Manual for Emergency Attention, which is the document that establishes guidelines, methodology and procedures to attend emergency situations. This Manual is the document that details how responses groups and institutions (that of SINAPROC) have to be organised and the procedures to accomplish for the follow-up of actions. The **General Manager of IPE-CNA** claims that EP has been effective in *'preventing'* floods by evacuating people. That is why they consider themselves as having a *'preventive'* approach to inundations. Again prevention means preparedness.

“We are *'preventive'* because we have managed to evacuate people on time before floods occur and besides we act during the emergency stage, and see that the action plans are put into place the moment we get at the flooded area”

(General Manager of IPE-CNA, 2003)

2.2.4 Targeted funding for technical reinforcement

CNA has started building a pipeline for La Compañía Canal; the project amounts to \$1,423 millions of Mexican pesos and it was expected to be ready in July 2008. It is 6.7km long, 5 meters in diameter and 20 meters deep. It runs from Talpacoya hill (where the LCC broke in June 2000) to Rio Los Remedios. Former President Fox and the current governor of the State of Mexico declared that this is the final solution to this

chronic problem and will provide benefits for the residents of the three municipalities: Chalco Valley, Chalco and Ixtapaluca. It is worth mentioning that this solution has been all along the residents' and affected people's demand. Besides, CNA, CAEM and ODAPAS participated in the implementation of the following works aimed at solving various problems of La Compañía Canal⁶⁵ in the segment that crosses the Municipality of Chalco Valley- Solidarity. It is worth mentioning that in all projects vulnerability is defined in terms of the number of persons exposed to inundations in a specific surface affected.

Table 7. La Compañía Canal and technical responses

Problem description	Causes	Vulnerability	Emergency Works and actions	Necessary works and actions to eradicate the problem
1. Blockage of LCC with branches, domestic rubbish and canal sediments (colonia D. Martinez)	Lack of maintenance (It was reported by CAEM that since April 1997 wall fissures were observed)	Land affected (92 has.) Population exposed (0)	Reinforcement of the south wall with sandbags	LCC walls cover
2. Extraordinary heavy rainfalls that generate the overspilling of LCC and lack of water pumps (colonia M Isabel)	Insufficient hydraulic infrastructure; lack of maintenance and Extraordinary heavy rainfalls	Land affected (423 has.) Population exposed (0)	Reinforcement in both walls with sandbags; fixing the pumping stations 1 and 2	Cleaning and dragging of the General Canal ⁶⁶ ; heighten both walls; fixing pumps 1, 2, 3 and 8
3. Frequent flooding because of low pumping capacity of pump No 16 (colonia San Isidro)	Insufficient hydraulic infrastructure	Land affected (423 has.) Population exposed (0)	Emergency pumping to dump into LCC exceeding water	Fixing pump No 16 and construction of two collecting stations
4. Extraordinary uncommon heavy rainfalls provoked waste water overspilling in LCC; illegal settlements; unevenness of the canal bed provoked wall fissures (colonias Avándaro, El Triunfo and San Isidro)	Unevenness sedimentation of the canal bed; Extraordinary uncommon heavy rainfalls; illegal settlements	Land affected (282 has.) Population exposed (3,850)	Reinforcement in both walls with sandbags; fixing breakage in the affected area; construction of a collecting station; canal bed soil dragging and cleaning	Heighten both walls; reinforcement of south wall in the Tlapacoya point with steel columns. (It is worth noting that at the time this report was prepared, 31-05-01, CNA was already elaborating projects to solve ongoing LCC infrastructure problematic).

⁶⁵ Data sources: Government of the State of Mexico(n.d.) Gerencia Operativa de la CAEM, Municipality of Chalco Valley- Solidarity

⁶⁶ The General Canal is the largest waste waters canal where the waste waters of La Compañía Canal flows. It discharges into the Rio Tula basin in the State of Hidalgo.

5. Ground filtration in colonia Xico; canal wall at pumping station No 5 is low	Insufficient hydraulic infrastructure; Unevenness sedimentation of the canal bed	Land affected (80 has.) Population exposed (1,050)	Emergency pumping to dump into LCC exceeding water; fixing pump 10; Heighten 1 mt. both walls with sandbags	Integral project for the whole zone; to level canal wall at the pumping station No 5; fixing pump No 5
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Another project is the “Project to control the rising of the water flows of La Compañía River”. At the time I did my fieldwork in April 2003, “La Gasera” dam was already working. It is located in San Marcos Huixtoco, Chalco Municipality. The objective is to regulate the water volume peaks coming from both San Rafael River and San Francisco River.

CNA implements the “Programme for Protecting the Population Centres”⁶⁷ that aims at reducing risk and mitigating the consequences provoked by floods in the population centres. This programme targets those settlements that are prone to flooding risk either by the accumulation of rainfalls and water flows over spilling. The type of works included in this programme are: a) elaboration of project, b) construction of dams for controlling high flows of water, c) construction of canal walls, d) deviations of streams and rivers, e) construction and restoration of the above mentioned works and f) maintenance, conservation and rehabilitation of the above mentioned works. This programme, in fact, frames the solution presented above.

CNA runs the National Meteorological System (SMN) that is in charge of generating and providing weather information about the state and evolution of cyclones, hurricanes and rainfalls to communicate to the Mexican peoples. This policy is coupled with the Programme referred to above and with the following ones: a) insurance programme for protecting infrastructure both of populations and of federal, state and municipal domains; b) Early Warning System to inform the potentially affected populations about the natural phenomena in order to evacuate risk zones and c) participation in the organisation when emergency situations arise.

⁶⁷ Chapter V, article 83 of the National Waters Law entitles CNA “to coordinate, construct and operate works for controlling water avenues and rivers and protecting populations from flooding. CNA determines and classifies the flooding risk zones and issues norms and recommendations along with setting operations, control and follow-up measures and financing contingencies” (CNA, (2000) “National Waters Law”

3. Accidents of nature and of man-made systems that disrupt human systems

The narrative of Chalco Valley's floods elaborated in Chapter Four showed the existence of different competing explanations of the floods causality – some of them expressed just in the aftermath of the disaster. The 'official' evaluation done by CNA established that what happened was an 'accident of nature' due to the impact of 'unforeseen' extreme heavy rainfalls on the LCC. Nature was blamed for the tragedy. High profile politicians such as the Minister of Social Development, the governor of the State of Mexico and even the then President of the Republic Ernesto Zedillo also claimed that Chalco Valley's floods were a 'natural' accident. Explanations of this type can be located in the discourse of accidental causality and are the starting point to analyse the following policy responses.

Therefore, in this section I examine the policy responses elements of "Accidents of nature and of man-made systems that disrupt human systems" problem. As it was discussed in Chapter Six, this floods policy problem is constructed with scientific information of 'natural' hazards such as heavy rainfalls, faulty man-made systems (LCC) and the socio-economic impact of disaster. It clearly illustrates the Behavioural Paradigm because it focuses on people's reactions to hazards and disaster which are conceived as unintended and unforeseen events. That is why three groups of interventions are commonly deployed: 1) early warning mechanisms to alert populations to evacuate chronic-flooding places (already discussed in section 2 of this chapter), 2) emergency plans that comprise engineering works to contain the waste water floods and disaster preparedness and 3) mitigation schemes to restore to the 'original' functioning of the community. Here I focus on disaster preparedness, early response and relief and mitigation; the first three lie under the concept of 'emergency management'. Thus, for the purposes of this analysis, I take UNISDR's definitions of 'emergency management' and 'mitigation'

'Emergency management' is the "organisation and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps. Emergency management involves plans and institutional arrangements to engage and guide the efforts of government, non-government, voluntary and private agencies in comprehensive and coordinated ways to respond to the entire spectrum of emergency needs". And 'mitigation' is the "lessening or limitation of the adverse impacts of hazards and related disaster. The adverse impacts

of hazards often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions.” (UNISDR, 2009: 5, 8)

Public policy is not designed to control accidents because potential causal triggering factors like heavy rainfalls, storms, hurricanes and earthquakes are beyond human control. They occur unexpectedly and sometimes suddenly. However, public policy can guide human actions to address what is collectively conceived as ‘social problems’. Thus, in this way, the government, organisations and people in general are thought to be able to intervene ‘before’, ‘during’ and ‘after’ hazards impact. So disaster policy responses can either contribute to prepare people and organise reactions to lessen or avoid fatal damages or they can mitigate the effects of the floods. That is why emergency management actions and mitigation measures are seen as the ‘correct’ and ‘desired’ interventions for tackling this policy problem. It is worth mentioning that, in general, these responses are the most commonly known responses in the public domain that the Mexican government has provided since disaster attention became a public policy concern (See Chapter Five).

This disaster response fits into the precautionary principle frame, developed in environmental debate the last 40 years and that is one of the core principles of ecological modernisation discourse, because it relies on action under uncertain conditions that may be caused by the likelihood of hazards impact. I argue that the internalisation of the idea of environmental care and the precautionary principle may have influenced policy making strategies for coping with residual risk and mitigate disaster consequences in Mexico. Regarding the design of policy objectives and the implementation of measures what seems to matter are actions to support government responses to lessen damages on affected people and provide social control. Capacity building policy responses target people in order to enable them to react in critical uncertain situations where assistance provided by the government is limited.

Therefore, as it was done in the two previous sections of this chapter, in this section I first proceed with the analysis of the claims and evidence that justify objectives and interventions and the beliefs and warrants that support and legitimise them. Thereafter, I focus on policy instruments and implementation namely emergency plans and mitigation schemes, particularly FONDEN. This is, among other reasons, because during Chalco Valley’s floods of 2000, FONDEN was implemented to contribute to the alleviation of the damages befallen on the affected people.

I explain how three policy objectives revolve around emergency aid, evacuation from floods-prone areas and mitigation. I found in the interviews that the type of intervention implies preparedness, the fostering of coordination between public and private institutions of SINAPROC and civil society to improve participation. I examine, then, the arguments' main claims of the emergency plans implemented in Chalco Valley by CNA, CAEM and ODAPAS, the civil protection programmes and FONDEN.

Nine interviewees were identified for these types of policy problem responses: the **General Director of SINAPROC**, the **Former General Coordinator of SINAPROC**, **The Research Director of CENAPRED**, the **Director of Emergency Aid of CARITAS**, **The Under-attorney of Natural Resources of SEMARNAT**, **The Head of Enviro PEMEX**, the **General Coordinator of Water and Sanitation of CNA in Mexico Valley**, **General Manager of the Department for Infrastructure Protection and Emergency Attention of CNA** and the **Operations Manager of GRAVAMEX-CNA**

3.1 Policy objectives and types of intervention

Emergency aid to affected people, evacuation from floods-prone places, and mitigation of the damaged

To initiate the analysis I refer to the organisational dimension of the emergency phase because the 'lack of coordination' was continuously referred to by the policy makers as a vital obstacle to overcome to truly engage organisations and institutions in the provision of effective emergency aid:

The **Director of Emergency Aid of CARITAS** states that disaster policy goal

{Claim A}

"...should be to set up a legal framework that specifies the basis for society's participation to prevent destructive events. In case destructive events occur, one has to clearly establish the basis for efficiently organising teams to cope with emergencies".

(Director of Emergency Aid of CARITAS, 2003)

In the interview with the **Director of Emergency Aid of CARITAS** I detected that one of his main concerns was to prevent 'chaos' when providing assistance to damaged populations in the aftermath of a disaster. His experience, he remarks, has

allowed him to realise that the emergence and participation of ‘unprepared’ volunteering groups becomes a serious obstacle that may even worsen the situation. There have been times – he recalled Mexico City’s earthquakes in 1985- when volunteer groups instead of assisting affected people become the ‘assisted’. For him, stronger regulations and real law enforcement are needed to improve preparedness and mitigation when it comes to channel efficiently the participation of NGOs and volunteering groups. The evidence that support claim A is the following:

{Evidence A}

“... with regards to volunteer groups, since 1985 (as a result of the Mexico City earthquake) a bunch of volunteer ‘specialized’ groups have emerged to ‘tackle’ emergencies or disaster and they are not well prepared; the opposite (occurs), they hinder the expert groups’ aid and become the ‘assisted ones’ because they lack equipment, training, they don’t even know the operation of the national plan of disaster...”

(Director of Emergency Aid of CARITAS, 2003)

In order to rule society’s participation, according to him, there are some intermediate objectives that should be met:

{Claim B}

“Unprepared volunteer groups have to be capacitated and well equipped to let them intervene (during emergencies); identifying them, controlling them and setting up standards to capacitate them”

(Ibid)

Claim B is warranted by the knowledge and perception the Director of Emergency Aid of CARITAS has acquired over the years regarding volunteer groups

{Evidence B}

“They (‘unprepared’ volunteer groups) do not know the structure of SINAPROC nor the National Programme of Civil Protection; information on how to act according to the type of emergency, the (adequate) type of equipment to handle the situation...”

(Ibidem)

Evidence B is warranted by the General Law of Civil Protection (GLCP) in the sense that it rules volunteer groups’ participation. Article 25 of GLCP states that:

“People willing to participate in rescue and aid activities should be organised as volunteer groups in order to receive

information and capacity building to be able to undertake coordinated actions to protect populations”

The explanation given by the **Director of Emergency Aid of CARITAS** alludes to the incorporation of volunteer groups by the state as an act of efficiency but it can also be seen as an act of political control. In the aftermath of the Mexico City earthquake in 1985 many NGO's and volunteer groups 'emerged' with the explicit aim of supporting the government in the reconstruction of the damaged areas. However, the lack of an institutional framework to coordinate their participation created chaos and in some cases made things worse because political conflicts arose surrounding other urban needs other than housing provision. So the Mexico City government felt the need to control these civil organisations. Besides some of these organisations gained political power by channelling other types of demands and needs from victims and non-victims.

In relation to the organisational dimension, the **Research Director of CENAPRED** also points out the institutional level when setting up the disaster policy objective. For him, it is the improvement of the coordination among all ministries and public institutes belonging to the SINAPROC that should be the main target of a disaster policy. He assumes that once coordination at federal level is realised, the likelihood of fostering the top-down participation from state to municipal level will increase and improve. Under that institutional arrangement, 'prevention' would take place and would make responses more effective and efficient. Ideally this arrangement might be replicated at state and municipal level. That would make SINAPROC a 'real' civil protection system with a preventive orientation, he asserts.

Both the **Research Director of CENAPRED** and the **Director of Emergency Aid of CARITAS** share the belief that coordination of actors and institutions is of paramount importance when it comes to improving the participation of volunteering groups, on the one hand, and that of the ministries and institutions, on the other. Volunteering groups' participation has to be organised right in the aftermath of a disaster on the basis of strong enforcement of a national policy (GLCP) whereas at the institutional level, organisation implies the coordination of preventive and reactive responses of all SINAPROC's institutions and government offices in a long-term period.

What this might be telling – I argue- is that the adscription to and position of the scientist or NGO member within a different social domain and their experiences and

duties condition the way he/she values a specific type and level of coordination - the former belonging to the social domain of science and disaster management and the latter to the social domain of local coping practices. So, it can be interpreted that there is a 'practical' coordination that takes place on the ground and a 'normative' coordination that is put into place within institutions and between institutions and volunteer groups. These two meanings of coordination are then policy values to be mainstreamed in the emergency stage, especially during the initial recovery steps, throughout SINAPROC at all levels.

A similar line of argumentation that values the institutional coordination is that of the **General Coordinator of SINAPROC**. The **General Coordinator of SINAPROC** gives importance to the institutional coordination and also emphasises the need to strengthen the legal framework that protects human life; that process can be triggered if public policies are assembled under a 'integral vision' considering the different competences of the various ministries involved.

{Claim C}

“The main policy objective is to strengthen the legal framework that protects human life, at the end of the day that is what we have to be worried about”

(General Coordinator of SINAPROC, 2003)

The legal framework she alludes to is the General Law of Civil Protection that limits the rights and obligations of public institutions within the SINAPROC (see Chapter Five) I assume that because she was the **General Coordinator of SINAPROC** at federal level her main concern was to raise the level of 'disaster risk awareness' of the participant institutions of the whole of SINAPROC to mainstream civil protection measures into their programmes and actions. Moreover I assume that her professional background, a lawyer specialised in public security and a former deputy, made her to think about disaster policy objective in legal terms mainly. The following claim backs this statement.

{Claim D}

“I am in charge of providing support to populations, the priority is to protect human life, in this context it is of paramount importance to let the rest of the SINAPROC institutions know that I know what they have to do...that I

understand when They should participate...under an organised and coordinated scheme of participation...

(General Coordinator of SINAPROC)

The **Under-Attorney of Natural Resources of SEMARNAT** also shares the view of institutional coordination and puts emphasis on two phases: 1) diagnosis to prevent disaster and 2) emergency responses which can be implemented through judicial, economic and organisational means within the existing government's structure of SINAPROC. A more programmatic approach is claimed by the **Head of Enviro PEMEX**. To him, the main disaster policy objective has to be SINAPROC's objective which is,

{Claim E}

“to protect the person and society against natural and man-made hazards through the implementation of plans, programmes and actions oriented to avoid or mitigate their effects.”

The **Head of Enviro PEMEX** grounds his claim E by using PEMEX example on how to deal with hazards and risk

{Evidence E}

“(What) We want (PEMEX) is to guarantee people's safety for those who live close to PEMEX facilities... to be safe and they have to know how to handle hazardous products and to implement cautionary measures and after all to provide emergency aid or to evacuate people”

(Head of Enviro PEMEX, April, 2003)

During the emergency phase, coordination at household and community level was raised again as an important factor to 'prevent' disaster. Thus the development of self-protection mechanisms within households as the basis for preventing disaster is what the **General Director of Civil Protection of SEGOB** considered to be the means to achieve *the* policy objective. The establishment of 'Self-help Committees' (*Comités de Ayuda Mutua*) with their internal rules to support populations can be a way to enhance local responses with the aid of government's orientation. In his words:

{Claim C}

“The ultimate objective is to enable people to make decisions to prevent themselves and make them aware of how to act in a

risk situation; people have to know how to respond in the first place and then..."

(General Director of Civil Protection of SEGOB, 2003)

This policy objective is a preliminary step towards demanding the participation of the State and other institutions. So, this claim leads to the next one:

{Claim D}

"... to ask for support from public and private institutions to succeed in coping with risk situations. That is the way security increases; but it has to be everyone's culture."

(General Director of Civil Protection of SEGOB, April, 2003)

Both claims C and D of the **General Director of Civil Protection of SEGOB** link two levels of coordination, between people and institutions that will result in better preparedness schemes. In other words, it is asserted that the government should provide an enabling policy system for institutions and people (at household level) to get prepared to act. So, in terms of disaster management and policy, the basic unit for coordination is the household. That is why the value of 'self-protection' is central to 'preventing' disaster, and bearing this in mind, policy tools are elaborated taking into consideration the 'household' as the policy target.

There is the belief among some policy makers like **General Director of Civil Protection of SEGOB** that civil protection should start at household level and that the government's role is to provide training and to set up a legal framework to channel the participation of households' members. With regard to training, a number of communication materials are issued containing, for example, information on how to act to avoid or mitigate damages 'before', 'during' and 'after' floods or an earthquake hits a house. As a result, the "Family Plan of Civil Protection" (FP) (CENAPRED, 1996) is a document (in leaflet version) issued jointly by SEGOB and CENAPRED to provide basic information for the family to elaborate its own emergency and civil protection plan taking into account risk conditions inside the house and its surroundings. FP is integrated by the following objective and steps (see Box 10 below):

Box 10. Family Plan in case of floods

Objective: All family members knowing what do inside the house before, during and after a 'disaster' situation through preparation and self-protection basic measures. Family Plan (FP) should set up four steps:

1st step: assessment of house, hazards and risks. FP should be a guide to assess the physical conditions of the house, electric, water and sanitation facilities. FP should also contain a sketch specifying the risks inside the house and its environs and the recommendations to reduce them.

2nd step: design of cleared exits and evacuation routes to step away from high risk zones in case the best action is to get out of the house and evacuate the affected zone

3rd step: Preparation of family members to take the most adequate decisions to face the disaster, to stay 'calm' and to know how to act according to the on-going event.

4th step: to carry out periodically emergency drills; an emergency drill is a rehearsal of how to proceed in case of an emergency. An emergency drill allows family members to evaluate and calibrate the efficiency of actions to improve future actions⁶⁸.

Source: CENAPRED (1996)

So far, it has been discussed that 'coordination' is central to the improvement of both preparedness and emergency aid at household and institutional level. This is both a policy objective and a policy intervention the policy makers emphasised as the way to further a 'preventive civil protection system'. In the following sub-section I analyse what 'coordination' means and how it is enacted in policy tools for emergency implementation. To perform this, I selected the 'Family Plan of Civil Protection' (FP) and 'Emergency Plan' of CNA (EP-CNA) that is implemented to protect hydraulic infrastructure and populations.

I argue that there is a parallelism between these in terms of objectives, steps and tasks; what seems to differ is the scale of intervention, the scope in terms of resources, means and beneficiaries of the actions. Eventually this comparison may provide inputs

⁶⁸ CENAPRED (1996) states that an emergency drill is a way to train family members on: allocation of responsibilities to family members, warning alarm; disconnection of electric appliances; to follow the evacuation routes; to stay calm and not to run, shout or push; get to the meeting point and assess procedures, outcomes; adjust times and movements.

to improve preparedness both at household and institutional level because some synergies between these two can be found to improve implementation. This comparison may also explain why it is believed that ‘disaster prevention’ should be – above all – a ‘self-protection activity’. I now examine the meanings that underpin ‘coordination’ both in the FP and in the EP-CNA. First, I take the four steps of the FP and then I place the EP-CNA into the frame of the FP. I utilise the information of the water sector provided by CNA (data from interviews to CNA policy makers and EP information) and the information provided by CENAPRED.

3.2 Policy instruments and implementation

3.2.1 The meaning of ‘coordination’ in emergency implementation.

‘Coordination’ was expressed by some policy makers (see above 3.1) both as a final policy objective and as a necessary intervention to promote effective participation of people and organisations within a normative-legal framework. In Mexico, CNA designs and implements the water policy at federal level through the Regional Management Offices. One of the main objectives of the National Water Programme (2001-2006; 2007-2012) is “to prevent meteorological and hydro-meteorological risks and to tackle their effects” (CNA, 2008:27).

In this regard, basic activity N° 10 of the Regional Management Offices of CNA⁶⁹ “...is to prevent risk and tackle damages provoked by inundations”. And the objective is “...to implement strategies and actions oriented to the prevention and attendance to damages provoked by heavy rainfalls and water bodies over spilling with the aim of reducing impact on population and productive areas” (CNA, 2002: 60)

The Emergency Plan of CNA (EP-CNA) is a policy instrument that is part of a series of tasks aimed at achieving the above mentioned objective. EP-CNA is elaborated and handed to state governments by the Management Department for

⁶⁹ There are 13 Regional Management Offices throughout the country: I. Peninsula de Baja California (Mexicali, Baja California); II. Noroeste (Hermosillo, Sonora); III. Pacífico Norte (Culiacán, Sinaloa); IV. Balsas (Cuernavaca, Morelos); V. Pacífico Sur (Oaxaca, Oaxaca); VI. Río Bravo (Monterrey, Nuevo León); VII. Cuencas Centrales del Norte (Torreón, Coahuila); VIII. Lerma Santiago Pacífico (Guadalajara, Jalisco); IX. Golfo Norte (Ciudad Victoria, Tamaulipas); X. Golfo Centro (Jalapa, Veracruz); XI. Frontera Sur (Tuxtla Gutiérrez, Chiapas); XII. Península de Yucatán (Mérida, Yucatán) and XIII. Aguas del Valle de México y Sistema Cutzamala (México, Distrito Federal) which is the region where this thesis case occurs. The Direction of Infrastructure Protection and Emergencies Attention (PIAE) coordinates emergency activities in 10 Centres of Emergency Attention throughout the country

Infrastructure Protection and Emergency Attention of CNA (IPE-CNA) whose main functions – as mentioned earlier – are to provide physical protection and security to hydraulic infrastructure and populations. Specifically EP-CNA is for the management of water bodies, dams and rivers and the maintenance and fixing of hydraulic infrastructure to prevent floods and damages. It is considered as the guideline to respond to emergencies with the coordination of State and municipal governments.

The EP-CNA contains the following aspects: geographic and hydrologic features; hydrometric scheme; parameters for warning; description of water flows in critical zones; planning and basic recommendations to population; organization to tackle contingencies; a list of potential affected areas and settlements, and shelter information. According to the General Manager of IPE-CNA, up to (April 2003, time of the interview) 73 emergency plans for the ‘most problematic rivers’ of the country had been elaborated and handed to the state governments.

However, an examination of EP-CNA cannot be done unless it is placed in the context of a series of tasks aimed at “preventing and attending damages provoked by heavy rainfalls and water bodies over spilling”. In the following Box (N° 11) I compare a FP with the series of emergency actions oriented “to prevent risk and tackle damages provoked by inundations”. These emergency actions are one of the 12 groups of basic tasks of the Regional Management Offices of CNA (CNA, 2002). Thereafter I analyse the policy makers’ main claims relating to the issue of EP putting emphasis on the LCC case and that of coordination.

Box 11. Comparison between Family Responses of Civil Protection and Emergency Response of CNA

Family Plan of Civil Protection 1.	Emergency Responses of CNA 2.
1. Assessment of physical characteristics of house and all water and electric facilities; identification of potential hazards and risks inside the house and the environs.	<ol style="list-style-type: none"> 1. Identification of flood prone areas 2. Identification of illegal settlements in flood prone areas and planning 3. Design and setting up of the hydro-meteorological early warning system 4. Follow up and inspection of populations that were re-settled in safer areas 5. Monitoring of the extreme hydro meteorological phenomenon 6. Delivery of hydro-meteorological early warning system 7. Monitoring of water bodies, rivers and hydraulic infrastructure works 8. Analysis of hydraulic and water assessment of rivers, etc

2. Design of cleared exits and evacuation routes.	Non Applicable
3. Preparation to take the most adequate decisions to face the disaster	9. Setting up the civil protection team 10. Warning population
4. To carry out periodically emergency drills	11. Training local civil protection authorities and operators 12. Integration of the Planning and Logistics team
5. Family Plan ready	13. Delivery of emergency plans to local civil protection operators 14. Elaboration of the working plan to tackle emergencies 15. Elaboration of emergency programs in case of infrastructure failure 16. Social, economic and environmental assessment of planned projects
6. Ideally family members' action coincides with institutional emergency responses ¹ .	17. Installation of Operative centres 18. Drafting of press bulletins and mass media attention 19. Emergency supply of drinking water to flooded areas and affected population 20. Sanitation and outbreaks prevention actions 21. Rehabilitation of damaged hydraulic infrastructure 22. Technical advice to SEGOB on natural disaster declaration 23. Fund raising for implementing agreed actions 24. Construction of infrastructure

1. Source: CENAPRED (1996)

2. Source: CNA (2002)

The first stage is known as the 'risk assessment stage' where the identification of hazards that may threaten populations, houses and infrastructure can give indication of the risk-prone zones. The information collected at household level during this stage constitute a type of 'early warning system' because it indicates the manner in which a hazard may impact the house and therefore how family members can respond accordingly. House physical conditions and hydraulic infrastructure are target points to provide adequate maintenance. Second stage is framed by the design of evacuation routes within the house in case floods occur. This is an important stage because it connects the 'inner' environment of the house with the 'outer' environment of public infrastructure such as the waste water canals. As the case study of this thesis demonstrated in Chapter Four, it is not sufficient to provide adequate maintenance to sewage canals but also to set up cleared routes for residents to evacuate the flooded area and temporarily stay in safer places.

Stage three is about team organisation to foster preparedness. It can be assumed that if communication between CNA authorities and risk-prone families takes place the preparedness can be better organised between these two levels of organisation. Communication may mean warning people to raise hazard awareness. Stage four is about emergency drills in houses and the integration of planning and response teams of

CNA. This stage is about team training in order to get prepared to act in case it is needed. Stage five is about the elaboration of Plans and can be considered as the moment to match both levels of intervention. the 'private' and the 'public'. This is the stage where communication between CNA operators and populations should be at its best. And finally, stage six takes place immediately after the hazard strikes. It is when the coordination between affected populations, CNA operators and authorities should be effective to start the relief moment.

3.2.2 Financing for mitigation: Fund for Natural Disaster (FONDEN)

Besides emergency plans, in 1996 the Mexican federal government through SEGOB created the Fund for Natural Disaster (FONDEN) as a major source of federal financing for the reconstruction of public infrastructure, restoration of protected areas, purchase of emergency response equipment and disaster relief. It provides incremental funding for disaster reconstruction directly to federal agencies and municipal governments through state trust funds (*fideicomisos mixtos estatales*) FONDEN has special provisions to assist poor and low-income households to re-build their communities and re-establish their incomes in the event of a 'natural' disaster. 'Natural' disaster have varied over time with drought being dominant in 1996, hurricanes in 1997, floods in 1998, earthquakes and floods in 1999, and lately hurricanes and floods in 2007 and 2008.

Evaluations of the implementation of FONDEN (Graizbord, 2007, 2006, 2005) indicate that the majority of submitted and approved projects fall into the following categories: 1) attention to affected people by providing basic goods, food and clothes 2) monitoring and forecasting 'natural' hazards of a meteorological nature, such as hurricanes, floods, and extreme rainfalls; 3) construction of protection works to counter the impact of 'natural' hazards and 4) reinforcement of buildings and infrastructure to withstand potential 'natural' hazards impacts and to mitigate 'natural' disaster.

FONDEN was implemented in Chalco Valley after the floods in 2000 (Table 8, below). A total amount of MX\$ 178,841 million were channelled into a number of mitigation tasks: 1)_SEDESOL implemented a compensation scheme that handed ten thousand pesos to each of the affected households; 2) SEDESOL provided food, clothes and other basic goods to affected households to cope with losses, basic furniture was also distributed; 3) the Ministry of Public Health implemented a sanitation programme

to avoid epidemic outbreaks and the spread of contagious diseases; 4) SCT rebuilt the segment of the Mex-Puebla highway, 5) SEP organised temporary shelters in the unaffected schools, 6) CNA blocked LCC wall hole and repaired the damaged wall and also dredged LCC bed and heightened and reinforced the two canal walls. CNA cleaned and disinfected houses, schools and streets and also restored the 'drinking' water provision. Along with the Army, mud and rubble were removed from streets and roads.

Table 8. Implementation of FONDEN in Chalco Valley in 2000

<u>Ministry</u>	<u>FONDEN</u>	<u>Temporal Employment Programme (PET)</u>	<u>Addition</u>	<u>State resources</u>	<u>Total of resources</u>
<u>Social Development (SEDESOL)</u>	<u>8,480</u>	<u>4,183</u>	<u>12,663</u>	<u>10,118</u>	<u>22,781</u>
<u>Communications and Transport (SCT)</u>	<u>2,802</u>		<u>2,802</u>	<u>962</u>	<u>3,764</u>
<u>Public Education (SEP)</u>	<u>2,713</u>		<u>2,713</u>	<u>2,967</u>	<u>5,679</u>
<u>Public Health (SSA)</u>	<u>6,450</u>		<u>6,450</u>		<u>6,450</u>
<u>CNA</u>	<u>137,565</u>		<u>137,565</u>		<u>137,565</u>
<u>CNA-CAEM</u>	<u>2,603</u>		<u>2,603</u>		<u>2,603</u>
<u>SUBTOTAL</u>	<u>160,611</u>	<u>4,183</u>	<u>164,794</u>	<u>14,047</u>	<u>178,841</u>

Source: CENAPRED (2001),
Units are in thousand of Mexican pesos

At this point, it is important to recall the claims about FONDEN implementation of the then General Coordinator of Civil Protection of SEGOB when floods occurred in Chalco Valley. It gives an indication of how FONDEN was conceived and implemented in Chalco Valley. It is important to mention that the socio-economic impact assessment of FONDEN in Chalco Valley elaborated by CENAPRED (2001) does not make any mention of how FONDEN was implemented and to what extent it helped mitigating the floods impact. It only proposes the works to be undertaken to reduce flooding and LCC over spilling. According to former General Coordinator of Civil Protection of SEGOB, FONDEN is, above all, an economic instrument to mitigate impacts and to safeguard local people's life and assets.

“Well... a very important policy instrument was created: FONDEN. It is very important...FONDEN considers the allocation of resources that is, after all, an economic insurance

to attend disaster (impact), then FONDEN was an excellent initiative of the federal government”

(General Coordinator of Civil Protection of SEGOB in 2000)

4. Exposure of vulnerable people to hazards is a consequence of socio-economic inequalities.

This problem construction differs from the previous three in the sense that vulnerability is considered to be a contributing factor of inundations. In this discourse, vulnerability appears to be the outcome of social and political processes, so objectives and responses implementation should ideally be directed towards addressing ‘unsafe conditions’ and society’s structural causes. In this section, I analyse how policy objectives and implementation are designed to address people’s vulnerability to floods and therefore to ‘prevent’ disaster.

People’s vulnerability to floods in Chalco Valley is understood, as it was discussed in Chapter Four section 3.2, in terms of three ‘unsafe conditions’ groups: 1) Physical environment (Unsafe housing and risk-prone location, and erosion or damage of house materials) 2) Fragile economy (Capital, assets and savings lost or damaged, jeopardising livelihoods, and job losses or unpaid) and 3) Policy responses (Unequal distribution of emergency aid and goods according to damage, increase of insecurity and social protection mechanisms, inadequate warning and claim making of affected people)

In the following analysis I intend to identify which components of these ‘unsafe conditions’ are present in the policy maker’s claims and which policy responses are proposed as solutions. The analysis indicates to what extent these policy solutions’ claims ‘really’ tackle people’s vulnerability to flooding. It is important to mention that I do not expect to find in the policy makers’ arguments all components of the ‘unsafe conditions’ but only some of them; the central ones. At the discursive level, this situation may indicate whether disaster policy is in the process of changing some of its elements related or not to the relationship between causal agents and policy responses by recognising socio-economic and political processes of disaster. Three policy makers mentioned ‘poverty’, ‘marginality’ or ‘inequality’ as causal factors of disaster or floods or the possible connection between vulnerability and development: the **Undersecretary of Ecology of the State of Mexico, the General Director of Environmental Policy**

and Planning of SEMARNAT, General Director of Disaster Management of SEDESOL

For analytical purposes the policy makers' arguments were grouped in two separate issues while recognising inter-connections between them: 1) Ecological management and natural resources conservation as the framework for integrating risk reduction; and 2) Urban and land use planning to contribute to the promotion of regional development and the reduction of inequalities and marginalisation. Again, as in sections 1, 2 and 3 of this chapter, I deconstruct the policy makers' arguments with regards to policy objectives, type of intervention, instruments and implementation by employing once more the Toulmin-Gasper model (2000). Unlike the previous three sections where I discussed the argumentative construction in separate sub-sections by objective, intervention, instruments and implementation, in this last section I develop the analysis issue by issue, unpacking the policy responses elements. I decided to proceed this way because each issue can be analysed as a distinct type of policy intervention on its own right.

4.1. Ecological management and natural resources conservation as the framework for integrating risk reduction into development planning

4.1.1 Policy objectives and types of intervention

The **Undersecretary of Ecology of the State of Mexico and the General Director of Environmental Policy and Planning of SEMARNAT** advocate this view of 'structural causality'. The **Undersecretary of Ecology of the State of Mexico** answered to the author of this thesis in two ways when it came to refer to who was doing the action and proposing solutions to the disaster policy problem. When he referred to the things that 'have to be done' he talked in the first person singular whereas when he referred to the way the Ministry of Ecology of the State of Mexico (SESM) has been conceiving disaster issues he spoke in the third person singular. This can be interpreted as a way of distancing himself from the view of SESM about disaster by implicitly stating that, up to now, SESM has failed in integrating 'disaster prevention' into its policy values and programmes. For him, so far, disaster attention has not been conceived as a problem closely connected to the ecological management of land; the way 'it has to be'.

According to the **Undersecretary of Ecology of the State of Mexico** the policy objective should then be:

{Claim 1}

“...to decrease the number of disaster and to minimise their impact on populations”.

He supports this claim by stressing the importance of developing three strategic actions: ‘ecological land planning’, ‘technological component’ and a ‘normative component’. These actions are in fact the warrants of Claim 1 and can be conceived as the policy interventions needed to ‘decrease the number of disaster’. He truly believes that ecological criteria are the ultimate set of values that should constrain human activities to reduce disaster risk. Warrant 1 stresses this:

{Warrant 1}

“An ecological land planning (in Spanish, *ordenamiento ecológico del territorio*) that would constitute the main framework to define land uses”.

Warrant 1 is supported by backing 1 and 2 through to technical and normative interventions that firms and populations have to endorse

{Backing 1}

“...a technological component which means that firms rely on technology, infrastructure and facilities that allow them to decrease disaster’ occurrence”

{Backing 2}

“ A normative component, what is commonly called ‘the rule of law’ there have to be a law, norms, regulations and institutions to make that (ecological management) happen...”

And when asked about other political and socio-economic elements that may play a role in the decision making process, the **Undersecretary of Ecology of the State of Mexico** appeals for a transformation of the bureaucratic culture that hinders the construction of a democratic and participatory planning that would really trigger a change towards ‘reducing disaster’:

{Evidence 1}

The ‘bureaucratic culture’ that still prevails in Mexico is that of authoritarianism ... decisions are made on a ‘top-down’ fashion

full of vices... (...) low and middle rank public servants do not dare voice their opinions...and besides... (...) the 'law of least effort',

"If it occurred to me to have an idea perhaps I will have to work more and that is not convenient for me..." (...) high rank authorities are not allowed to fail or err... (...) and being a high rank policy maker, like a minister, "I will try to show that I am the one who knows everything..."; and that is why there is no collaboration between high rank policy makers..."

On the other hand, according to the **Undersecretary of Ecology of the State of Mexico**, SESM views disaster as 'unforeseen' and 'accidental' events that suddenly happen without an 'apparent' or 'known cause'. This view clearly contrasts with his claim that 'disaster are the outcome of socio-economic, ecological and political processes'. He criticises the SESM's view and also blames the Ministry of the Interior of the State of Mexico for neglecting the importance of environmental planning and the 'rational' use of natural resources when trying to prevent disaster. That is reflected in the fact that the Ministry of the Environment is called forth to intervene in the aftermath of disaster just as a 'supporting' public institution. SESM does not take part in the design of disaster policies and this has to change. Disaster policies have to be 'environmentally-sound'.

Thus, according to the **Undersecretary of Ecology of the State of Mexico** an important objective of the 'environmental sector' would be to promote the mainstreaming of 'ecological aptitudes' of the ecosystem into civil protection and disaster prevention planning. That is why he put forward the following three problems (which in fact constitute policy beliefs) that cause the disaster. Policy interventions, then, have to address these problems:

- a) 'Institutional problem'. He makes reference to the political power the civil protection sector lacks within the development planning system of Mexico. Civil protection is not taken into consideration when designing 'integral' development policies. So 'preventive policy values' are not integrated into development planning.
- b) 'Human resources problem'. In Mexico there is no a single policy oriented towards capacitating people in civil protection issues. People who happen to hold a civil protection position in the public administration are not professionally qualified to perform their duties; they are 'improvisers' (*son improvisados*).

- c) ‘Culture and education problem’. There is a lack of a ‘culture of civil protection’; to support this claim he refers to the individual’s irresponsibility for not integrating risk into the individual’s daily decision making; he speaks in the second person plural. “We do not contract a life insurance plan, we are not worried about attending the doctor once in a while for preventing illness... we drive without fastening a seat belt and.... It’s part of the Mexican culture...”

For the **General Director of Environmental Policy and Planning of SEMARNAT**, the objective of a disaster policy is to set up an ‘integral’ management of natural resources and ecosystems (for instance through a reforestation programme) that will provide environmental goods, services and benefits to society. For instance, reforestation will prevent downstream settlements from flooding by catching run-off water. He claims that ‘ecologically sound use of ecosystems’ through soil and vegetation conservation and sustainable water consumption would increase resilience and would enhance household’s coping capacities ahead of future hazards impact.

The **General Director of Environmental Policy and Planning of SEMARNAT** argues that an ‘integral basin management framework’ is the ‘adequate’ planning tool to reach a prevention stage of public policies. Within this framework it is absolutely necessary to develop a ‘strategic planning’ that should comprise 1) the setting up of priorities based on ‘rational’ knowledge, 2) the use of technical knowledge for decision making, 3) monitoring, evaluation and follow-up of the outcomes to get to know the suitability of the project or programme. He justifies that claim on the basis of a recognition of the need to achieve ‘objectivity’ as a central value for decision-making. He criticises the fact that, according to him, decisions and solutions are made upon ‘subjectivities’. ‘Subjectivities’ are connected to group interests and power relations. So, according to these two policymakers, ecological management and natural resources conservation are *the* essential components of the framework where ‘disaster prevention’ has to take place.

The **General Director of Disaster Management of SEDESOL** claims that the main objective of a disaster policy is to prevent disaster through ‘rational’ land use planning and housing and urban infrastructure development. He refers to mainstreaming disaster prevention into urban planning. He argues that by the ‘connecting institutional’ efforts of SEMARNAT, CONAPO and SEDESOL, a ‘preventive system’ will be

consolidated. He is convinced that disaster are socially constructed phenomena and that a preventive policy would mean tackling those factors that create social conditions for the reduction of poverty; this is a structural argument; in short, the 'poor are the most at risk', for several reasons: poor people settle in risk prone places such as near river beds, lake beds, etc; they cannot afford to build good quality houses. Therefore, he claims that:

{Claim 1}

“Avoiding disaster would mean recognising first, the 'poor' social conditions under which many people live/”

He supports Claim 1 by referring to 'commonplaces' such as the relation between material welfare and people's capacities to have access and use of more reliable housing materials in the face of hazards

{Evidence 1}

“So when you see the disaster that have already taken place (in Mexico) you realise that the poor are the most affected groups ...disaster occur always in poor communities and that is because despite hurricanes, or inundations, storms striking in rich communities, they are not affected thanks to the good housing materials, and rich people's houses resist and those (of the poor) are o bad quality and therefore very vulnerable...”

So he states that something can be done regarding housing and its resistance qualities to natural hazards. However he does not elaborate more on the 'social conditions of the poor' and he reinforces the prevailing idea that points out to the engineering works for coping with hazards. For instance, he stresses that floods can be prevented by building dams, providing good maintenance to river beds. This policy intervention is similar to the technical solutions proposed in section 2. “Failure of infrastructure and inadequate monitoring of risk object” and indicates that hydraulic engineering solutions (that characterise policy responses in section 2 and 3) prevail in policy makers' understanding of what have to be done. This illustrates the fact found in this research that a policy maker' discourse may be made up of different elements pertaining to other 'causalities'

When it comes to talk about obstacles to policy implementation under the principle that 'preventing disaster starts by reducing risk exposure', the **General Director of Disaster Management of SEDESOL** brings to the fore three obstacles that

have to be overcome. Interestingly these obstacles are the similar to the ones expressed above by the **Undersecretary of Ecology of the State of Mexico**:

- 1) Institutional barriers, but in this case referred to as the 'lack of institutional awareness' with regards to the need to mainstream disaster risk reduction into their policies and programmes.
- 2) Lack of 'well-trained public servants' of various sorts to carry out scientific risk assessments.
- 3) Political problems in the sense that civil protection is not a policy value within the different ministries and public organisations.

4.1.2 Policy tools and implementation

Programme of Soil Restoration of La Compañía River Basin.

The 'Programme of Soil Restoration in the La Compañía River Basin' (Gobierno del Estado de México, (2003) was designed and implemented by the Ministry of Ecology of the State of Mexico. It can be considered as an attempt to develop an 'integral' ecological management framework to contribute to the reduction of floods risk. The main goal is to create sustainable ecological conditions for the conservation of the La Compañía 'river' basin. It comprises the following four specific objectives: 1) reforestation of the basin to contribute to improving the air quality of the Metropolitan Zone of Mexico City, 2) to reduce siltation in the water bodies and rivers, 3) to increase the recharging capacity of the Chalco Valley region's aquifer and 4) to control the increase of the water flows that are generated up-stream LCC. One of the most important expected benefits (by the end of 2003) was to reduce the accumulation of mud and other organic materials in the LCC bed to prevent over spillage.

According to the Ministry of Ecology of the State of Mexico, this set of strategic actions can contribute to a decrease in the Aeolian erosion in the Metropolitan Zone of Mexico City (MZMC). It was expected this programme would also contribute to improving the air quality of MZMC by increasing the forested areas of Chalco Valley's region. Moreover it will contribute to the creation of improved microclimate conditions and recharge the aquifer of the region and reduce the rate of siltation in LCC and Chalco Valley's sewage system. During the delivery of the First Stage of the Programme for Soil Restoration in the Sub-basin of Río La Compañía, the Minister of Ecology outlined

the achievements of the programme: construction of 500 km of terrace, 4 500 km of subsoil and 50 km of breaches, construction of 200 000 trenches, construction of 300 dams to control azoic production, transport and planting of 4 million trees. The positive effects of the programme included (by 2003): reduction of azoic by 62 000 cubic metres per year, retention of 14. 9 million cubic metres of rainwater drainage, and mitigation of the generation per year of 170 tonnes of suspended particles PM10. With a four year duration, the project will benefit an estimated population of 300, 000 in the region.

Unlike the other policy responses discussed in sections 1-3 of this chapter, ecological management of the basin constitutes an integral´ system of strategic planning that intends to solve not only the deforestation problems of the LCC basin but also air quality of ZMMC.

4.2 Urban land use planning to contribute promoting development and reduce poverty.

4.2.1 Policy objectives and types of intervention

According to the **Director of Disaster Management of SEDESOL**, disaster prevention at neighbourhood level (*a nivel de barrio*) is the policy objective. For him, disaster prevention means “to reduce damages” in ‘specific and ‘concrete’ neighbourhoods through land use planning. He argues that prevention cannot be realised at city level but at a micro level. For him, the HABITAT Programme intends to ‘make aware’ and ‘educate’ families living in *barrios* about the need to prevent disaster. He asserts that,

“It is easier to educate, let’s say, 500 families than 100 million people”.

(Director of Disaster Management of SEDESOL)

When defining disaster prevention he alludes to ‘unsafe housing of poor people’ and ‘risk-prone location’. However, regarding floods prevention measures he refers to hydraulic works like dams. He has recourse to technical solutions already referred in section 2 of this chapter. This again may indicate the manner in which technical remedies ultimately are conceived as the last option to ‘reduce floods risk’. He appeals to the development of a ‘culture of prevention’ as the social change needed to raise risk awareness and prevent disaster. He claims that, “We are not used to insuring our own house, our car...” Besides he refers to ‘mitigation works’, for example, reinforcing canal walls, hillsides and eviction actions to safer places. Through the implementation of the

HABITAT Programme, he affirms, poor and marginalised people can be better integrated into the urban development. It is also assumed that poor communities can define the risk they are exposed to. Another assumption is that risk reduction can be achieved through up-grading urban neighbourhood and providing urban services. The next warrant backs this claim.

“We can have piped water and sewage system in a *barrio* but if floods ‘arrive’, these will damage urban infrastructure and ...fruitless efforts put into place”.

(Director of Disaster Management of SEDESOL)

4.2.2 Policy tools and implementation

HABITAT Programme

The General Direction of Disaster Management of SEDESOL is in charge of implementing the ‘HABITAT Programme’. This Programme is aimed at tackling urban poverty and development through the implementation of an ‘action model’ that combines the improvement of infrastructure and collective equipment in marginalised urban zones with vulnerability reduction of households to ‘natural’ hazards. Its main objective is to fight urban poverty, improve the ‘popular’ habitat, and to make cities and neighbourhoods safer and liveable. ‘HABITAT Programme’, coordinated by SEDESOL, is a policy intervention aimed at promoting ‘spaces’ of social identity, orderly management of urban development, the connection of marginalised neighbourhoods (*barrios*) and ‘misery belts’ with the legal city, and therefore improving the quality of life of city’s inhabitants. It is a complementary instrument to those implemented by the State government in the matter.

‘HABITAT Programme’ comprises six groups of action, namely, 1) Fighting urban poverty which is designed to improve capacities and opportunities of households’ members living in marginalised urban zones; 2) Supporting female headed households which is oriented to support poor women through actions that promote the development of capacities to allow poor women to enter the work market and improve their work performance; 3) Physical improving of ‘*barrios*’ which introduces basic infrastructure and services in marginalised urban zones to integrate them into the city in order to improve the quality of life of its inhabitants; 4) Giving access to reserve land, which

supports cities to have access to urban land for settlements of poor people; 5) Land planning which is oriented to reduce vulnerability to natural hazards of poor people living in marginalised zones, and 6) Establishing Habitat Development Agencies to promote the interaction of all agents of urban development for the furtherance of local development and the implementation of strategic projects (DOF, 25 March, 2003).

One of the specific objectives is to strengthen actions to prevent disaster in marginalised urban zones through actions oriented to reducing settlements' vulnerability to natural threats. In this regard, the Federal government through SEDESOL provides resources to: for land use planning and the elaboration of Risk Maps; to capacitate people living in marginalised urban zones to tackle risk and disaster; to undertake disaster risk mitigation works towards reducing settlements vulnerability to natural hazards; for the re-settlement of poor households to safer places in order to avoid non-mitigated disaster (SEDESOL, 2009)

Under the umbrella of this Programme, the Undersecretary of Urban Development and Planning of SEDESOL issued the Methodological Guide to Elaborate the Atlas of Natural Hazards ('Guía Metodológica para la Elaboración de Atlas de Peligros Naturales a Nivel Ciudad') that sets up the basic principles to provide information of natural hazards and related risks that affect urban zones. It is expected that the information contained in the Guide will supply important inputs to prevent disaster and to develop strategies of self- protection aimed at reducing economic and social costs as well as losses incurred from the impact of 'natural' disaster. (SEDESOL, 2004:5).

It is expected that by using the Guide, one would be able to identify the 'natural' hazards in urban zones that the urban infrastructure, services and populations are exposed to with the aim of reducing risk exposure. Zoning is the method employed to analyse risk with regard to a certain level of affectation. Thus, there can be zones within a city where exposure to natural hazards can be reduced (mitigated risk) whereas in other zones this cannot be and evacuation is the only policy response. So, two types of zones are delimited: mitigated risk zones and non-mitigated risk zones. Under this view, disaster prevention means disrupting the connection between the 'disturbing' agent and the exposed system with the aim of reducing or avoiding the impact of the natural hazard.

The Guide takes into consideration hydro-meteorological hazards such as 'extraordinary' rainfalls, floods, hurricanes, tropical cyclones, blizzards, hails, drought and extreme temperatures. After having identified the natural hazard, urban zoning of

hazards follows at neighbourhood level. Zoning depends on the type of hydro-meteorological phenomena. Once zoning is done, mitigation measures and actions are taken highlighting the precise location.

Fund for Natural Disaster Prevention (FOPREDEN)

By the time the fieldwork took place (January-May, 2003) I got information that FOPREDEN was not implemented in Chalco Valley. However it is important to mention in this thesis FOPREDEN's characteristics to acknowledge the manner in which financing schemes for prevention can be allocated to 'prevent' disaster. This may explain how the federal government is understanding 'prevention' and toward which direction policy implementation is slowly shifting. FOPREDEN was created in October 2003 by the Federal Government and its implementation is coordinated by SEGOB through the General Coordination of Civil Protection. Its main goal is to provide resources to the Ministries of Federal Public Administration and to the states to undertake actions oriented to reduce risk and to avoid or lessen the impact of 'natural' hazards on populations, public infrastructure, services and the environment. (DOF, 2006; SEGOB⁷⁰)

FOPREDEN is conceived as a complementary financial mechanism because State and Municipality governments are supposed to allocate resources to prevent disaster. The set of 'preventive' actions feasible to get funded by FOPREDEN are those oriented: 1) To identifying risk; 2) To reduce or mitigate risk and 3) To promoting a 'culture for civil protection' before 'natural' disaster. In particular, projects are funded if they fall in the following lines of action:

- Improving the functioning of SINAPROC
- Develop scientific knowledge of 'natural' hazards and risks.
- Contribute to reducing physical vulnerability.
- Strengthening coordination and communication among the three levels of government, social and private sectors and population.
- Strengthening applied research to develop and improve technology to mitigate risks.
- Implement policy and culture for 'self-protection'

⁷⁰ <http://www.proteccioncivil.gob.mx/Portal/PtMain.php?nIdHeader=2&nIdPanel=136&nIdFooter=22>

It is argued that one of FOPREDEN's goals is to contribute to make SINAPROC a 'preventive-oriented policy system'. Evaluation of the FOPREDEN's implementation (Puente, 2006) concludes that there are important barriers to its successful implementation such as lack of information and communication about FOPREDEN's objectives and scope, lack of a 'culture for prevention', weak coordination between the three levels of government and private and social sectors; the concentration of decision-making, the need to improve 'natural' hazards monitoring systems and *few options for prevention financing*. The existence of FOPREDEN as a policy tool to further prevention is an important issue regarding how disaster prevention implementation is being conceived in Mexico.

Conclusions

Under the "Ignorance of hazards and unsafe conditions" a culture for civil protection above all is the ultimate objective to be achieved by a policy that intends to prevent disaster. This can be realised through changes at individual, structural and institutional level. The basic assumption of policy makers is that all affected people can contribute to prevent disaster regardless their socio-economic condition and their vulnerability to floods. There is the belief that prevention starts at individual level by changing the attitudes and behaviour of those who are prone to floods risk.

Intermediate objectives were found to promote a civil protection culture, namely the education of affected people (labelled as 'ignorant') to change their floods risk perception to accept 'living at risk'. To do so, enabling conditions have to be created or fostered to facilitate the achievement of these objectives. At the structural level, there has to be a shift in the prevailing discourse storyline of both policy makers and the residents of the state of Mexico surrounding municipalities of Mexico City: from 'evacuation of unsafe places' to the acceptance of 'living at risk'.

Somehow this discursive shift may be the result of the 'unbalanced' demographic and economic relation between the State of Mexico and Mexico City due to continuous and permanent migration from Mexico City to the industrial municipalities of the State of Mexico where 'natural' and man-made hazards are generated therefore distributing risks unequally. At institutional level, it is believed that by integrating 'civil protection inputs' into development planning the change in the

behaviour of affected people would be facilitated since institutions would finally accomplish a 'real' preventive policy system.

The links between risk perception, behavioural change and the enabling structural and institutional conditions could be established thanks to existing coalitions between the 'inadvertence by ignorance' and 'structural' disaster causality discourses. By attending to these coalitions elements for policy change can be suggested. Because the policy objective targets individuals' risk perception and behaviour, 'disaster prevention implementation' relies on human action and means 'to get prepared to evacuate' or 'to live at risk'. This example illustrates the prevailing meaning of 'prevention' amongst many policy makers that has been 'translated' into prescriptive actions found in policy tools like the CPPEM. To prevent is to be prepared just before a 'natural' hazard hits. So the word 'disaster preparedness' frames all actions that have to be adopted in the 'before' stage.

Finally, the rhetorical analysis of disaster policy implementation provided inputs to explain the compelling power the education language has in the disaster prevention language. Section of the CPPEM and the Family Plan of Civil Protection embody the transference of meaning between these two languages and prescribe actions of risk communication, dissemination of civil protection culture, implementation of emergency plans, operation of early warning system and evacuation from unsafe places on the basis of training, learning and capacity building processes.

Under the "Failure of infrastructure and inadequate monitoring of risk object" even though the claims that construct the objectives highlighted technical solutions, evidence and warrants of the claims are not necessarily of a technical nature and are determined by institutional learning and the policy makers' professional position. This fact demonstrates the argumentative and social dimension of policy responses whereby the interviewee's ethos is important in making the argument compelling. Thus, policy responses are not only technical remedies.

Common policy objectives like the improvement of 'natural' hazards forecasting and monitoring of the sources of risk are backed by different warrants and beliefs. On the one hand, previous experiences of floods made CAEM aware of the need to construct regulatory small-sized dams to control the increase of water avenues of LCC. This in some way can be seen as a response to affected people's claims about the need to have a definitive final solution to the permanent failure in the risk management of

LCC. It is an example of the risk management that plans, among other things, and that also serves to manage public concerns over technological uncertainty.

The belief that more scientific research is necessary to finally control 'natural' and man-made hazards brings to the fore the discussion about the interface between science and policy making because the policy makers that endorse these policy responses truly believe that it is the scientific characterisation of threats that indicate how institutions and society at large should act in terms of building resilient infrastructure to control hazards. This issue is, in fact, one component of a broader discussion about the social construction of floods risk where different knowledge evidence may contest in providing the most urgent solutions. The improvement of 'natural' hazards forecasting and monitoring the sources of risk is an indication of the extent to which institutions and policy makers can also get better prepared. This institutional learning depends on how the scientific information is 'applied' in risky and emergency situations.

The conception of floods as an accidental narrative underpin emergency as the desired policy objective. 'Emergency management' is therefore the intervention that contributes both to prepare people and organisations during contingencies and to set up emergency actions in the aftermath of floods. The main policy objective is centred on the issue of coordination because according to policymakers, society's organisations do not comply with law in terms of how to coordinate with local, state and federal governments. It was found that there are parallelisms between the Family Plan for civil protection and the Emergency Plan of CNA in terms of the objective of risk assessment, preparedness stage, delivery of plans and communication.

Regarding policy responses that attend 'structural causality', even though the policy objective was phrased in very general terms, policy intervention is related to ecological land planning as the policy tool and 'ecological aptitudes' of the land as the central value to be mainstreamed into disaster policy responses. This is coupled with complementary interventions already expressed in the previous sections 1-3 such as 'promoting a culture for prevention' and hydraulic engineering works. In short, it was interesting to note that ecological management of land and urban land use are related to floods policy implementation. This was exemplified with three Programmes being implemented, at regional and micro-urban level. FOPREDEN was mentioned by Director of Disaster Management of SEDESOL as a very important financial source for

disaster prevention, and the need to spread its implementation in cases like Chalco Valley's floods.

CHAPTER EIGHT: CONCLUSIONS

This thesis developed a social constructionist analysis of 'natural' disaster at the policy level for Mexico by focusing on arguments and discourses. The interpretivist analysis of disaster policies carried out in this thesis highlighted the importance of taking into consideration the existence of different, and often contested, policy values which underpin different policy responses. It explained the rhetorical and discursive power of 'disaster causal' stories in constructing reality of Chalco Valley's floods and provided a method to examine the inundations causality as a policy problem.

In this research, disaster causality discourses established, in particular, concrete framings for discussing the value of four ways of talking about Chalco Valley's floods, and in general, the main causal stories that can be found in the disaster policy context in Mexico. The analysis of arguments and discourses of disaster provided novel ways to explain how 'disaster causality' were framed by the policy-relevant subjects and how these framings shape institutional responses. I demonstrated that 'natural' disaster is a concept shaped by a complex combination of subjects' interpretation of causal factors, their images and relationships. By focusing on the arguments of disaster causality I could explain how knowledge claims and evidence were constructed and used to depict flooding of Chalco Valley in terms of four different causal stories, namely 'inadvertence by 'ignorance'', 'inadvertence by 'carelessness'', 'accidental' and 'structural'.

Evidence and warrants of policy claims are loaded with meanings and beliefs and this explained the value-laden nature of the interpretations of Chalco Valley's floods by the policy-relevant subjects. Even though the floods of waste water that occurred in Chalco Valley in 2000 were 'real facts', policy-relevant subjects' interpretations differed substantially not only in terms of the claim content and the claim-making context, but also on the claim maker's *ethos* and *pathos*.

The difference of interpretations was also due to other factors that pertain to the institutional level: the professional background and position the policy maker holds within an institution and the institutional context from where the policy-relevant subject is perceiving the floods and talking about these. In general, evidence and claims ranged from risk perception of local affected people by the floods, technical data of heavy rain falls and the impact on La Compañía Canal to more complex interactions between socio-economic, ecological aspects of urbanisation in Chalco Valley and floods risk

generation. By analysing the four causal discourses of Chalco Valley's floods I could explain how different systems of statements construct different objects and subjects in various ways. This was examined in detail by attending to the variety of claims and evidence found within each argument.

I explored what objects the four disaster causality discourses alluded to. The discourse of 'inadvertence causality by 'ignorance'' constructs 'natural' objects which are portrayed as unchanged 'natural' elements of Chalco Valley such as La Compañía 'river' and ex-lacustrine ecosystems. These objects are placed in the narrative background where 'active' subjects perform a play of 'risk ignorants' versus 'experts' and 'illegal migrants' versus 'residents'. It was found that the subject, that is allowed to talk in this discourse, is an 'authorised' voice of the policy maker who characterise both the 'supposed' cognitive features of the affected people to be aware of risk and the 'experts' capabilities to foresee future floods. Education as a policy response is the means to capacitate vulnerable people about the flooding chronic risk either to avoid or accept 'living at risk'. This can be observed as an attempt to shift the political discourse to the search for 'acceptable risk' and in this sense, it can be discussed that risk produces both danger and opportunity, as Fischer (2003, b) states. In sum, this type of discourse is more about people than objects and the discussion revolved around *who is politically entitled to talk about floods*.

The discourse of 'inadvertence causality by carelessness' constructs predominantly man-made objects such as sanitation system, and La Compañía Canal. For this reason, the subjects that emerge in this discourse are the ones related to the functioning and maintenance of these objects, namely water and sanitation operators and managers. Floods risk management is defined in terms of technical capabilities of the sanitation operators and the efficiency of the engineering works implemented to cope with the floods. This discourse is both about government managers and operators and technical remedies. The rationale behind this discourse is the containment of chronic hazards and the faith on technical interventions to contain them and the trust on operator's abilities. This disaster discourse can be placed in the ecological modernisation debate which generally states that there will always be "technical solutions for the most potentially apocalyptic of natural issues, and where crucially, the instrumental social sciences are harnessed as a key for 'optimising' societal responses to the environmental costs and benefits in an intensifying commodification of nature" (Szerszynski et al. 1996) and that "no tough choices need to be made between

economic growth and environmental protection, or between present and the long-term future” (Dryzek, 1997) in order to guarantee society’s development. In this regard, Hajer (1996) the technical capabilities of the state for coping with risk and damages are central to overcome ecological deterioration and to further industrial innovation. Even though it recognises the social roots of environmental problems, it focuses on the pragmatic legal-administrative response of the state. The rhetorical influence ecological modernisation can have on disaster discourse analysis is that disaster can be read as *a course of events* and therefore disaster prevention policy can be interpreted as a process of institutional learning and societal convergence. Dominant institutions such as CENAPRED, SEGOB and CNA can learn and that their learning can produce meaningful change on society. Around this learning disaster policy is to be developed with the aim, among others, of manufacturing physical measures to withstand the impact of hazards. This discussion also has connections with the discourse of ‘inadvertence by ignorance’ in the sense that it relies on the state’s faith of promoting change by educating people on risk awareness and that as long as people become more ‘educated’ on their exposure to hazards, policy implementation will achieve its goal of changing risk perception and enabling change.

The discourse of ‘accidental causality’ constructs objects as unexpected and unforeseen ‘natural’ forces and man-made haphazard causes. Because the blame is put beyond human agency - floods are natural accidents- and this causal story places human intervention in terms of reactive actions, preparedness and mitigation to minimise damages. Human capabilities are subordinated to the ‘natural’ forces. Unlike the two previous discourses where floods risk can be perceived by the subjects, in this discourse floods risk is not perceived as a policy problem and therefore it does not underpin any kind of response. Emergency plans both at household and institutional level were found to be the means to promote a behavioural change to either avoid hazards or tackle floods damages. Mitigation schemes such as FONDEN proved to be an important financing source for recovery and lessen the floods impact on vulnerable people. The ‘accidental’ causality discourse connects with the ‘inadvertence’ by carelessness because floods prone people and institutions are supposed to be aware of technical issues.

The discourse of ‘structural causality’ constructs ‘natural’ objects such as the ecological characteristics of Chalco Valley and their transformation. Environmental changes created floods risk prone conditions in the XX century. These have been directly caused by authorities, policy makers and ‘corrupted’ politicians. This discourse

constitutes a more radical interpretation of floods because the blame is put on specific political actors who 'appeared' to have made 'wrong' decisions. This discourse integrates other elements that pertain to structural aspects such as regional socio-economic inequalities between Mexico City and Chalco Valley, the imbalance between the State of Mexico and Mexico City in terms of ecological costs and benefits. Few 'preventive' programmes were elaborated and put into place to revert ecological degradation and poverty. It may be interpreted that the existence of these elements can be regarded as claims that underpin a shift in the discourse by trying to integrate political and social aspects of floods causality.

The metaphors and representations the discourses paint of a reality can be distilled into statements about that reality. This supports the assertion that a discourse is a system of statements. The statements in a discourse can be grouped, and given certain coherence, insofar as they refer to the same topic. In this thesis, different systems of statements regarding disaster causality, in general, and floods, in particular, were found and analysed and these characterise the four discourses differently. Therefore it can be said that the four floods discourses are embodied in the following statements: a) 'lessons for affected people', b) the 'lack of precaution and maintenance of La Compañía Canal', c) 'accidents of nature' and d) 'social and political processes that are the outcome of urbanisation, corruption and lack of land use law enforcement'.

I analysed rhetorical elements of the four constructions of Chalco Valley's problem, namely 1) Ignorance of hazards and of unsafe conditions, 2) Failure of infrastructure and sanitation system and inadequate monitoring of risk object, 3) Unforeseen accidents of nature and of man-made systems that disrupt human systems, and 4) Exposure of vulnerable people to hazards is consequence of socio-economic inequalities. Rhetorical analysis provided detailed information of images of Chalco Valley people, the Government, hazards and La Compañía Canal to understand the compelling nature of arguments and the construction of meaningful narratives intended to persuade and inform. The analysis also provided explanations of how the images served as backing for claims about the nature of Chalco Valley's floods. The appeals and values the images elicited were important to analyse because this provided socially acceptable basis for justifying the claims about the different four problem constructions and to imbue these claims with proper sense of weight and legitimacy.

Findings of the rhetorical analysis are important for policy making because they make us aware of whether the intended target populations are discursively constructed by the policy-relevant subjects or not and how. In this case, awareness of Chalco Valley's vulnerable people through their images can be of paramount importance when policy change is sought to really integrate people's vulnerability on policy design and implementation. This somehow was found on the 'Exposure of vulnerable people to hazards is consequence of socio-economic inequalities' problem and the policy interventions proposed because target people are constructed as vulnerable, deserving special attention. Vulnerability reduction goes beyond technical issues and attends to political factors. Nevertheless, it can be concluded that 'vulnerability' that comprises 'unsafe conditions' and 'root causes' is not that relevant within the prevalent policy making system in terms of eliciting policy responses that are oriented to reduce floods risk.

At the same time, by knowing how the images of 'the Government' are constructed by the same Government officials and policy makers, it is possible to propose ways to improve floods risk communication because policy-relevant subjects will be in the position to understand that not all of these are equally perceived by the others. This step can be useful for making them aware about the position they hold within the different floods causality discourses. The analysis of knowledge claims of floods causality carried out in this research can also provide inputs to characterise the three social domains of disaster. The discourse of 'Inadvertence by ignorance' is based on the belief that all people, regardless their socio-economic status and cognitive abilities, can prevent floods by being aware of floods risk. The evidence used to support the claim that 'exposure to floods risk can be avoided or minimised, indicates that there is 'objective' knowledge of the risk situation that everyone should have. This invokes the 'universality' of knowledge claims of floods risk and its prescriptive role for decision making in terms of educating the 'risk ignorants'.

The universal value of floods risk knowledge found in this discourse in fact can be seen as an element that shapes the 'domain of disaster governance' because it reflects political motivations regarding the legitimisation of policy makers' knowledge for taking actions. The domain of disaster governance is also nurtured by this discourse in terms of what and how the policy target populations should be in ideal scenarios of 'good planning'. It was also found that this domain integrates elements of the 'structural causality' discourse in the sense that part of the explanation regarding flooding is based

on 'dynamic pressures' such as illegal urbanisation due to migration of poor people who are unaware of floods risk.

The discourse of 'inadvertence by carelessness' clearly constructs objects that characterise the domain of science and disaster management because the claims alluded to the geophysical processes of disaster and the development of technology for monitoring and tackling the 'natural' hazards impact on hydraulic infrastructure. The evidence used to support the claims comes from scientific and technical studies elaborated by CENAPRED and CNA. There is the belief that technology for hydraulic infrastructure will ultimately solve the 'inundations problem'. According to the policy makers' claims, the intention of disaster management is to control hazards through rational planning and engineering measures.

This type of knowledge of 'natural' hazards is also used for the elaboration of disaster plans and emergency responses as the means for governing disaster. In this way, the discourse of 'accidental causality' clearly characterises the domain of science and disaster management since it is expected that government institutions and families should act according the instructions CENAPRED and SEGOB provide on the basis of the magnitude and likelihood occurrence of heavy rain falls and inundations. This discourse is also linked to the central assumption that states that local people can cope with emergencies, maximising their own capacities, resources, and social networks.

The discourse of 'structural causality' can be identified with the assumptions found in the domain of disaster governance because disaster prevention is more a political and social endeavour than a technical practice. The evidence used to back the claim that 'disaster risk reduction can be realised by reducing poverty and ecological deterioration and political corruption' points to the corruption in land use occupation as one of the central factors that drove illegal urbanisation and hence increased floods risk. The research also showed that there are no 'pure' domains in terms of floods causal narratives but a mixture of argumentative and rhetorical elements that in fact erase the theoretical boundaries between all three domains regarding the evidence use and how it supports causality claims.

The framework for analysing the discursive construction of 'Floods Causality as a Policy Problem' in the social domains of disaster is a useful framework for carrying out interpretive analyses of causal events that are arguably constructed as social problems. This is important because it gives analytical tools to explaining how different policy-relevant subjects value and assign different meanings and beliefs to social

problems. This framework also allows understanding the relationships between policy-relevant subjects' claims and this situation can become the ground for shared understandings for common definition and resolution of what is stated as 'a the most relevant problem' to be solved.

This framework is a clear example of how an interpretive analytical tool can be developed and applied to policy analysis because it details the elements that a researcher can focus on when seeking for explanations of how a discourse can be supported and legitimised and why. Moreover, by highlighting the position of the policy-relevant subject within an institution, this framework gives conceptual inputs to relate the main claims to institutions' identities and the processes by which claims can be contested by other institutions. The examination of knowledge claims of disaster causality and the origin and use of evidence proved to be a practical way to unpack discourses and the discursive 'proximity' and 'remoteness' of the subjects involved in a particular argumentation situation. Thus, with the use of this interpretive tool one can seek to analyse other social problems where usually different policy-relevant subjects are engaged in problems' construction and transformation. Therefore, the reader of this thesis can get a theoretical frame and methodology to practice interpretive analysis of causal events.

The reading of Chapter Six 'Chalco Valley's Floods as a Disaster Policy Problem: The Discursive Construction' can be important for analysts and academic researchers who seek examples of causal discourses at the policy level. This is relevant because the reader can gain an appreciation of how concrete argumentation can give rise to specific discourses. The explanation of how a problem is defined and legitimised through an argumentative process supports the idea that language matters at the policy sphere and that 'reality' is discursively constructed with regards to empirical information within a specific institutional arrangement like that of SINAPROC.

The framework for the analysis of policy responses proves to be useful for explaining how policy problems shape policy responses. This is because this framework provides concrete argumentative means to unpack the *logos*, *ethos*, and *pathos* of the proposed interventions which are seen as right courses of action to solve specific social problems such as Chalco Valley's floods problem. Moreover, it provides ways to undertake interpretive analysis of policy implementation and can be regarded as an example of a constructionist reading of human intervention within the scope of an institutional policy system. The analysis of Chapter Seven exemplifies how an

interpretive policy analysis can expose the technical rationality of responses and how these operate in prescribing courses of action by neglecting, in almost all cases, the social factors of vulnerability and risk. This analysis also explains to what extent the Behavioural Paradigm is embedded in policy responses claims and how and why policy implementation may fail by not recognising vulnerable people as the policy target population. This is important to consider for the policy-making process because it can give valuable information as to what can be done to change policy implementation, by identifying the political drivers and axiological assumptions of responses.

Theoretical and methodological contribution of the thesis and areas for further research

This thesis contributes to the epistemological analysis of 'natural' disaster by specifying the manner in which knowledge claims of disaster causality are constructed. It relates knowledge to its social producers and users which reflects the interest and culture of the disaster policy-relevant actors that conform the SINAPROC in Mexico. It contributes to the existing constructionist knowledge of the environment because it details the various ways 'nature' and 'natural' disaster is socially constructed through arguments and discourses. This thesis contributes to the existing debate on social nature by 'denaturalising' 'natural' disaster and establishing them as specific social products. This was done by setting forth four components of the *process of construction* that served as the basis for the development of the two analytical frameworks. This thesis enriches the constructionist epistemology of the social nature debate because it proposes research of 'natural' disaster at the policy level by acknowledging how 'nature' plays a role as social actors in disaster causality framing and how 'nature' has a rhetorical place in the politics of natural disaster discourses at the policy level in Mexico.

This thesis also contributes to the growing body of knowledge of the interpretive policy analysis because it establishes concrete ways to develop a methodology that can be used to focus on meanings, beliefs and metaphors of policy arguments of causal events which are typical in the policy and politics arenas. This thesis also contributes to the sociology of the environment because it details how floods risk in Chalco Valley is the result of a claim making process, the claim themselves and the conceptual structure of the social definition of floods risk. This thesis also contributes to the existing literature on water vulnerability and adaptation in Mexico because the description of the

situation of vulnerability in Chalco Valley highlights the need to recognise flood vulnerability as a historic and socio-economic and political process in which solutions should be sought in social and political factors such as poverty and political corruption reduction and environmental rights and governance.

The two analytical frameworks developed in this thesis contribute to the literature on post-structural understanding of the shaping of disaster and development discourse and how these links to policy choices and action. These represent new areas of research that the two frameworks open when seeking to establish the relation between policy subjects, institutions and policy measures. And finally, this thesis is a contribution to the understanding and analysis of 'natural' disaster as social process in terms of their argumentative and discourse construction. Throughout this research it became clear that, even though 'natural' disaster are the result of physical and material changes and provokes great damages, disaster can be viewed and analysed as the product of the interaction between language, discourses, arguments, collective representations and interests. This thesis achieved the objective stated in Chapter One in terms of contributing to the understanding of disaster, risk and policy as social products.

The findings of this research might be of interest to both scientists, policy makers, and other policy-relevant subjects because it explains how and why knowledge of disaster risk and disaster differs and sometimes conveys in the policy process. Making these subjects aware of this epistemological complexity might result in better understandings regarding disagreements over disaster risk problem and potential changes for resolving them.

There are several areas for the development of further research. This thesis characterised a landscape of discourses but provided only an exploratory explanation of how they were constructed. A major element for further research can be the analysis of how discourse come to exist through social interaction. In the field of disaster policy, more research work could be undertaken to provide an in-depth explanation of how people affected by disasters make sense of policy responses over a certain period of time when hazards hit vulnerable populations on a regular basis. This understanding might help overcoming communication and action barriers between policy makers and vulnerable groups when designing policy. More information on vulnerable people's interpretations of risk and disaster might be useful for policy makers to re-frame the way they define disaster and implement responses. A comparative study between Chalco Valley's floods case and other cases of similar scale might also allow one to find

similarities and differences regarding the use of evidence for constructing disaster framings and justifying solutions. Finally, the discussion of the interaction between lay policy and scientific knowledge could be further developed in terms of identifying the processes that shape common and different claims, establishing common points where policy change can be driven. This could contribute to the understanding of the dynamics on knowledge production on disaster risk and policy implications.

Limitations of this Research

One of the main limitations of this thesis revolves around the fact that the framework adopted may restrict the analysis by presenting discourse as a rational set of ideas that lead policy-making, bounding the research so that it may fall short of analysing the processes that shape discourses. Regarding the relationship between the discourse and its translation into policy and material change, for instance, the tensions between actor and structure in bureaucracies, learning as a top-down process of paternalistic control are not fully developed and represent a limitation to be addressed by future research. The methodology only allows for the reporting of respondents views and these are derived from formal interview and documentary review. In this sense, the discourses may be understood as surface stories rather than more complicated sub-text that drive policy. Nevertheless, this would require a different methodology and more in-depth interviewing or participant observation. In these two ways the framing of the research problem limits analysis to a detailed description and juxtaposition of dominant bureaucratic discourses rather than an examination of the power asymmetries and cultural contexts that shape surface and hidden discourses and the relation to policy, resistance and material action. These concerns can be addressed through future research and publications.

Moreover, there are some important themes that are just touched upon and could be further elaborated in future work. In this research I refer to ‘institutional learning’ in passing but it should be highlighted that this is an important element of the shaping of discourses and it would be useful to expand this in further research with examples of learning or blocked learning; ideally learning leading to a change in institutions rather than technical procedures and tools being updated. For example, this thesis mentions CENAPRED as a bridge between science and policy and it would be interesting to further explore what facilitates or hinders this role and how it shapes discourse and

policy. In addition, the notion of 'self-protection' explained in Chapter Seven is identified as a key element of dominant discourse and it would be interesting to acknowledge the implications for the social distribution of costs to adapt to risk and how this notion fits within the context of a paternalistic State. These among others are issues to be researched for future publications.

The Chalco Valley's floods case proved to be an interesting one to document to unpack the construction of 'natural' disaster at the policy level. To my knowledge no works have examined the argumentative and discursive construction of disaster causality let alone how this operates for Mexico. This thesis hopefully provided a complete picture of this social process. Certainly, collecting data of different nature and the integration of a case study proved to be a challenging and enriching exercise, through which I hope to contribute to diverse strands of literature and themes, and more particularly to the field of disaster studies and the social constructionism at large. Although the realities of fieldwork constrained data collection, interviews provided sufficient reliable evidence to complete the objectives that I set myself when initiating this research. However, as mentioned earlier, the social constructionism perspective focuses on understanding and explaining how 'things' come to 'exist' through social interaction, so substantial findings are only applicable to the case of Chalco Valley's, though general statements and the frameworks constructed and the methodology used can applied to other settings.

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APPENDICES

APPENDIX I

DECONSTRUCTION OF INTERVIEWEE'S ARGUMENTS OF CHALCO VALLEY'S FLOODS CAUSALITY

1. Disaster Governance

a. Water Sector

National Commission of Water (CNA)

Figure 1. The structure of Miguel Aguayo's claims about Chalco Valley's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] Well... in general...it is a lesson we all know.</p> <p style="text-align: center;">↑ vs. ↓</p> <p>[2] It was a surprise [Floods] for those who live there and finally [they] realised that there is a 'living' river</p>	<p>We, the people who live in Mexico City, since ancient times, (know) that this is a flooding zone... and we have tried to control [past] inundations by any means...</p> <p>It is nature and the fact that people are not aware of the geographical and natural conditions when settling in a place is what puts them at risk.</p>	<p>[Assumption] Aguayo recurs to the role of contextualized and experienced knowledge in perceiving inundations and shaping policy responses.</p> <p>Risk perception in explaining the disaster and the image of the affected people as victims of their own actions.</p> <p>[Assumption] It was a foreseen consequence that was ready to occur; the fate of the inhabitants that sooner or later would come.</p> <p>CNA had told them (to the affected inhabitants) that there was a 'living' river</p> <p>They (affected people) are to be blamed for not paying attention to the information provided by CNA and not being aware of <i>the</i> risk.</p>	<p>Settlers liked to be here and to live that way [being exposed to flooding risk]. We have increased [the population size] and have tried to control inundations by various means.</p> <p>We have not to forget that the natural condition of that zone is for the river to be there, it has always been there and will be.</p> <p>The river is old and [during the flooding event] it <i>recognised</i> its own ancient riverbed</p>

Figure 1. The structure of Davila Capiterucho's claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] "...and then an extraordinary water current of 22 m3 arrived...The night before it rain a lot in that zone and around 22 m3 in the river basin that includes San Francisco river and another one I don't remember right now...and then that created</p> <p style="text-align: center;">↓</p> <p>[2] A big hole that had not been detected before and due to the heavy rainfalls and the river current... the water level raised very fast and it went out through the cracks and since the hard structure (of the canal) is above the soft clay...that created the breakage ...it was a hole in the wall and that is why many measures were implemented...</p>	<p>"What happened is that the river was... full of sediments; it had only 25% of its carrying capacity.</p> <p>"The river's capacity was insufficient to cope with the increasing water flow...and because of the quality of the walls material (<i>bordo</i>) ... (the water) it encountered a little geologic fault that, in this case, was a fissure and that provoked the river damage..."</p> <p>But that is quite different from saying that any kind of direct responsibility can be attributed to someone...of course not...because CNA was doing their business, inspecting (the LCC) once in a while due to this problem that kind of task was being undertaken more often ...</p> <p>...That means sometimes nature show us what we should had prevented, I repeat it once again it is a river that because of its geologic characteristics it is a complicated river that has threaten us... after June 2000 there have been leakages with any rainfall, luckily thanks to the integral rehabilitation works and ...we have explained to the local population that they have to learn how to live in constant anxiety because there will always be leakages because the river material is very, very treacherous ...</p>	<p>That was the information handled</p> <p>A mistake was committed: the river walls have been heightened, heightened and while doing that the walls become heavier and cannot hold their weight... they lack of a reliable structure...</p> <p>They committed a mistake...they built a rigid structure (a new wall) over a flexible structure (river walls), any engineer knows that you cannot seal the ground with cement...</p>	<p>The river used to be 'glued' to the (Elephant) hill flowing along its natural stream but over the years the river was diverted and (because of that) it has exhibited vertical and horizontal twists...it twists...</p> <p>In fact there is no one to blame, it is an extraordinary event that nobody could have foreseen...since many years ago no similar event had taken place</p>

Figure 1. The structure of Francisco Patiño's claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] There was a problem on the left riverside of the La Compañía river...the left wall collapsed and created a hole on the left riverside that caused..., obviously, the water...the water flow generated by the heavy rainfalls broke the wall...along 20 mts...and that flooded the <i>colonias</i> because they are adjacent and below the riverbed and the water reached 2mts and a half...</p>	<p>Mainly that happened as a consequence of the ground problematic in that zone and the extraordinary heavy rainfalls...and that combination was what caused the wall breakage</p> <p>There is evidence of previous assessments (but) since then (after the floods of 2000) the (monitoring) system was set up and it detected that that (La Compañía river and adjacent areas) is a high risk prone zone... (and also because of the fact that the river is in the transition zone of two geologic structures: soft –that of the clayed ground- and hard –that of the 'Elephant hill...but yes, we have evidence...</p>	<p>We (CNA) have set a monitoring system [to detect changes in the inclination and behaviour of the structure (of the LCC), that is why we have evidence (of what happened)...the ground settlement is measured...to see whether the walls slope or not ...how walls deform... and this [is because] obviously to the quality of the ground and soils in that zone.</p>	<p>That is because extraordinary heavy rainfalls that never had happened in that way (never in the history of the region)</p> <p>...and that happens because, as we already mentioned, there are illegal (human) settlements close to the riverbed...illegal settlements that 'arise' without any planning and they end up putting pressure to the municipality authorities and sometimes to those of the state government so (local population) is allowed to dump waters into the riverbed...but in an uncontrolled way...and in consequence non authorized water discharges are permitted... and that happens in other places in Mexico</p>

Figure 1. The structure of Gustavo Paz Soldán's claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] No, but there was no awareness about the severity of the situation in certain segments (of the LCC)... these walls that were damaged by the sinking underground and then...suddenly a failure (fault) occurs eh...? A fault occurs because the ground sinks, (canal walls) crack and the disaster takes place, no?</p> <p>Perhaps it was not foreseen, nobody could have imagined that that could happen but very good emergency aid was provided and since then the follow up with (prevention activities)... the problem was diagnosed, studied and it is (now) obviously clear.</p>	<p>Yes, indeed...for so many years, that's why I started mentioning..., the great problematic of the Mexico Valley underground [sinking process] created adverse conditions for discharging those high water volumes coming from this zone of the City (eastern area of Mexico City) that has grown a lot...one solution was envisaged... population kept on growing a lot and a lot of people discharging their wastewaters...and the ground was sinking creating a differential structural situation...before the disaster normal inspection was carried out...</p> <p>...</p>	<p>(Undoubtedly we know) scientifically what the problem is... what is going on...we have detected it and therefore controlled it...</p> <p>The problem is that the ground is sinking very fast in that zone and that create cracks on the walls that could eventually generate a (big hole) crack...and of course for solving that the walls were reinforced and monitoring since the accident because it was not a disaster ...we are trying to control the illness...the ill person has got aids...so illness cannot be eradicated...</p>	<p>REBUTTALS</p> <p>[It was said] that affected people got flooded with waste waters, but those were not completely wastewaters (<i>aguas negras</i>) because it was raining (they mixed with rain water) Thus, the water that polluted was not entirely waste water but mixed with rain water but obviously it was polluted and provoked the disaster...</p>

Figure 1. The structure of Edgardo Castañeda's claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1]...An extraordinary storm generated a massive volume of water flow higher than the riverbed coping capacity of 43 m/sec and... [it took place] in the transition zone where the terrain is sinking...</p> <p style="text-align: center;">↑ ↓</p> <p>[2] ...leaks in one of the (canal) walls...here... (he shows a drawing) the canal curves and because of the storm and the leaks the wall weakened and couldn't cope with a high hydraulic pressure and ...the wall failed and a lot of water spilled and affected many people</p>	<p>“...and since the ground is sinking between 40 and 60 cms per year for the last years, the [canal] walls had to be heighten and the heightening of the walls has generated leaks or any other situation that is not monitored...</p>	<p>“the official assessment reported that...”</p> <p>...It is impossible to blame someone when it comes to extraordinary hydro-meteorological phenomena since many times the are no feasible [technical and economic] solutions...institutional response capacity for providing definitive solutions is constrained by the economy</p>	<p>Well... I think that it is very difficult to put the blame on someone when it comes to nature...</p> <p>...It is said that in past times leaking had occurred and were noticed by local people but that has passed unnoticed by authorities, nevertheless I can tell you that the same kind of situation had occurred and nothing serious happened by then...</p>

Decentralised Body of Drinking Water and, Sewage System
and Sanitation of Chalco Valley (ODAPAS)

Figure 1. The structure of Óscar Zavala's claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] In that time May 30 to June 1st La Compañía Canal fractured which is a very important canal that collects waste and rain waters flowing down from San Martín Huixtoco, San Rafael, Chalco and the human settlements of the region; the LCC was loaded and since it fractured it flooded the <i>colonias</i> San Isidro, Avándaro, El Triunfo a to a lesser extent La Providencia.</p> <p style="text-align: center;">↓</p> <p>[2] <i>Unstated conclusion</i> Due to the topographic conditions and the fact that the Canal is above ground level the sewage system of Chalco Valley cannot cope with rainfall water and the waster waters dumped by the growing population settled in the different colonias of the Valley</p>	<p>Two pumping stations are not enough and due to their characteristics they cannot cope with such volume of both rain and waste waters...One of the pumps relies on electricity so when the energy is cut the diesel pump starts working... it is not a reliable system... Imagine if the energy is gone for two hours, waster waters would spring up through the house drains...in</p>	<p>The local inhabitants witnessed and were affected by the LCC fracture, according to them the canal broke and it didn't spill over as some other people (like politicians) affirmed.</p> <p>“(LCC) It fractured that is why we designed our Contingency Plan...”</p>	<p>Chalco Valley is a saucepan... it is a Valley like a kind of...saucepan and all waste and rain waters are pumped into the La Compañía Canal and from there to the <i>Gran Canal</i> that is why we have a lot of problems because even tough the sewage system works... we can't say that it works perfectly but it can't cope with when heavy rainfalls</p> <p>Discharge fee is not covered by the households</p>

1.2 Civil Protection Sector

General Director of Civil Protection of the State of Mexico

<p>Figure 1. The structure of Arturo Vilchis' claims about Valley Chalco's floods causality <i>I propose that</i></p> <p style="text-align: center;">CLAIM</p> <p>[1] "That happened because La Compañía Canal (LCC) is a very old canal..." <i>Stated conclusion (SC)</i></p> <p style="text-align: center;">↓</p> <p>[2] "...a section of the canal is especially problematic; it is 7 km. long between the Chalco Valley and Ixtapaluca area..."</p> <p style="text-align: center;">↓</p> <p>[3] "...what happened is that once in a while (LCC walls cracks) and (wastewaters) leaked through it..., so we have to permanently inspect it and if we detect one of those leakages, we fix it immediately..."</p> <p style="text-align: center;">↓</p> <p>[4] "...but that day (1st June 2000) the leakage was not detected and in a matter of few hours water filtrations increased and created a huge hole through which the water flowed out and the water volume increased [flooding the area]"</p>	<p><i>given that</i></p> <p style="text-align: center;">DATA</p> <p>"(LCC)... is located in an ex-lacustrine region where the Chalco, Zumpango and Texcoco Lakes existed... then at the beginning of last century (XX) the lake was drained...an hacienda (La Compañía) was set up and used the river (which turned into the LCC) to get rid of its waste waters"</p> <p>"...because that is a ex-lacustrine zone I referred to and due to the nature of its soils it sinks unevenly and [because of that] LCC 'moves' and even though it never reached its carrying capacity (35 m3/sec), its historical peak was 27 m3/sec..., anyway it carries a lot of water and LCC moves all the time... [it is a natural open sewage canal, not a man-made canal]..."</p>	<p><i>And since the rule/principle that</i></p> <p style="text-align: center;">WARRANTS</p> <p>[assumption] From the outset the statement: "<i>I have the information</i>" functions as the warrant to justify the claim from data provided.</p> <p>Technical reports of the topographic and ground sinking process and the LCC canal capacity in that region.</p> <p>According to Vilchis, CNA did not detect the leakage and may partially be blamed.</p>	<p style="text-align: center;">BACKINGS</p>
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Figure 1. The structure of Mario Alvarez' claims about Valley Chalco's floods causality

<i>I propose that</i> CLAIM	<i>given that</i> DATA	<i>And since the rule/principle that</i> WARRANTS	BACKINGS
<p>[1] Ah, in the river...It was a big hole [in the LCC walls] and they tried to block it...that situation blew...and the highway got flooded as well as the <i>colonias</i> in both sides of the highway</p> <p style="text-align: center;">↓</p> <p>[2] What provoked the inundations was... that the LCC couldn't cope with the exceeding volume of water (exceeded by 9m3 sec) ...in part because that prior to the floods in a segment of the canal rectification works were being undertaken and were not properly done...</p> <p style="text-align: center;">↓</p> <p>[3] This time the canal over spilled because of the heavy rainfalls that provoked the increase in the waste waters flow and also because the rubbish dumped reduces the canal channel</p>	<p>...what happens is that due to its design and infrastructure [condition] the LCC is outdated and couldn't cope with all the increasing water flow that comes down from many upstream <i>colonias</i>...</p>	<p>We participated in the evaluation of the damages that is why we have the information...</p> <p>State of Mexico makes also recommendations for avoiding further damages (That is what they call risk evaluation. The recommendation is based on topographic considerations, mainly)</p> <p>People who live (In Chalco's Valley near the canal) are to be blamed for dumping rubbish and also the LCC is blamed for carrying increasing volumes of waters...</p>	<p>... because all are discharging their wastewaters into the LCC and nowadays is insufficient... and along the years the LCC walls were 'lifted' that made the canal more fragile to the flows...</p> <p>...and because all the maintenance works never are on time...and those are only corrective works instead of being preventive...CNA is not doing their job the way they should (inspecting the LCC) and CNA doesn't give us notice of what is going on ...LCC just reached its limits and there was a potential danger of overflowing</p> <p>CNA is not working well And the municipality government for allowing settlements... there is no control for people for settling in flood prone terrains. Poor people ended up settling in the river margins and get the plot in a clandestine way;</p>

Metropolitan Civil Protection Commission, representative of the State of Mexico Government.

Figure 1. The structure of Mireya Mercado’s claims about Valley Chalco’s floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] Canal breakage and inundations...housing is built under the Canal level, waste waters and hence it occurred a disaster.</p>	<p>LCC infrastructure was not the adequate ...lack of adequate maintenance for coping with rainfalls...besides people lack of education and they dump rubbish into the canal so it gets blocked...</p> <p>Chalco Valley is bad designed...there are zones without drainage system...Government doesn't provide services because (people are) located in high risk zones. When disaster occur people get upset and demand housing and plots....</p> <p>Government was informed but they didn't do anything People expected help from government but to what extent is the government obliged to respond and provide services to people settled in risk zones? Social and political costs are high. People land (paracaidas) and then it is quite difficult (to evict them)</p> <p>CNA , the Canal was not in good conditions the way it should be...so many things converge...</p>		<p>I am not aware whether the people bought the plots at low cost knowing the risk and their needs. Some people take advantage of the situation and get 4 or 5 plots even if they don't live there</p> <p>Whereas there are others who are poor and don't have where to go... it is about extreme poverty conditions.</p>

Figure 1. The structure of Oswaldo Flores' claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[C1] Heavy rainfalls, mainly heavy rainfalls were the causes; of course with the natural escurrimientos, the sinking process the Valley has undergone for many years and also because of the technical aspects that are explained there [in the official report]</p>	<p>Unstated evidence that the interviewee assumes the interviewer already possesses. Flores refers to the official reports in order to avoid discussion about responsibility and blame.</p>	<p>The official report gives to the Flores legitimacy to justify the claim. This can be considered an authoritative warrant and therefore an argument since [it can be assumed by the way he talks and read the document] the reliability of source is warranted and uncontested...</p>	<p>I think that when a natural disaster takes place and causes a critical situation...one has to look for solutions instead of culprits I don't dare to say ...I am not a researcher nor would like to judge; In my work I have to provide solutions, to make solutions work...I don't seek culprits...</p>

General Coordinator of Civil Protection

Figure 1. The structure of Carmen Segura's claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] "Chalco's floods were a disaster..." <i>Unstated conclusion (SC)</i></p>	<p>"...yes, that's what happens when populations settle in unsuitable places to live"</p>	<p>"...it is very easy to realise that those places are unsuitable to live in; ... even despite the lack of sanitation infrastructure and (urban) services politicians disregard that fact and arrange 'social' commitments with poor people and allow them to settle there and grant them deed titles..."</p> <p>"...poor people are forced to live there and they are not aware of risk that is why they ended up settling there...and at the end of the day, politicians have to accept that situation and tolerate those people because they are unable to evict them... that happens everywhere"</p>	<p>So that is why policy has to be designed in terms of convincing people to live at risk, otherwise prevention cannot be achieved.</p>

Former General Coordinator of Civil Protection

Figure 1. The structure of claims of Oscar Navarro about Valley Chalco’s floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[C1] Well... what I can say is that the canal couldn't stand a high volume of water flow, it broke and part of Chalco got flooded.</p>	<p>Let us remember that Chalco is a lacustrine zone, it was a lake...people used to travel by ships and boats during the XIX and XX century then [it is still] a flooding area...</p> <p>...and if you jump on the other side of the Canal you encounter an urban zone that is below the canal level...</p> <p>it is a lacustrine zone that naturally gets flooded...with the aid of the canal management water has been (rightly) diverted ...therefore settlements would have never existed there... and what happened is that it got flooded there and many blocks inundated</p>	<p>The inundations claim is based on his personal experience. At the time of the inundations he was the General Coordinator of Civil Protection at Federal level and that allowed him to coordinate emergency responses. His accounts of the floods and how he frames the causality are influence by what was done during the emergency stage in order to fix the mechanical problem of the canal and to cope with the serious situation.</p>	

1.3 Environmental Sector

Undersecretary of Ecology, State of Mexico

Figure 1. The structure of Adolfo Mejía' claims about Valley Chalco's floods causality

<i>I propose that</i> CLAIM	<i>given that</i> DATA	<i>And since the rule/principle that</i> WARRANTS	BACKINGS
<p>[1] Unstated conclusion that is left to the reader's interpretation</p>	<p>In Chalco many things mixed together...urban planning without environmental criteria...authorities allowed illegal settlements in risk zones and of course a deficient policy regarding natural resources management that contributed to basin deterioration, deforestation, wind and water erosion causing canal sedimentation...and the (conditioning) things that, you know, were present for inundations to take place...</p>	<p>Politicians and policy makers pursue their own interests without protecting the common goods</p> <p>The authoritarian political culture...it is a top-down decision making where no other opinion is allowed but only that of the boss.</p> <p>[unstated assumption] Ecological planning of urban settlements has to be mainstreamed in land use planning</p>	<p>(It was because) a complete lack of planning (environmental aspects were not considered) only urban issues mattered...</p> <p>People settled where they were allowed so they voted for the politicians that provided the plots...within the vicious Mexican system And all political parties behave like that (PRI, PAN, PRD) because that is the political culture Because we all grew up like that ...PAN followers are also like them...</p>

Figure 1. The structure of César Reyna's claims about Valley Chalco's floods causality

<i>I propose that</i> CLAIM	<i>given that</i> DATA	<i>And since the rule/principle that</i> WARRANTS	BACKINGS
<p>[1] Even though I have little information about hydraulic infrastructure... ...For sure... It was a problem caused by the lack of maintenance, of sediments accumulation that reduced the riverbed along with an extraordinary storm that loaded the river and this provoked the breakage... and of course all problems regarding social inequalities in that zone arose we all know...</p>	<p>In that zone, out of the blue (during Carlos Salinas's administration) that area -Chalco Valley settlements- didn't exist and let's say it is a stream, a natural lake and in the moment that there is a breakage it simple flows to its natural riverbed and that leads us to problems...</p>	<p>The uses a disclaimer by saying that he lacks of technical information regarding the LCC infrastructure.</p> <p>Immigration to that region increased notoriously and government couldn't provide adequate and sufficient infrastructure.</p> <p>LCC analysis has to integrate the national dimension of urban and regional policies since immigration is a conditioning factor of disaster risk construction.</p>	<p>People settled where they can.</p> <p>Mexico City has always attracted many immigrants from all parts of the Republic and thereafter during the 70's the neighbouring municipalities of the State of Mexico received many immigrants because Mexico City couldn't afford to welcome them.</p> <p>A national policy has, since long time ago, favored Mexico City needs providing more resources than to the State of Mexico disregarding the urban and regional dynamics of the neighbouring municipalities of the State of Mexico. That has contributed to immigration increase into the State of Mexico. State of Mexico depends on the federal government with regards to those problems.</p>

General Director of Environmental Policy and Planning, SEMARNAT.
 Figure 1. The structure of Luis Bojóquez' claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] It was a terrible misfortune... [I was driving back to Mexico City from Puebla City when I got stranded for six or seven hours and at that time I didn't know what was going on...] and then I came across information that it was this canal (LCC) rupture and this inundation and population was flooded by shit, it is a shame that We have rivers of shit...</p> <p style="text-align: center;">↓</p> <p>[2] There was not (LCC) maintenance, It was not a natural disaster... it was a misfortune, a disaster but a man-made (artificial) disaster as far as I can see...</p>	<p>The water and sanitation management in Mexico is so bad that we are going to get flooded with shit</p> <p>As far as I know it was not because of heavy rains because it didn't rain extraordinarily, nor Mexicans didn't take more shit than any other day</p>	<p>We live in an endorreic basin which is prone to flooding so sooner or later it is going to get flooded...you don't have to be a genius to know it</p> <p>Water policies in Mexico are schizophrenic</p> <p>A great city, Chalco that it is already a municipality and all this can be traced back to past times so it is going to get flooded...so there is no way this zone is not getting inundated</p>	<p>Because basic needs have not been met namely we don't treat wastewaters in the source and besides that being an inundations problem because you loose your belongings is also a serious problem of public health...of illnesses...everyting gets mixed... imagine what those canals carry</p> <p>And that happened because there are many public official, bureaucrats who are not doing their job</p>

1.4 Urban Development and Planning Sector

Figure 1. The structure of Alejandro Rodríguez' claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] The river spilled over...yes...unexpectedly...I should say it was a problem of waste waters discharges or something like that... I am not pretty sure of what happened but several <i>colonias</i> got flooded</p>	<p>I guess...rainfall, rainfall I don't remember. Heavy rainfalls increased the river flow and since it was a wastewaters canal...that spilled over...</p>	<p>Newspapers accounts are the information sources of Rodríguez.</p> <p>[Assumption] Official scientific-technical reports are not enough for adequate explanations in disaster causality in an unequal society where there are no real choices for avoiding risk exposure. Those reports are commonly used to explain causes and consequences of disaster and isolate the damaged area.</p> <p>[Unstated assumption] There is no point for understanding what happened in the LCC if there is no other information regarding the socio-economic roots causes that made people to live in a risk environment.</p>	<p>Society can be blamed...</p> <p>But you'll have to find out why the LCC flooded, where did it originate... and I don't only mean in terms of physical failures but it can be traced back to decisions made 50 years ago... in those days there was nothing...only one little stream and over the years things evolve and you let them happen...</p> <p>....Who is the direct culprit, perhaps a government employee who didn't care about it [LCC] You can always find culprits who are not really culprits... You cannot point to the culprit when a water pipe on the street gets broken...a driver with his car passing by and stepping over the pipeline...or the guy who installed the water pipe... I should say there are no culprits or everyone is culprit</p> <p>Who is the culprit? Who knows... Who</p>

			<p>are the culprits for world's problems... and I can say since Adam and Eve the problem mess started...</p> <p>Corruption culture (as a way of doing things in Mexico) allowed illegal settlements in risk areas and no control over land market is exerted.</p>
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1.5 Mexican Oil Company (PEMEX)

Figure 1. The structure of Rafael Fernández' claims about Valley Chalco's floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] Inundations' main cause is the oversight of the canal...the [lack] of a good management (programme) of an open air canal...</p> <p style="text-align: center;">↓</p> <p>[2] ... The canal brakes and floods a lot of people with waste waters with the high likelihood of causing health problems</p>	<p>Chalco Valley's is an example of the worst sanitation management of waste waters in an open canal under very difficult conditions...besides, the canal is above (the ground)</p> <p>Trying to find the culprit is very difficult... when the canal was designed many years ago, there was no one living in Chalco Valley... what happened is the result of the lack of land use planning and uncontrolled settlement</p>	<p>Any risk analysis would indicate that a huge problem would come up...Risk could have been foreseen ...Nobody cares about the potential risk it may potentially pose</p>	<p>Because there is no (land use) planning...people got there and settled...since the beginning of the settlement people has been exposed to risk and the living conditions were very bad because there is no urban planning and people settle where they can instead of settling where they should...</p> <p>...For me the main cause is the lack of planning... (that) triggered an anarchical urban growth and nobody cares about the potential risk it poses...</p> <p>In Mexico the lack of waste waters treatment <i>in situ</i> makes it to be carried away from the sources... there is no point in 'transporting' waste waters...</p>

2. Science and Disaster Management
 2.1 National Centre of Disaster Prevention

Director of Research

Figure 1. The structure of Sergio Alcocer’s claims about Valley Chalco’s floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] the weakening of the wall, water excess in the LCC</p>		<p>“...we know what was published, what happened...There is a report elaborated by the Institute of Engineering in the UNAM, Ramón Domínguez...we participated in the elaboration of the assessment of this...and we sent it to the CNA...”</p>	
<p>[2] Finally, we got an inundation, in a flooding zone that it was known that it was a flooding zone...</p>	<p>Despite the fact that there was a land use plan, illegal settlements populated Chalco; authorities allowed this to happen to avoid social uprising and problems; what they do are to pave roads, provide electricity; and at the end we have this zone inundated; it was known that Chalco was a flooding area.</p>	<p>...There are laws and regulations concerning the land occupation people have to obey and endorse. One serious negative obstacle civil protection has to face is the lack of law enforcement...”</p>	<p>“... in Mexico is illegal to live in high risk zones but due to impunity and corruption illegal settlements occupy those zones...”</p>

Figure 1. The structure of Daniel Bitrán's claims about Chalco's Valley floods causality

<i>I propose that</i>	<i>given that</i>	<i>And since the rule/principle that</i>	
CLAIM	DATA	WARRANTS	BACKINGS
<p>[1] It is a typical case...It could have been foreseen in advance by monitoring the [waste] water levels...and how that could be affected with forecasted rainfalls and by [evaluating] the canal walls [physical condition]...evidently, isn't it? It was simply a lack of precaution...</p>	<p>[That happened] because of the increase in the volume waters that 'found' a vulnerable exit and kept on undermining [the canal wall] until it broke it...how many years have passed...[it was not known] in what condition it was (the canal wall)</p>	<p>Cenapred carry out evaluations of the event to explain what could have caused the floods and in particular about the impact of heavy rainfalls in the canal.</p> <p>Cenapred is not in charge of the canal maintenance...[only of disaster impact evaluation]</p> <p>Let's accept that nature manifest in extreme variations...</p>	<p>...There is no planning in the long run and that happens quite frequently; if one thinks in the long run one has to carry out prevention [measures]</p>

Coordinator of Capacity Building and Training of CENAPRED

Figure 1. The structure of Gloria Ortiz Espejel' claims about Valley Chalco's floods causality

<i>I propose that</i> CLAIM	<i>given that</i> DATA	<i>And since the rule/principle that</i> WARRANTS	BACKINGS
<p>[1]. "... [t]he overspilling of the Bordo de Xochiaca, It got damaged, it got crackings on its walls and that provoked the floods in a vast area of Chalco Valley, an area I don't remember how vast it was..." [she mistaken the name of LCC by <i>Bordo de Xochiaca</i> which is another canal not located in the Chalco region]</p>	<p>It is a long explanation of causal factors of two types: 1) an spotted and very concrete problem in the physical features of the LCC and 2) allowance (by local authorities) large settlements adjacent or close to a hydraulic infrastructure that was not meant to support water peaks without having a maintenance programme.</p>	<p>According to Gloria Espejel, technical and social issues reports were drafted intended to explain the happenings.</p>	<p>The relation between population growth-migration into the State of Mexico neighbouring municipalities and a lack of adequate policy responses.</p>

3. Local knowledge and coping practices

NGO Caritas

Figure 1. The structure of Alejandro Hoyos' claims about Valley Chalco's floods causality

<i>I propose that</i> CLAIM	<i>given that</i> DATA	<i>And since the rule/principle that</i> WARRANTS	BACKINGS
<p>[1] [Not referring to the particular case]: "...disaster develop, they don't arise spontaneously, and they are the total sum of risks, vulnerabilities, threats that turn the equation...into a disaster, isn't it?</p> <p>[2] <i>Unstated conclusion</i> [canal] walls breakage</p>	<p>IF you set up communities in plains, IF you do it without adequate sanitation and rain drainage, IF... you put people close to the canal of those dimensions without providing proper maintenance, IF you lack of a monitoring system to warn people about the canal flow behaviour...IF you sum up all these factors that trigger a disaster and... I think all that led to [canal] walls breakage and caused this disaster</p>	<p>Experienced knowledge of the inundations by the affected people appears to be the basis of the warrant.</p> <p>[assumption] No regulations and adequate land use planning were put into place since the inception of the communities in the Chalco Valley's region</p>	<p>This disaster that [had] developed 30 years ago when communities settled there, when that infrastructure was designed, when regulations were not observed/enforced or there were none... then the total sum of those factors resulted on [what we know]... current administration is not to be blamed nor the former one...[this problem origin] has many years of development, negligence and a bunch of culprits that should be legally punished because of [no action] made them accessories of one thing that originated from the beginning..."</p>

APPENDIX II
FINAL FIELDWORK QUESTIONNAIRES

Questionnaire for policy makers and governmental officials

0. My presentation

I am Fernando Aragón, a PhD student of the University of London, England. I am doing a research about natural disaster within the Mexico policy system. The objective of the interview is to know your view and opinion about them. The information you provide is very important for my research and will be used only for academic purposes. I thank you very much for your collaboration.

A. General information about the interviewee.

1. *What is your name?*
2. *What is your academic background?*
3. *Could you please provide details about your position?*
4. *What is your job about?*
5. *What are the main functions of your institution/office/organisation?*
6. *Since when have you worked in this institution?*

B. Conceptualisation of natural disaster and environmental risk

1. How do you define natural disaster?
2. How do/would you approach/study natural disaster? (It depends on whether the interviewee works in the “disaster policies” sector or in the “other policies” sector)
3. Why?
4. How do you define environmental risk?
5. What makes people be exposed to environmental risk?
6. Do you think that there are some groups who are more exposed to environmental risk than others?
7. If yes, why?
8. Do you think that certain groups in society are more vulnerable to and affected by natural disaster?
9. If yes, why?
10. What is your opinion about the difference between environmental risk and environmental vulnerability?

III. Natural disaster policy system: formulation and implementation

A. Policies formulation

1. Could you identify the policies that are directly and indirectly relevant to the prevention of natural disaster?
2. Which policies within your institution deal directly or indirectly with natural disaster?
3. What are the goals of such policies?
4. What are the means to achieve such goals?
5. What are the main problems to be solved by those policies?
6. Why?
7. What kind of knowledge is used in the formulation of those policies?
8. What is the importance of scientific-technical knowledge for formulating those policies?
9. Do you know which other institutions/agencies/community of experts are involved in formulating natural disaster policies?
10. Is there a relationship between those institutions and yours?
11. How is the relationship between those institutions and yours when it comes to formulating natural disaster policies?
12. Which other institutions/agencies/community of experts should be involved in formulating natural disaster policies?
13. Why?

B. Policies implementation

1. Which institutions/agencies are involved in implementing natural disaster policies?
2. What are the main outcomes/actions of natural disaster policies?
3. Who are the main beneficiaries of natural disaster policies?
4. Who should be the main beneficiaries of natural disaster policies?
5. Why?
6. Which other institutions/agencies, you think, should be involved in implementing natural disaster policies?
7. Why?
8. What other measures and/or policies should be adopted to deal with natural disaster?
9. Why?

IV. Evaluation of natural disaster policies

1. What is your opinion about the policies you have already referred to?
2. Do you think they are adequate/inadequate for dealing with natural disaster?
3. Why?
4. How do the policies you already mentioned affect the intended beneficiaries?

V. Chalco's floods and policy makers' interpretations

1. What happened in Chalco on the 1st June 2000?
2. In your opinion, what caused the floods?

3. Could you provide concrete evidence for explaining the event?
4. Is there someone to blame for?
5. Who?
6. Why?
7. What should be done concerning the La Compañía Canal and Valley of Chalco?
8. Why?
9. What kind of policy measure would be adequate for dealing with this problem?
10. Why?

Questionnaire for Valley of Chalco, Chalco and Ixtapaluca people

0. My presentation

I am Fernando Aragón, a student of the University of London, England. I am doing a research about the inundations of June, 2000 that took place in Valle of Chalco. The objective of the interview is to know your experience and opinion about them. The information you provide is very important for my research and will be used only for academic purposes. I thank you very much for your collaboration. Your identity will remind confidential is you wish so.

I. General information about the interviewee. Local people's perception/interpretation about their *colonia*, dwelling and household.

A General characteristics of the interviewee and his/her household.

6. *What is your name?*
7. *Your age?*
8. *Your occupation?*
9. How many people live in the house?
10. Who are your relatives?
11. How many of them work?
12. Who takes the decisions about how the money is spent?
13. Where were you born?
14. Are you a *nahua*? An *otomí*? Or...?
15. From which other indigenous group are you?
16. Where did you live before coming to Valle de Chalco?
17. Why did you move to Valle de Chalco?
18. For how long have you been living here?
19. Are you the owner of the house?
20. Are you the owner of the plot?
21. Is there piped water inside the house?
22. Is there a sewage system?
23. How does it work?

B. Physical setting

1. How do you find your *colonia*?
2. Do you like it?
3. Why?
4. What do you dislike of your *colonia*?
5. Why?
6. What changes would you make it?
7. Why?

II. Valle of Chalco's floods and environmental risk: local people's interpretations and beliefs.

A. Disaster

11. What happened in your neighbourhood on the 1st June 2000?
12. In your opinion, what caused the floods?
13. Is there someone to blame for?
14. Who?
15. Why?
16. To you, what is a disaster?
17. Why do you think disaster/ or tragedies occur?

B. Disaster impact and affected people

1. Were you and other members of your household affected?
2. How?
3. Were the family members relations affected?
4. How?
5. Do you know other people in the colonia who were also affected?
6. How were they affected?
7. Why?
8. How do you feel living near the La Compañía Canal?
9. Did you ever think that the La Compañía Canal would break and would provoke such floods?
10. Why?
11. How long before the incident?

III. Relationship between local people and the government

B. Institutional responses for assisting affected people and local people organisations

1. Can you tell me, what did the municipality do in the aftermath of the disaster?
2. Where?
3. Were their actions/activities adequate/inadequate?

4. Why?
5. Who else participated in assisting the affected people?
6. Where?
7. Were their actions/activities adequate/inadequate?
8. Why?
9. Do you know if some local groups participated in assisting the affected people?
10. Who?
11. Where?
12. How?
13. Did you receive support or assistance from relatives, friends or non affected people?
14. How was it?

B. Claim making process and authorities' responses

1. Did you know about claims addressed by people to authorities before the tragedy?
2. To whom were they addressed?
3. Who made them?
4. How were the claims?
5. Did you address claims to public authorities?
6. Did you make it by yourself or along with someone else/ group of people?
7. How?
8. What were the authorities' responses/actions?
9. Did these responses fulfill your expectations?
10. Why?
11. Why do you think they responded the way they did?

C. Disaster prevention and mitigation activities

1. What has the municipality done about the Canal since the floods?
2. Were their actions/activities adequate/inadequate?
3. Why?
4. What has the municipality done for preventing future disaster?
5. Are their actions/activities adequate/inadequate?
6. Why?
7. Do you or your neighbours participate in activities for preventing disaster?
8. Why?
9. What have you done inside your house to face future floods?
10. Do you think the Canal will break again?
11. Why?
12. Is there something you would like to add?

**APPENDIX III
LIST OF INTERVIEWEES**

A. FINAL FIELDWORK.

I. ENVIRONMENT

Nombre	Institution	Dependencia
Sergio Sánchez	SEMARNAT	General Director of Air Quality and Pollution Management
Diana Ponce	SEMARNAT	Underattorney of Natural Resources
Luis Bojórquez	SEMARNAT	General Director of Ecological Planning
César Reyna	State of Mexico	Comisión Ambiental Metropolitana
Adolfo Mejía	State of Mexico	Subsecretaría de Ecología del Estado de México
Gustavo Reséndiz	SEMARNAT	Delegate of SEMARNAT in the State of Mexico
Ricardo Sánchez Rubio	State of Mexico	General Director of Prevention and Control of water and air pollution

II. WATER

Jorge Malagón.	CNA Mexico Valley Region (GRAVAMEX)	General Manager
Francisco Patiño	CNA Mexico Valley Region (GRAVAMEX)	Operations director
Gustavo Paz Soldán	CNA Mexico Valley Project	Coordinator
Antonio Dávila Capiterucho	CNA Infrastructure Protection and Emergencies	General Manager
Enrique González Isunza	Water Commission of the State of Mexico (CAEM)	Project Assistant
Ing. Edgardo Castañeda	Water Commission of the State of Mexico (CAEM)	Projects Manager

III. CIVIL PROTECTION AND DISASTER PREVENTION

Carmen Segura	General Coordination of SINAPROC	General Coordinator
Oswaldo Flores	General Direction of SINAPROC	General Director
Roberto Quass	CENAPRED	General Director
Gloria Luz Ortíz Espejel	CENAPRED	Coordinator of Capacity Building
Tomás Sánchez	CENAPRED	Coordinator of Communication
Óscar Navarro	General Coordination of SINAPROC	Former General Director
Arturo Vilchis	General Direction of Civil Protection of the State of Mexico	General Director
Mario Álvarez Sierra	General Direction of Civil Protection of the State of Mexico	Director of Risk Atlas. Secretary Executive of the Civil Protection Metropolitan Commission
Mireya Mercado Sánchez	General Direction of Civil Protection of the State of Mexico	Representative of the State of Mexico in the Civil Protection Metropolitan Commission
Mr. Rodolfo Díaz Mena	Municipality of Ixtapaluca	General Director. Civil Protection Agency and Firemen Department
Alejandro de Hoyos	ONG: Cáritas	Responsible for the Emergencies Programme

IV. URBAN AND SOCIAL DEVELOPMENT

Jesús Aguiluz León	General Direction of Urban Management	General Director
Alejandro Rodríguez	General Direction of Urban and Ecological Planning	General Director

V. MEXICAN PETROL COMPANY (PEMEX)

Rafael Fernández de la Garza	Direction of Corporate Security and Environmental Protection (PEMEX)	General Director
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VI. ACADEMIC EXPERTS

Ing. Osvei Gelmann	Centre of Applied Sciences and Technological development UNAM	Researcher and disaster Expert
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Ing Roberto Meli	Institute of Engineering UANM	Researcher and expert on Eartquakes
Virginia García Acosta	Centre of Social Anthropology Research (CIESAS)	Historian and disaster expert

Affected people from Avándaro, El Triunfo, San Isidro and Unión de Guadalupe

Name	Colonia	Municipality
Alfonso Martínez Galván	Avándaro	Chalco Valley Solidarity
Marilu Reyes Vázquez	Avándaro	Chalco Valley Solidarity
Martha Arriaga	Avándaro	Chalco Valley Solidarity
Agustin Noyola	El Triunfo	Chalco Valley Solidarity
Antonio Rivadeneira	El Triunfo	Chalco Valley Solidarity
Carmen Otelo	El Triunfo	Chalco Valley Solidarity
Francisca Hernández	El Triunfo	Chalco Valley Solidarity
José Meneses	El Triunfo	Chalco Valley Solidarity
Norberto Robles	San Isidro	Chalco Valley Solidarity
Agripino Ruiz	San Isidro	Chalco Valley Solidarity
Alberto Rojas	San Isidro	Chalco Valley Solidarity
Juan Tepo	San Isidro	Chalco Valley Solidarity
Beatriz Gaspar	Unión de Guadalupe	Chalco
César Gaspar	Unión de Guadalupe	Chalco
Consuelo Sánchez	Unión de Guadalupe	Chalco
Cristóbal Elvira	Unión de Guadalupe	Chalco
Isabel Rosas	Unión de Guadalupe	Chalco
José Luis Robles	Unión de Guadalupe	Chalco
Matilde Mercado	Unión de Guadalupe	Chalco
Patricia Jiménez	Unión de Guadalupe	Chalco
Victor Huitrón	Unión de Guadalupe	Chalco
Victoria Guzmén	Unión de Guadalupe	Chalco
Juanita Robles	Unión de Guadalupe	Chalco

B: PRELIMINARY FIELDWORK

Interviewed Policy-Relevant Subjects

Name	Institution	Post
1. Luis Wintergerst	Civil Protection Agency of Mexico City	General Director Civil engineer
2. Adolfo Mejia	Ministry of Ecology- State of Mexico	Under-minister of Ecology. Doctor in Biology
3. Miguel Angel Carmona	Sewage Systems- DGCOH	Under-director
4. Octavio López Maya	Hydraulic Engineering. DGCOH	Under-director
5. Arturo Vilchis	Civil Protection Agency of the State of Mexico	General Director

6.	Rodolfo Diaz Mena	Civil Protection Agency and Firemen Department/ Municipality of Ixtapaluca/State of Mexico	General Director
7.	Benito Vázquez Lara	Firemen Department/ Municipality of Ixtapaluca	Head
8.	Miguel Angel Aguayo	Department of Rural Programmes and Social Participation of the Regional Administration of the Valley of Mexico (Gravamex)/ National Commission of Water	Chief CNA official responsible of establishing links between the National Commission of Water and the community affected.
9.	Dr. Sergio Alcocer Mtez de Castro	National Centre for Disaster Prevention/ Ministry of Internal Affairs (Cenapred)	Director of Research
10.	Dr. Daniel Bitran	National Centre for Disaster Prevention/ Ministry of Internal Affairs (Cenapred)	Responsible of economics evaluation of disaster.
11.	Samuel Hdez. Lastiri.	Regional Administration of the Valley of Mexico (Gravamex)/ National Commission of Water, CNA General Resident East Zone (Canal of La Compañía)	Head of the East Zone Group and responsible of the Canal <i>La Compañía</i> Civil Engineer
12.	Jaime Noyola	Office of cultural affairs of the municipality of Valley Of Chalco-Solidaridad.	Head
13.	Oscar Zavala	Decentralised Body of Drinking Water, Sewage and Sanitation of the municipality of Valley Of Chalco-Solidaridad (ODAPAS?)	General Director
14.	Antonio Dovalí	Hydraulic Construction and Operation- Mexico City	General Director

Interviewed People from Chalco Valley-Solidarity

1.	Ms.Aurora	Municipio Valle de Chalco-Solidaridad Colonia Darío Martínez-II Calle Justo Sierra	Inhabitant of Valley Of Chalco-Solidaridad.
2.	Ms. Leticia (Aurora's daughter)	Municipio Valle de Chalco-Solidaridad Colonia Darío Martínez-II Calle Justo Sierra	Inhabitant of Valley Of Chalco-Solidaridad.
3.	Ms. Sara Villanueva Ramírez	Municipio Valle de Chalco-Solidaridad Colonia Darío Martínez-II Calle Justo Sierra	Inhabitant of Valley Of Chalco-Solidaridad.