RISK PREVENTION AND POLICY FORMULATION:
RESPONDING TO THE 1999 MUD-FLOODS CATASTROPHE IN EL LITORAL
CENTRAL, VENEZUELA

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Submitted to the Department of Urban Studies and Planning
At the Massachusetts Institute of Technology, M.I.T.,
in partial fulfillment of the requirements for the
Degree of

Master of Science in Urban Studies and Planning, SPURS

June, 2005

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RISK PREVENTION AND POLICY FORMULATION: RESPONDING TO THE 1999 MUD FLOODS CATASTROPHE IN VENEZUELA

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Fifteen days of constant and intense rainfall in Venezuela culminated on December 16, 1999, in catastrophic landslides and flooding along 25 miles of the Vargas State coastal strip. This catastrophe ravaged the Caracas seaside, ripping up houses and infrastructure and literally reshaping the coastline and beaches. Historical records indicate that similar natural events leading to landslides have occurred in this region before—each fifty years on average. Moreover, the evidence of obliterated structures over hazard-prone areas in Vargas State’s cities has led the assumption that land-use planning was not successfully used as a hazard-mitigating technique.

Today, after the 1999 mud-flood catastrophe, Venezuela’s government is implementing land-use mitigation strategies. However, their efficiency in face of future similar events is not guaranteed. Depending on the tools and instruments used to implement these strategies, these programs will perform successfully—saving lives, time, and resources and promoting the economic and social growth of the region—or fail just as they have in the past. With the aid of government, dwellers have returned slowly to reconstruct their damaged properties, forgetting the strength of nature and the footprints of the rivers, to rebuild in hazard-prone areas and thus starting the cycle again.

To evaluate this cycle, this study analyzes the tools used by the Venezuelan government to implement land-use policies in this risk-prone area. This study finds that the combination of tools used in the past and the combination used in the current program are inefficient to pursue the desired goals. These programs are mainly owned and operated by the national government, leaving very little space for local government, the private sector and communities to participate in the reconstruction process. This predominance does not mean national government should not be present in these programs. It does mean that the national government should inform, coordinate, and provide incentives to local governments to engage proactively in the reconstruction process while incorporating mitigation measures in land-use planning. Vargas State inhabitants must be active and willing participants in this process and the government should provide whatever assistance may be needed.
Acknowledgements

My advisor John de Monchaux have contributed with his time and intellectual energy to make sure that this thesis remains clear and focused. I would not have been able to do it without him. Professor Mark Schuster who shared me his insights and material from his course on spring 2003.

In Venezuela, I owe greatly to professors and planners Frank Marcano and Melida Brewer of the Instituto de Urbanismo, Universidad Central de Venezuela UCV, who helped me with all the statistics of Vargas State. Planner Beatriz Olivos at the Autoridad Única de Vargas, AUAEV who provided me with maps, photographs and data, and who offered me insights into the Vargas rebuilding Plan indispensable for this thesis. Many thanks to the Venezuela’s National Cartography who gave me access to all the maps and photograph archives. Elizabeth Fox and the Writing Center who helped me with the edition of the last version of this thesis.

Carlos Blanco, my most strong supporter, has helped me through the toughest moments encouraging me to take all the challenges for this project and during my three years at school.

Last but not least, my family in Caracas, for their unconditional support.
To my children,
Sofía and Eduardo
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PROLOGUE

El Litoral Central Today
PROLOGUE

The greatest catastrophe that Venezuela has endured in its recent history, the mud floods of December 1999, represented an opportunity. The media coverage of the event, its human drama and its consequences brought first the attention of international and national aid donors and then funding for replacement of the lost property. One of the achievements of this interaction was a coherent project whose main objective was to recover El Litoral Central coastal area, offering high standards of living to its inhabitants. The plan was conceived in a stage-by-stage redevelopment strategy, in accordance with sustainable environmental and urban criteria. Today, five and a half years since December 1999, the recovery plan’s goals are not achieved, signs of economic recovery are weak, and the evidence of the 1999 mudslides is still visible. Moreover, rains in February 2005 brought back more mud along with additional economic loss and the awful memories of the 1999 events.

During my research trip to El Litoral Central, I set out to investigate which measures among the ones to promote the recovery of the area were designed to prevent or ameliorate damages of future mud floods. I met with planners and community leaders and visited the institutions in charge of the redevelopment process. I found that risk reduction measures such as land use planning for recovery have been lost and whatever support to recovery is taken by government agencies, bilateral and multilateral agencies and NGO’S is uncoordinated and fragmented. In order to turn disasters into opportunities and to promote sustainable post-disaster recovery, recovery planning should incorporate risk management and reduction considerations into all recovery activities from the outset. When recovery is addressed in this way, it can close the gap between emergency relief and sustainable development. What would happen if mitigation strategies were incorporated into the planning practice? Taking care of environmental criteria, how can we employ the resources used for the recovery of El Litoral Central to guide the rebuilding process into a more sustainable future?

The first chapter of my thesis presents an overview of the urbanization process of El Litoral Central urbanization process. I describe how its assets function as demographic magnets against the natural forces that twice per century, on average, destroy urbanization. The second chapter presents Venezuela’s policy
choices in the past as responses to previous disasters and the dilemma of choosing between the planning or market approaches. Following a critical assessment of the Venezuela’s recovery plan as a response to the 1999 catastrophe and assessing the analysis of Schuster, de Monchaux, and Riley’s “Tools” perspective, Chapter Three presents an alternative to the common planning policies in order to achieve the sustainable development in the El Litoral area. Let me begin with twelve photographs from my field trip and other resources that will demonstrate the importance of incorporating land-use planning as a mitigation measures.
1. La Guaira Port

Venezuelan's first commercial and second most important port of Venezuela. Together with the Maiquetía International Airport, the system of public beaches, the private clubs and their marinas, as well as an important part of the residential areas, were built to serve the Capital and are closely linked to its economy.
As many towns in the coast, Caraballeda was having an increase of density with the construction of vacation apartments along with the growth of informal settlements. Many of the new dwellers are located in the slopes of the mountains. Check in the back of the photograph. Do these dwellers recognize the zone as highly vulnerable to mud-floods?
San Julian River main watercourse was one of the few rivers in the El Litoral that had been canalized in the lowest part. Engineering works upstream were not completed. Check the density of development next to the ravine. The river disappears in the city.
After the December 1999 Events


The Spanish Guipuzcoana Company was in charge during colonial times of the port activities and operated in this building. La Guaira City was founded in the sixteenth century as the main port for Caracas and one of the most important ones in the whole of the Caribbean, a role the city maintains to this day. Given the damage to this Historic Monument it has been listed by the World Monuments Watch as one of the 100 Most Endangered Sites.
5. Town of Caraballeda

Aerial view of debris-flow deposition resulting in widespread destruction on the Caraballeda fan of the Quebrada San Julián. Alluvial fan of the main channel (left side of photo) resulted in deposits up to 6-m in thickness and totaling about 1.8 million cubic meters of bouldery debris. Secondary new flood channels are visible through center of fan to the lower right of photo.
6. Caraballeda, Los Corales neighborhood

Apartment buildings in the town of Caraballeda extensively damaged by passage of debris-flow front at least 3.5 m in height, leaving boulders (>1 m) on second floor of structure.
El Litoral Central  
The Reconstruction

7. Dam in Guanape

Upstream view of concrete crib-type. Check debris already overloading the capacity of the dam.
Canalization of the Guanape River in the Town of Camuri. Debris flow and flood water overflowed channel and damaged part of the work done at this point midway on the canalization.

For the government, the rebuilding process has meant rebuilding infrastructure such as dams, main highways, and bridges, which have already comprised a vital part of the recovery. It is evident the lack of prevision regarding land use control in the riverbeds.
9. "No to demolition. We want a relocation solution, fast." A sign in the village of Carmen de Uria, completely devastated and listed as inhabitable due the high risk-prone area. Survivors were forced to leave their homes.

Lack of enforcement of the new regulations regarding land use and lack of information about the natural threat and have made former residents returned to live in damaged units, using their life savings to gradually repair and restore their properties no matter the location. There has been an extremely limited assistance for privately owned property.
Aerial view of the destroyed main coastal road. Note on the right a piece of a destroyed bridge recently rebuilt. Given the magnitude of the February rains, many coastal towns remained unable to communicate, without electricity and water.
10. Town of Tanaguarena, 2005

Bridges and main coastal road have been swept away.
Check the footprint of the alluvial fan, now vacant lots. There has been no land use restrictions in this area previously devastated. Individuals are making decisions to stay in or leave an area, to rebuild housing or not, based on their jobs and their personal financial circumstances.
CHAPTER 1

Coastal Development and Urbanization: Is Urbanization Causing Disasters?
Growth and migration in combination with natural events have been the cause of cyclical disasters in El Litoral Central’s urban areas. With a description of the natural characteristics and the factors that stimulate urban growth of the study area, this chapter illustrates how urbanization itself does not cause disasters; the relative risk presented by its attributes causes the repeated loss of life and property.

The Site

El Litoral of Vargas State, known as El Litoral Central, is located at the North of the Liberator Municipality and is part of what is called the Capital Region. The general boundaries of Vargas State are the following: to the north, the Caribbean Sea; to the east, Chuspa River in Miranda State; to the south, Libertador municipality in Caracas; to the west, Aragua state. Vargas is divided from Caracas Valley by the Cordillera de la Costa Mountain, locus of the Avila National Park.

The topography of this region of coastal Venezuela is extremely steep and rugged. The crest of the Avila Mountain reaches 2,700 m within about 6-10 km of the coast. The rivers and streams of this mountainous region drain to the north and

13. Vargas State location in Venezuela. The darkest area represents Caracas Metropolitan Area.
emerge from steep canyons into alluvial fans before emptying into the Caribbean Sea. In Vargas, little relatively flat area is available for development with the exception of the alluvial fans. The weather is classified as tropical-humid with an annual average temperature of 78-80°F, and the annual average rainfall is 900 to 1530 mm values, completely changed the days before the catastrophe.

14. Shaded relief map of the Venezuelan coastline north of Caracas between Maiquetia and Naiguata

El Litoral Central results from a process of urban settlement developed over the years in the narrow strip between the mountain and the sea. This urban pattern of interrelated towns extends for approximately 26 km and measures nearly 2 km at its broadest points, in which are located at both ends of the urban system the towns of Catia La Mar and Caraballeda. The strip becomes so thin in some sectors that it hardly leaves space to accommodate road access. Along this isthmus, smaller communities were developed—Carmen de Uria, Camurí Grande, Anare, etc.—as well as large private clubs, recreational facilities, and resort apartments.

All the urban centers were built on the flood plains of the numerous watercourses that run off Mount Avila. This relationship among mountain, stream, urban center, sea, is a pattern that is repeated along the coast. With this pattern, the areas are exposed to cyclical disasters. (Figures 15, 16). The 3-dimensional model below is, in Figure 17, represents part of the Cordillera de La Costa mountain range and the pattern of the repeated vulnerable areas. It shows that there is very little flat area with no risk of mud floods. Caraballeda, like cities along the coast, was developed on the San Julian River alluvial fan. If we add the
projected census of Caraballeda in 2020, we could predict that if mitigation measures do not succeed, more population will be at risk and a disaster of greater magnitude will occur.

15. (above) Map showing floodplain and flood plain buffer areas. If we compare it with the photograph below, note how the flood plain areas are the ones most highly urbanized.

16. Downstream view towards the sea, showing an alluvial fan highly urbanized. This pattern of urbanization is repeated along the coast.
17. (above) 3-Dimensional Model showing part of the coast and the alluvial fans. Areas in black are considered to be highly risky to mud-floods. Areas in beige are the areas less mud-flood prone. In Vargas, little flat area is available.

18. (above) Aerial photograph of Vargas State showing the debris-flow, fresh sediment deposited in the alluvial fans. Matthew C. Larsen.
Cyclical Events

The storm of December 1999 began with fifteen days of constant and intense rainfall and culminated in catastrophic landslides and flooding along 25 miles of the coastal strip of El Litoral. The Venezuelan Civil Defense agency reported that landslides and floods destroyed more than about 8000 individual residences and 700 apartment buildings. Roads, telephone, electricity, water and sewage systems were severely disrupted. In addition, much of the two-lane coastal highway was destroyed or damaged (Sancio and Barrios, 2000). Total economic losses were estimated at $1.79 billion (Salcedo, 2000). Early estimates suggested that between 5,000 and 50,000 people may have perished (Brandes, 2000; Sancio and Barrios, 2000; Salcedo, 2000; the figure of 30,000 is now generally cited as the approximate number of fatalities (USAID, 2000). Many people were buried or carried out to sea by the debris flows and flooding, and only about 1000 bodies were recovered.

The timing and intensity of rainfall of the storm of December 14-16, 1999, were unusual because the rainy season in coastal Venezuela normally lasts from May through October. Beginning in early December of 1999, the interaction of a cold front with moist south-westerly flow from the Pacific Ocean towards the Caribbean Sea resulted in an unusually wet period over coastal northern Venezuela.

Moderately heavy amounts of rainfall during the first week of December were followed by extremely heavy rainfall beginning on December 14 and lasting through December 16. According to the USGS report and the data from the GOES 8 satellite, the 3-day rainfall at the International Airport at Maiquetía (43 m above mean sea level), for a 52-h span on December 14-16, totaled 911 mm (from 1945 on Dec. 15 to 2345 on Dec. 17, UTC).

The landslides and flooding that were caused by the intense rainfall were not unique in this region. Historical records indicate that similar hydrologic events leading to severe flooding and/or landslides occurred in this region in February 1798, August 1912, January 1914, November 1938, May 1944, November 1944, August 1948, and February 1951 (Salcedo, 2000).

On average, at least one or two high-magnitude mud-flood or landslide events per century have been recorded in this region since the 17th century (Larsen et al., 2000). Using Spanish archives, Röhl (1950) provided a detailed summary of flash floods and debris flows in La Guaira in February 1798 that caused extensive damage to (219) homes and government buildings and destroyed all bridges. The high magnitude of this two-day event forced Spanish soldiers to place cannons cross-wise in front of the upstream-facing entrance of a fort, located near the stream channel, to prevent debris from pouring into the structure. Examination of deposits exposed on terraces and along the banks of river channels reveals a record of prehistoric floods and debris flows as well. According to the USGS, prehistoric flood/debris-flow deposits and large boulders exposed along channel banks in most of the observed watersheds are evidence of previous mud floods. The sizes of boulders and thicknesses of prehistoric deposits are at least as large as those of December 1999 and in several areas, greater, indicating that the December 1999 event was not necessarily the largest event to have occurred in this region.
20. Prehistoric debris-flow deposit (7.7-m thick) undermined in channel bank of Quebrada San José de Galipán. Top of deposit which is matrix free produced by winnowing of debris flow by recessional and/or secondary overland water flows.

21. Structure at Plaza de Piedras in the eastern older portion of Caraballeda. This “House of Stones” built around 1917 predated the flood and debris-flow

Carmen de Uria was a town built entirely on the narrow flood plain against the almost vertical slopes of the highest and steepest areas of the Avila and on the outlet to the sea of one of the larger rivers basins. Over time, this town has been destroyed and rebuilt again. (Figure 22) Particularly in December 1999 the loss of lives was huge, and the material destruction was almost total.
Los Corales neighborhood in Caraballeda, was originally a middle class permanent residential area comprised of single detached homes. Over time, it began to experience an increase of density, with the construction of vacation apartment buildings along with the growth of squatter settlements in the higher areas, which often crossed the boundaries of El Avila National Park. Los Corales was also one of the worst hit areas in December 1999. The indiscriminate urban development, formal and informal, was one of the main reasons for the high degree of destruction in Los Corales. Once more, constructions built on the riverbed blocked and modified the torrents, which seeking their way toward the sea leveled everything in their path. Figures 23, 24, 25 shows a comparative sequence of the re-building and destruction, part of the urbanization process of Caraballeda.
Aerial photography after the 1956 mud flood. San Julian Fan.
Source: Venezuela National Cartography

Source: Venezuela National Cartography
Los Corales neighborhood completely developed over the San Julian River Fan

Source: Venezuela National Cartography
Los Corales neighborhood destroyed in 2000
El Litoral Central as a Magnet

The coast of Vargas State is an area of vital importance for the metropolitan Area of Caracas and the whole country. The strategic and economic infrastructure such as the Maiquetía International Airport, La Guaira Port, and the system of public of beaches are three main factors that have contributed to attract population to El Litoral Central’s urban areas.

Maiquetía International Airport is located at only 25 Km (15.5 miles) from Caracas and serves as the main entrance to the country from abroad. Its location in the Caribbean enables it to serve as connecting point between Latin America, the Caribbean and Western Europe. From 1994 to 1998, Maiquetía absorbs the greatest number of the international traffic operations, an annual average of 32,086 that represent 74% of the total flights served in the country. (Figure 26). During these years, Maiquetia also had the highest number of national traffic operations, an annual average of 63,109 that represent 31.2% of the total operations in the country, more than three times the operation of Maracaibo, the second airport of the country. (Figure 27) During the 90's, Maiquetía received annually more than 100,000 airplanes. This volume rises towards the end of the decade. (Figure 28).


between 1994-1999

28. (above) Maiquetía International Airport. Annual amount of operations 90’s Decade

According to the Economic Commission for Latin America and the Caribbean-United Nations, (ECLAC-UNDP), the Maiquetía International Airport building itself did not suffer much damage. However, extraordinary loss was generated by the use of its space as temporary refuge to victims of the mud flood. Direct damages to the airport structure are estimated on $4.5 million. Indirect
damage originated by the lack of operations during 20 days after the events was estimated at $86.1 million.

The port of La Guaira, is located, 21 miles from Caracas and 7 miles from Maiquetía International Airport. Is the second most important port of Venezuela in terms of freight and is, as like in colonial times, the entrance to the Caracas metropolitan area, and the states of Vargas, Miranda, and Aragua, of incoming goods. In addition, it is the busiest port in terms of passenger movement and carries the greatest number of the Caribbean cruiser lines. From 1994 to 1998, La Guaira Port has the second place of freight movement absorbing 26% of the total freight mobilized. (Figure 30).

29. La Guaira Port indexes 1998-2000
Años Total 1994-98 VARIACIÓN 1994-98

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>La Guaira</td>
<td>1.568.063</td>
<td>1.690.037</td>
<td>1.645.439</td>
<td>1.785.923</td>
<td>2.129.421</td>
<td>8.618.883</td>
<td>15,51</td>
</tr>
<tr>
<td>Maracaibo</td>
<td>889.540</td>
<td>964.260</td>
<td>1.1.186.765</td>
<td>1.240.066</td>
<td>1.167.743</td>
<td>5.400.374</td>
<td>9,50</td>
</tr>
<tr>
<td>Guanta</td>
<td>516.093</td>
<td>757.226</td>
<td>543.226</td>
<td>965.540</td>
<td>551.553</td>
<td>3.335.638</td>
<td>5,07</td>
</tr>
<tr>
<td>Puerto Sucre</td>
<td>72.492</td>
<td>127.392</td>
<td>138.466</td>
<td>194.273</td>
<td>398.671</td>
<td>931.294</td>
<td>1,64</td>
</tr>
<tr>
<td>Carúpano</td>
<td>23.019</td>
<td>56.294</td>
<td>39.285</td>
<td>892</td>
<td>24.419</td>
<td>143.909</td>
<td>0,25</td>
</tr>
<tr>
<td>Guaranao</td>
<td>229.924</td>
<td>207.072</td>
<td>129.863</td>
<td>172.890</td>
<td>786.115</td>
<td>1,38</td>
<td>-79,83</td>
</tr>
<tr>
<td>El Guamache</td>
<td>42.615</td>
<td>78.759</td>
<td>66.102</td>
<td>82.615</td>
<td>124.306</td>
<td>394.397</td>
<td>0,69</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8.505.229</td>
<td>10.527.726</td>
<td>10.530.753</td>
<td>13.312.456</td>
<td>13.986.682</td>
<td>56.862.846</td>
<td>100,00</td>
</tr>
</tbody>
</table>

30. Main ports of the country.
Total freight mobilized in each port from 1994-1998

Tourism has also been a very important magnet for population. With a surface of 369,668 acres and 105 miles of beaches, Vargas state is an economy of services, international commerce and recreational tourism. Before the 199 events, El Litoral’s system of public beaches, private clubs and their marinas, received around 250,000 local tourists during holidays and weekends. Figure 37 shows the list of 53 beaches, their area and their capacity. Although historically there has been very little international tourism in this area, the regular weekend beach exodus from Caracas has created an intensely symbiotic tourist relationship with the capital. Caracas weekenders gather frequently, particularly on portions of the Littoral further to the east.

Concerning international tourism in the area (Figure 31), gives an idea of the international cruisers and tourists’ movement in Vargas. Note how in several months of the years 1998 and 1999, cruisers did not include Venezuela as a visiting port in their itineraries even though all their lines have offices in the country. The mud floods and the damage they left deterred tourists and cruises from visiting.

Population Growth

Even though the estimated population of El Litoral in December 1999 was approximately 280,439 and by January 2000 230,103 inhabitants, which evidences the loss of 70,892 because of the tragedy of December 1999, urban growth is still at an incipient stage in most of El Litoral Central’s region.

32. Vargas State population estimated for the year 2010.
The population in Vargas represents 4.78% of the Capital Region and 0.95% of the total population of the country. By 1990 Vargas’s work force represented 1.7% of the country and 6.4% of the capital. This proportion was stable until 1981. (See Figure 33)

![Graph](image)

33. Population in Caracas and Vargas state, 1981-2010

It is estimated at the present time that the proportion of the total population living in urban areas will be 258,488 by 2010. (Figures 32,33) The geographic and physical placement of these additional 30,000 urban inhabitants in El Litoral Central, as well as the quality of housing and construction, will be determining factors in the country’s future vulnerability. Should current trend persist as they stand, marked by the absence of effective land-use planning in urban areas, by the neglect of the needs of the poor and by the domination of haphazard market forces--, it can almost be guaranteed that the population of El Litoral Central’s urban areas will become increasingly vulnerable to natural threats.
A Natural Hazard Mitigation Strategy

Preventing heavy and constant rain from falling and rivers from flooding or eroding the earth surface is impossible. If there is nothing we can do to alter the natural process of the earth, the response to environmental hazard must assume one of two alternatives: we could take steps to avoid disasters in advance or we can develop measures to recover from its effects in the aftermath. Alternatively, we could address the problem only by influencing the behavior of individuals, groups, and communities living at risk from these hazards. We can prevent people from locating in mud-flood hazardous areas.

Improving utilization of geographic space is fundamental in order to provide a safer future for the population of El Litoral and organization of human activity is a critical determinant of risk in natural disasters. In order to attain a better balance between space, sustainability and the reduction of vulnerability in the future, it will be necessary to review traditional frameworks, and to integrate a systematic concern with the dynamics of population redistribution within efforts aimed at reconstruction and development in the region's urban areas. Stimulating new patterns of spatial organization in order to reduce vulnerability and to promote longer-term sustainability requires a proactive approach, which includes demographic, economic and environmental aspects. The key question in this context is how to distribute population over this land area in order to promote both sustainability and the mitigation of vulnerability, while also exploiting the country's comparative advantages.

The challenge is to define what concrete options exist, in terms of spatial distribution, what are the benefits and drawbacks of each option and what instruments are at our disposal for the promotion of the most sustainable options.
CHAPTER 12
Past, Present, and Future Villages
This study identifies three recovery policies approaches portrayed throughout the history of Vargas State's urban areas expansion and cyclical destruction, in three scenarios: past polices, present policies, and future policies. Past policies, describe how the government has traditionally managed the recovery policies after catastrophic events. Present policies, identifies, the hazard mitigation measures in the current redevelopment program and, impediments to their effectiveness. Future policies, will suggest a combination of measures and implementation tools for hazard mitigation strategies that will increase their effectiveness in the future.

**De Monchaux, Schuster, and Riley's "Tools Analysis"**

The approach of the analysis of Venezuela's government intervention in El Litoral, comes from de Monchaux, Schuster and Riley's "tools" perspective. This approach focuses on the generic tools that can be found in the state's toolbox of possible actions. These five tools are the following: Ownership and Operation; Regulation; Development Rights; Incentives; and Information. According to the authors, each one of these tools will send a particular message if the state adopts it as part of any program of action. These basic messages might be characterized as follows:

<table>
<thead>
<tr>
<th>Ownership and Operation</th>
<th>“The state will do X”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation</td>
<td>“You must (or must not)do X”</td>
</tr>
<tr>
<td>Incentives/Disincentives</td>
<td>“If you do X, the state will do Y”</td>
</tr>
<tr>
<td>Property Rights</td>
<td>“You have a right to do X, and the state will enforce that right.”</td>
</tr>
<tr>
<td>Information</td>
<td>“You should do X,” or “You need to know Y in order to do X.”</td>
</tr>
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34. Tools for Implementation

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The reason for adopting this methodology is that, as the authors state, it is a way of “analyzing the policies adopted by government in relation to their effectiveness” and explains the achievement and failures of the program. Five years after the December 1999 events and given the latest incidents of mud floods in Vargas—February 2005—it is time to examine the hazard-mitigation strategies and the tools in practice for their implementation. I will find out the impediments to the success and what the missing tools are that, if applied, would make these policies effective. The plan of recovery for El Litoral Central is a complicated one; thus in order to provide a thorough analysis, this chapter will limit its scope to the provisions in the recovery plan regarding natural hazard-mitigation strategies.

**Past Policies: Do nothing “until it happens”**

In El Litoral Vargas, doing nothing “until it happens” is the policy that has allowed individuals to assume whatever level of mud-flood risk they wish, so long as they are willing to live with the consequences of that decision. It is also called the “sixth tool.” Under the no-action policy, a family that chooses to live in the floodplain bets that a mud flood will not occur during their probable lifetime or will not occur before they find a better place to live.

In Venezuela, historically, victims of disasters have turned to the government for post-disaster aid because the government manages the resources necessary to deal with the aftermath of a disaster. The effect of these policies in practice, of government emphasizing governmental assistance in the post-disaster period is to soften the burden of the risk of those families, through their choices, have assumed and to spread that risk over the taxpaying population. Post-disaster relief has, in sum, “socialized” mud-flood risk so that all individuals, whether themselves living at risk or not, assume a share of the total burden proportionate to their tax burden. Because of this socialization, the argument is often heard, that these policies offer counterproductive incentives. Post-disaster provisions punish risk-aversers and reward risk-takers. In addition these polices encourage the settlement of hazardous areas because they absolve individuals from any responsibility for the risk involved. The message these policies are sending is that one can freely build and rebuild in hazardous areas because the government will always be there to shoulder the losses whenever disaster strikes again.
Current Policies: Venezuela’s Recovery Plan after the 1999 Catastrophe

Immediately after the floods, the National Government created the Autoridad Única de Área para el Estado Vargas or Unique Authority of the Area around Vargas State (AUAEV). AUAEV works as an institutional mechanism that coordinates territorial planning for the redevelopment of El Litoral in order, its charter states\(^3\) “to bring a full development plan of the area affected by the heavy landslides; to carry out studies and programs and to implement mechanisms required to carry out the recovery plan.” In order to accomplish the rehabilitation of El Litoral, the AUAEV started by designating the recovery areas as Areas Under Regime of Special Administration (ABRAE)\(^4\). These areas are limited to the portion of the territory of El Litoral highly damaged by the floods, which also corresponds with the highest urban development rate. The definition of this portion of El Litoral as an ABRAE grants AUAEV the rights to establish general guidelines, set up the implementation of large infrastructure systems, and delimit the sectors that would deserve specific attention, such as the alluvial fans. These areas were designated as “critical areas with priority treatment and of environmental protection and recovery.” Each of these “critical rehabilitation zones” within the larger ABRAE has, special regulatory plans, as required by law, and is contained in the Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State. These areas are conceived as “windows,” demanding a higher level of definition in comparison to the general consideration contained in the larger ABRAE. The urban development proposals for each of these “critical rehabilitation zones” are defined in the APRA Plan and were designed to be eventually incorporated into the General Urban Plan for El Litoral. (See figure 35).

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\(^3\) The Current Organic Law for Territorial Planning contemplates the creation of a Special Authority (AUAEV). Official Gazette 3,238 Extraordinary, 8-11-1983

\(^4\) The same Organic Law for Territorial Planning considered the designation of Areas Under Regime of Special Administration, (ABRAE)
The Corporation for the Recovery and Development of the State of Vargas, CORPOVARGAS, was created by means of a law published on June 8, 2000 to promote and carry out the construction, financing and coordinating the physical environmental, economic, and social projects and programs required for the redevelopment of El Litoral. CORPOVARGAS is an agency created and managed by the central government responsible for the implementation of AUAEV reconstruction plans. It is important to mention that the definition of both ABRAE and the "critical rehabilitation zones" specified in the APRA Plan, grants the Special Authority the power to act immediately on that territory, modifying the pre-existing legal urban development conditions.

The current environment in El Litoral—politics, economics, pre-existing social relationships and institutional structures—has constrained the choice to Ownership & Operation and Regulation as the strongest two tools in the government's intervention. The rest of the tools--property rights, incentives and

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information-- are not employed. The remaining tools, if employed would offer valuable ways to help mitigate the risk of disasters.

Ownership and Operation

According to Christopher K. Leman (2002)\textsuperscript{6}, direct government is the delivery or withholding of a good or service by government employees. The AUAEV and CORPOVARGAS represent the "command and control" approach that the economist Charles Schultze has distinguished from the free-market mechanisms. As government institutions, AUAEV and CORPOVARGAS have developed organizational structures and assigned responsibilities within them, formulated a sense of mission, recruited and managed human resources, and secured and accounted for financial resources.

AUAEV

AUAEV is the planning agency in charge of the redevelopment of Vargas State. As a publicly owned and managed external agency for the recovery, AUAEV represents the government. It has created a regulatory body to implement its programs. Since AUAEV was created to pursue specific goals, its personnel and mechanisms are specialized for their tasks and equipped professionally to carry them out. AUAEV is independent in terms of consultant help, field work, and office supplies. AUAEV has recognized land-use planning\textsuperscript{7} as a potentially valuable instrument in the long-term reduction of human vulnerability and loss potential to natural hazards. This recognition is demonstrated with the designation of the ABRAE Land Reserves and APRA Plan. The purpose of the designation of a portion of El Litoral as an ABRAE Land Reserves, grants the AUAEV the right to establish general guidelines and to delimit the areas the territory of El Litoral that were highly damaged by the floods and deserve specific attention related to the use of land. In this respect, the AUAEV has coordinated a process of overall technical studies with the support of the Ministries of Infrastructure, Environment and


\textsuperscript{7} Land-use planning as hard mitigation measures for mud-flood hazard include removing or converting existing development, discouraging development, and regulating development (Erley and Kockelman, 1981).
Natural Resources, Industry and Trade, and Petróleos de Venezuela, PDVSA, to identify and designate these areas. Without the political and technical support, resources, and coordination among ministries the design of guidelines would not have been possible. With the creation of ABRAE’s\textsuperscript{8} land reserves and the APRA Plan, AUAEV has designed non-structural mitigation strategies\textsuperscript{9}.

**CORPOVARGAS**

The prevailing approach that CORPOVARGAS’ has used to mitigate hazards after the 1999 disaster has been to mobilize resources for structural mitigation measures\textsuperscript{10}. The appeal of this approach is that technological structures work by themselves, with or without modifying the land use choices of individuals or communities. Structural mitigation measures in Vargas have generated political support for government because of their “visibility” and because they create great employment opportunities. This approach poses the same disincentives that the post-disaster relief policies pose. Flood-control structures of any type tend to encourage, rather than discourage, levels of development, as the assumption is that it is safe to build and invest in areas that are protected. Structures are designed according to an optimal performance, determined by largest disaster event that can be contained by the structure. While structural measures may protect very well against the events at or below the design standard, they may exacerbate the destruction caused by events that exceed it.

The advantage of government-owned centralized agencies such as AUAEV and CORPOVARGAS, created to redevelop Vargas, is that they have provided immediate decisions, clearing and corrective engineering, framed within a long-term vision for Vargas State. They have provided legislation and designed strategies that include land-use development at state and local levels. Both

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\textsuperscript{8} The same Organic Law for Territorial Planning considered the designation of Areas Under Regime of Special Administration, (ABRAE)

\textsuperscript{9} Structural Mitigation Measures includes the construction of protective works such as flood storage reservoirs, diversion of water to side channel storage or other watersheds, construction of storm channels to carry water surrounding the area to be protected, and levees along the floodway with tools to reduce flood damages.
agencies have mobilized state resources and existing bureaucracies to carry out decisions and programs.

The disadvantage of these new state-owned agencies is that they have overloaded the burden of the state bureaucracy. The AUAEV and CORPOVARGAS constitute a special administrative apparatus crafted to pursue the goal of the reconstruction, and have increased the amount of the administration staff and budget required for Vargas State. Competition for land control and mismanagement, and lack of coordination between the municipality and the new agencies have hindered achievements of their goals. This situation is evident in the decay of the municipal areas such as in the new beaches from the land claimed to the sea, and open space in the alluvial fans. The lack of municipal authority over property declared inhabitable is letting former dwellers come back and occupy their damaged properties. Moreover, because there is no clear coordination between CORPOVARGAS and the municipality, problems such as clearing the debris from the 1999 mud floods and finding a place to dump it are challenges.

Another disadvantage of state control over all programs is that it does not allow for local entrepreneurial action. CORPOVARGAS has assumed that the State local governments, civic associations in Vargas are unable to carry out rebuilding projects on their own, so they have designed programs to be carried out by international enterprises. For instance, the Spanish government had a contract to rebuild dams and electrification projects; the French government had the contract for a Public Transportation Plan, a Floods Emergency Plan, and mapping and GIS projects.

**Regulation**

ABRAE Land Reserves and APRA Plan are two regulatory instruments. Regulation as a tool is implemented by AUAEV to control development.

**ABRAE Land Reserves**

The importance of public regulation of some of these areas, particularly the ones designated in ABRAE Land Reserves, is that they are unique opportunities for the survival of the protected areas. Particularly in Vargas State, locus of the Avila National Park, which occupies an important portion of the land characterized by very steep slopes, the direct involvement of government regulating open land
will control the boundaries of the coastal cities of urbanizing wetlands and flood areas. Moreover, public control guarantees forest protection, clean air, habitat for wildlife, and recreation for the enhancement of quality of life in Vargas State’s urban areas.

The problem with these areas, specifically in the mountains, is that because the abruptly steep slopes and large areas are expensive to protect and maintain. Illegal occupation is one of the most significant threats to these areas as the surrounding towns grow. The parklands near the sprawling Vargas urban areas are highly valued for development. Newcomers often try to build homes inside the parklands, taking advantage of borders that are minimally enforced. The illegal occupation problem is difficult to manage because many of the perpetrators are former dwellers in the area. In addition, the surrounding towns cause waste management problems. Although the garbage dumps are outside the park, most are located near the border, and contaminate parklands during rainstorms. Regulation faces the challenges not only of protecting the parklands from development but also of protecting the lands from the by-products of development.

APRA Plan

The main goals of the APRA Plan are to enable the recovery of the area and control all the factors that originated the decay, to restrict new developments, and to designate buffer zones in hazard-prone areas. The most important feature of this plan is recognition of the area as highly vulnerable to mud-floods; this feature has conditioned its design. The plan proposes non-structural mitigation measures such as land-use and specific zoning based on the elaboration of risk maps. Further, the APRA Plan has stated general guidelines for promoting consistent land occupation, paying special attention to its previous development potential and looking for new potential as a site for recreation, tourism, urban activities, and communication and trade services.

One of the greatest benefits of the APRA Plan regulations is that they have identified flood-prone areas. The standards and mitigation strategies after this identification are designed to meet the needs of specific risk levels within the zoning districts. The land is also divided in units such as an alluvial fans unit, an
urban coast border unit, stream channels, and watersheds; the permits for rebuilding are granted on the condition of an environmental evaluation of the possible impacts of the proposed activity and its intended use. The local-use plan will direct the location of development to areas compatible with their resources such as beach resorts next to the sea, or higher density in areas less vulnerable. The huge economic and social costs of the recent event in Vargas State have demonstrated the consequences of leaving vulnerable areas unregulated. Zoning provisions following comprehensive plans will lead to predictable outcomes, providing an environment of certainty, key for attracting former dwellers to reinvest in destroyed properties or to the promotion of future investment.

The drawback of regulation as a unique tool to control development in vulnerable areas is that it does not assure that those standards will be met. In addition, regulation has high administrative costs of formulating standards and then monitoring and enforcing them. Moreover, if regulatory measures are taken alone, without informing the citizenry about the consequences of not monitoring their performance and policing their lack of commitments to the rule of law they will bring rent-seeking behavior on the part of self-interested firms and individuals. The effectiveness of regulation will be based on the knowledge of resources and adequately predicting the costs of future mud floods. Enforcing regulations also requires strong cooperation among agencies. For instance, Avila National Park, part of ABRAE Land reserves, belongs to INPARQUES (both agencies have their own guidelines); the AUAEV designs and CORPOVARGAS contracts.

Incorporating portions of El Litoral land in the group of ABRAE Land Reserves has enabled AUAEV to create a regulatory body aimed to protect and recover El Litoral. ABRAE Land reserves of El Litoral now are handled within a nation-wide classification system. Planning has been crafted according to the new needs of the region. At the regional and national levels, follow-up and research is being carried out. So far, the problem with ABRAE regulatory tools is that by themselves, they do not resolve the problem of mitigation or conservation. In practice, ABRAE lands are only “protected” from development but, have no budget and their regulations are not enforced.
Venezuela's response to the 1999 catastrophe area illustrates a government taking care of the entire program of planning and rebuilding. The prevailing model to redevelop El Litoral has been of government intervention with capital for reconstruction of infrastructure and replacement of inhabitable properties. The general balance of the tools is that direct government has prevailed over the other tools. The extent of the bureaucracy, the extension of the land, and the set of regulations have jeopardized the outcomes of a highly ambitious plan. Information, Incentives and Property Rights tools have been underestimated.

Among hazard mitigation strategies, the government has chosen the structural ones. One more time, using the national treasury, the state's support has worked as insurance and as a "better" alternative to unpopular demands of reallocating homes, tougher standards, and functioning insurance. Structural measures have worked as disincentives to do better. After bridges were replaced and the coastal road rebuilt in the aftermath of the 1999 events, no additional non-structural mitigation measures, were implemented. Moreover, the events of February 2005 have proven that bridges and dams will encourage new dwellers nearby and thus, increase their vulnerability. Non-structural mitigation strategies in the recovery plan, such as land use planning, have only reached the planning phase. The latest floods proved the lack of effectiveness of the recovery plan. Moreover, the state of decay and anarchy in El Litoral continues. The inadequate combination of tools for implementation of these strategies limited to Ownership and Operation and Regulation, have proved to be inefficient. A change to pro-active management of natural disasters requires not only the identification of the risk, but also the development of strategies to reduce that risk, and the creation of policies and programs to put these strategies into effect. Non-structural measures can be especially cost-effective if the areas in question are subject to frequent mud-floods, such as is the case of the town of Carmen de Uria or Caraballeda.
**Future Policies: Do something, control the hazard.**

The complexity of the recovery process in Vargas has been to overcome the inertia of government in relation to planning against future mud-floods. Although the national government has plans to regulate land and its use, it has been unwilling to enforce land use controls in hazardous areas. This unwillingness persists, even with the establishment of funding programs such as Proyecto Reviba that imposes minimum standards for hazards reduction as a condition for federal assistance, the cycle of destruction rebuilding destruction will persist.

It is difficult for any level of government, or even a private lender to require costly changes in the dwelling location or building improvements to meet the minimum life-safety standards for the purpose of protecting against damage from an event that may or may not happen within the next 30-50 years. The regulatory dilemma is not simply a disaster technology problem; it is common to the building and the real estate industries. Developers seeking a competitive price in commercial rents or home sales compete against local governments for imposing up-front fees for schools, transportation, and other community services. Home-builders argue that people do not want the added safety features. Instead, builders argue that buyers want cheaper ones. However, it is true, that the majority of home-owners are unwilling to add fifty dollars monthly to the cost of their mortgagees, just as they are unwilling to spend the same amount for mud flood insurance. Facing this problem, governments have two alternatives, the planning approach or the market approach.

If one accepts that the disasters-recovery problem is at least partially a government responsibility, and if one accepts that the current withdrawal of private insurance companies from natural hazards coverage will adversely affect the capacity for recovery, a policy question emerges. How can the central government control costs under the present system of limited supplemental assistance for local government refocus recovery spending to meet the needs of a broader spectrum of disaster victims? The huge amount of funds spent in the Vargas reconstruction and in assisting the victims of the 1999 disaster in more than four years has not met their needs. Not only are homeless families are still living in temporary shelters, but the goals of the reconstruction plan have not been met. The lag and costs of the recovery have demonstrated that tax payers ended
up paying for more emergency services, more temporary housing, more specialized aid, and standards for building location remain lax in high-hazard urban areas.

On the other hand, if one takes the position that government should not be the general safety-net for private-property loses, then the policy debate is limited to whether the government should simply quit funding recovery programs, and, redirect funds to promote protection of property through mitigation, insurance and/or savings for a minor event. Given the experience with the latest flood disaster, we should be cautious of the apparently simple market approach. Neither builders nor buyers want additional costs; but at the same time, insurers are unwilling to underwrite disaster insurance in high-risk areas. How does a government make policy in the face of such resistance?

As noted earlier, current patterns of population distribution in El Litoral is determined largely by market factors, result in people being forced to occupy inappropriate areas. This contributes enormously to their vulnerability. How can this trend be reverted? Do we have a coherent game plan, based on considerations of vulnerability? In what directions would we ideally want to promote growth? What do we know about the "ideal map" that could help us take a proactive stance aimed at reducing the vulnerability of poor people in Venezuela’s Central Coast? Implementing a successful mitigation strategy requires a junction of planning and market solutions. Only government can coordinate the spectrum of stakeholders in the reconstruction making public its plans. Only government can compel individual property owners, through a combination of regulation and incentive, to finance and improve building standards. Only government has the capacity to provide a true safety net for potential victims who, because of their low incomes or some form of market failure cannot afford to purchase insurance. Conversely, only the private insurance market can ensure that funds will be available for repairs, by virtue of a contract that underwrites a portion of the owners risk in exchange for an annual fee. Finally, only a partnership between government and private insurance industry can provide the research and the information necessary to develop fair and competitive insurance rates for the specialized hazard market.
CHAPTER III

Tools of Government in Action
Government’s Role in Mitigating Risk Hazards

The critical state of destruction and vulnerability of El Litoral after December 1999, when public safety and wealth were directly threatened, justified government intervention into the plans for reconstruction. Planning infrastructure and construction such as restoring the coastal road, bridges and dams, is appropriate governmental responses to an emergency. Absorbing risk is another function of direct government for large undertakings in which risk is so massive that private interests are not able, or not willing, to absorb them. The steep slopes of the Cordillera de la Costa mountain range that occupies a great extent hazard of the Vargas State makes developing safety difficult, of not impossible. Moreover, the market is incapable of assigning value to many environmental goods and lacks the long-term vision required for investment in sustainability. Hence, it is the public sector's duty to orient market mechanisms towards the sustainable use of space in practical ways, such as zoning and provision of incentives. With the creation of the APRA Plan, AUAEV has already taken this role, using the long-range approach and visualizing different scenarios of spatial organization with the object of maximizing economic and environmental advantages of new or ongoing investments. The dilemma, however, is to decide when direct government has satisfactorily performed its role and can retire, or stay and decide which programs will guarantee that risk will be mitigated.

Civic Society’s Role in Hazard Mitigation

Mitigating vulnerability and promoting sustainability require a proactive approach to space that combines economic benefits with social and environmental concerns. Taking this approach is not easy but progress can be made basically along two dimensions: the orientations of urban growth and of regional development. The entity that should be capable of initiating and coordinating the implementation of a sustainable vision of the future is the State, but instigated,
and controlled by civic society. The sustainable use of space requires the active presence of the State. Its role is not only to preserve environmental legacies but also to provide a comprehensive view of the relations between demographic trends, economic activities and environmental dimensions.

The visualization of a sustainable future and of reduced vulnerability should draw on participation from a variety of social actors. Planning for urban or regional space provides rare opportunities for dialogue and partnership aimed at adjusting ideal images and real images, and at making sure that public interests prevail over private interests. In this regard, community participation is considered a key issue. Community participation is important in the prevention, preparedness, and recovery stages. For example, the Yokohama Strategy and Plan of Action for a Safer World state the following:

“Community involvement and their active participation should be encouraged in order to gain greater insight into the individual and collective perception of development and risk, and to have a clear understanding of the cultural and organizational characteristics of each society as well as of its behavior and interactions with the physical and natural environment. This knowledge is of the utmost importance to determine those things which favor and hinder prevention and mitigation or encourage or limit the preservation of the environment for the development of future generations, and in order to find effective and efficient means to reduce the impact of disasters.”

The presence of a strong state for the redevelopment of Vargas urban areas has reduced the scope for Civic Society engagement. Effective and credible processes of delegating authority to private citizens should be increased and thus contribute to improve citizens’ trust in public institutions. Social accountability should play an important role in the creation of more transparent and representative governments and aid public institutions in meeting the expectations of the population. In order to promote civic engagement to maximize the effectiveness of the mitigation strategies already in place, other measures and other tools for implementation should be incorporated into the Vargas State’s recovery program. All regulatory bodies will be effective only if they can be respected, enforced and supported by citizens aware of their vulnerability.
Because of this need I suggest Information and Incentives as the main tools of my proposal.

Information

The major role of public agencies before setting standards is to promote the coherent occupation of land. This goal can be achieved through an information-rich context for private citizens, interest groups and firms to work together to solve the problem of the cyclical destruction by mud floods. Long-term vision for Vargas State, legislation, design of strategies that include, land-use development at state and local levels, building codes, and standards are set by experts in this case under governments' operation. However, informed citizens, buyers and simple settlers still have the choice of where to live. The impact of an information program to lowers risk of future event, such as the next mud-slide, would persuade dwellers in their choice on where to live and how to pay for a new or reconstructed building. Of course, information has its limits. Information contains just exhortations and admonitions, which the recipients are not forced to follow. And, since compliance with recommended behavior the targets behavior compliance will never be 100 percent, other tools such as incentives, property rights, regulation and Ownership & Operation would necessary support this policy. These policies would inform citizens, buyers, about the other tools that would work as support to the information. Such information includes facts about the Incentives/Disincentives to locate, the property rights that owners would lose or gain to maximize developing their properties, and finally how government contributes or not in any event of this nature.

Delivering the information of the Risk Maps

AUAEV, has designed these plans and should share its contents with the municipality and public their information. Good information on the nature and extent of hazard vulnerability is crucial to effective management of coastal flooding hazard, including assessment of adverse effects and evaluation of alternative hazard management scenarios. In the Vargas Region, the definition of the risk from coastal flooding at any particular site generally requires information on the following areas:
Land and building floor levels in low-lying flood-prone areas

The highest priority work is to further improve design information in regard to coastal flooding in the different areas. Information on past coastal flooding events is a significant factor towards damage from flooding. While the risk from flooding events in Vargas areas is probably relatively low, the magnitude and potential impact of such flooding is a very significant threat to human life and safety. A joint partnership with local district councils, transit and other parties may be required to facilitate this work.

Community adaptation and adjustment

Essentially this option covers those measures that aim to avoid or reduce the adverse effects of coastal flooding by modifying human use and occupation of flood-prone areas. There are a wide range of measures that can be used to modify human use and behavior in flood risk areas, including three main ones:

- Planning Options.
- Insurance and other financial or economic instruments.
- Community information and participation.

There is a wide range of environmental planning measures that can be used to avoid or reduce losses associated with coastal flooding.

Community Information and Participation

These measures aim to modify human use and occupation of flood prone areas by raising public awareness and preparedness through information and increased opportunity for meaningful community participation in hazard prevention. Still in Vargas community awareness of the causes and effects of natural hazards is generally low, as their preparedness for hazard events. Greater emphasis on raising community awareness and understanding is critical to appropriate changes in attitude and behavior. This is need particularly strong where hazard mitigation emphasizes human adjustment and preparedness.

There is also considerable knowledge and ability in local communities that can be drawn upon to improve hazard management and response. Local Civil Defense teams already make considerable use of the knowledge and abilities in local communities in disaster response. However, yet there is only limited use of these resources in hazard planning and preparedness. The development,
implementation and monitoring of site-specific management strategies should give particular emphasis to community participation.

Changes in hazard prevention and disaster response are also currently placing greater present emphasis on individual and community responsibility for mitigating risk and covering losses. At present, there is a high level of community expectation that government and insurance will “take care” of these matters. This expectation can result in much community frustration and distress, particularly following disaster. Emphasis on raising community awareness and participation is critical to help empower communities to adjust to their increased responsibilities. Emphasis of greater community participation will also help government agencies adjust to such changes and to better define and develop their roles in the new partnerships that are evolving.

Increasing public knowledge of hazard-prone areas and participation in management.

This topic includes, for example, warning labels that notify consumers about existing hazards, development of publicly accessible databases characterizing hazardous circumstances, and public hearings on risk management issues. At this time, a large fraction of the public is not familiar with the nature of the risk and the fact that risk-management decisions cannot not simply be made by technical experts and public officials and then imposed and justified to the public after the fact. Communication about risk is now viewed as being a dialogue among interested parties - risk experts, policy makers, and affected segments of the public.

Engaging the public in risk decision

The experience of the 1999 events, where children playing in the streets heard the sound of the boulders and ran inside to notify their parents, suggests that identifying sound, credible, and effective hazard reduction priorities and solutions depends in large measure on an informed public, with the public having a working knowledge of risk issues and opportunities to express opinions and become involved in risk assessment and risk management activities. Often the public receives its information from the media, and thus it is important for the media to
present balanced and reliable risk assessment. If the media do not report accurately, constructive public involvement becomes more difficult.

Monitoring, warning, and evacuation programs are also valid as mitigation strategies. In order to increase the ability of emergency managers to respond to future potential events, early warning systems based on weather forecasts and rainfall information could be developed. Enhanced weather forecasting is needed for the Caribbean and the northern coastal parts of Venezuela. For example, in cooperation with the U.S. National Weather Service (NWS), the USGS developed a real-time landslide warning system that was used to issue the first public regional warning for debris flows in the United States during the storms of 12-21 February 1986 in the San Francisco Bay region (Keefer et al., 1987). These warnings were conveyed to local officials in the San Francisco Bay region responsible for emergency services, who deployed resources in areas likely to be affected. Such warnings are estimated to have saved lives and prevented damage.

Warning Systems

Early warning about coastal flooding events has the potential to significantly reduce losses associated with these events, particularly in regard to items that can be moved above flood-risk levels. Warnings can also allow households to make better provision for themselves. Communication of such information and community response are required to realize benefits from flood warning. These communications should be critical elements of site-specific management strategies.

The reliability of advance warnings is also a key issue. Events with the potential to cause coastal flooding in the area can generally be detected several hours before flooding. For instance, major coastal storms (the primary cause of coastal flooding in Vargas) can generally be detected and followed for several days prior to their impact on the areas. An advance warning of one to three hours generally allows sufficient time for establishment of a civil defense, response and evacuation of threatened people, but it provides very limited time for households and communities to take other action to reduce losses and disruption.

Therefore, in the immediate future, realizing the potential of communities to reduce losses and disruption may require increased community response to early and less definitive warnings.
Incentives

Insurance and other Economic and Financial Measures

These measures are essentially financial incentives and disincentives that can be used to promote changes in the pattern of land-use and development in flood-prone areas. Insurance has traditionally provided a means by which the economic losses associated with use and occupation of flood-prone areas can be spread over both the wider community and time. It is a critically important tool to both individuals and communities in flood-prone areas. As insurance transfers rather than reduces flood issues, it does not directly decrease flood losses to the community or nation as a whole. As such, it is not a substitute for individual and community adjustments to reduce losses and should always be accompanied by such actions. Insurance has often sheltered individuals and communities from the true costs of use and occupation of flood-prone areas -delaying appropriate adjustments. However, this is will be less common. Ongoing changes in the insurance industry increasingly ensure that the availability and cost cover reflects the risk to individual properties and communities. In such circumstances, the availability (or non-availability) and cost of insurance cover can provide a very strong economic incentive for appropriate community adjustments.

Other financial measures have also tended to move in this direction in recent years (e.g. loss of various legislative changes related to institution of a user/beneficiary pays regime). These changes increasingly ensure that the full costs associated with use and occupation of flood prone areas (including all social, economic and environmental losses fall on the relevant parties.

These changes will generally provide strong economic incentive for appropriate adjustments. However, while these changes can send strong economic signals to affected communities, efficient and equitable adjustment will generally require some form of government co-ordination or facilitation. The changes to insurance and other financial and economic measures that have previously sheltered individuals and communities also add urgency to the task of ensuring that individuals and communities are well informed of risk.

In some cases, financial support or incentives may also be appropriate to facilitate appropriate changes to the occupation and use of flood-prone areas. In general, the use of such measures has been restricted in flood-prone areas because
of economic constraints and the lack of benefit to the wider community. However, along coastal margins there is potential for the use of such measures to have significant community benefit. For instance, voluntary purchase of flood-prone coastal lands can be used to enhance public access and amenity to provide opportunities to enhance natural character and other coastal values.
The thesis presented here contains the kernels of three separate theses that, if expanded, could each be developed on its own: Standards for Non-Structural Mitigation Measures for Venezuela’s Coastal Developments; Problems and Limitations of Venezuelans Regulatory System; and Design and Management of Government Land. Research being endless, two particular ideas themes in the thesis would have benefited from further development and research if I had had more time.

The first is the Idea for the creation of a Land Reserve Fund to manage the new land owned by the state. Clearing risk-prone areas requires the expropriation of properties in order to prevent future damage and to allow the public sector to design and build the necessary infrastructure to allow the redevelopment of El Litoral. Such properties must be acquired by the public sector, in accordance with the procedures outlined in the article 18 of the Law of Expropriation by Reasons of Public Utility. The new areas created by the landslides on the shore land should also be considered areas for future development and, as such, considered as assets in a fund. It would be necessary to establish fair replacement and compensation mechanisms for the affected population that would allow them to benefit from the redevelopment process. Key to the recovery of the area is knowing how to implement a real estate development program accessible to the affected population, which recognizes the different degrees of property damages; to minimize the financial contribution of the public sector; and to generate marketable instruments, shares, bonds, equivalent to their lost land.

The second is how to recover the lost opportunity that Vargas State had after the 1999 events, when the eyes of the world through the TV networks were following Venezuela’s situation and the country/State/disaster captured the attention of the bilateral and multilateral aid donors. Rebuilding cities according to global standards as providers of services, tourism, and high levels of life standards to make El Litoral Central a competitive destiny in the Caribbean is a considerable and time-consuming task. The energy and resources necessary to rebuild sustainable cities require such immense energy and resources that only a project with the support of all Venezuelan constituencies will make it happen. I wish I had the knowledge and time to develop these projects; future research in these directions should prove valuable.
APPENDICES
Appendix A:

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By Sonia Parisca, 2005

P= Programs Present in the current redevelopment Plan
A= Programs Absent in the current redevelopment Plan
Appendix B:

Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State Unique Authority of the Area around Vargas State (AUAEV)

Land Use and Management 1
Arrecife-Punta Mulatos
Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State
Unique Authority of the Area around Vargas State (AUAEV)

Identification and Levels of Risk 1
Arrecife-Punta Mulatos
Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State
Unique Authority of the Area around Vargas State (AUAEV)

Identification and Levels of Risk 2
Punta Mulatos-Tanaguarena
Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State

Unique Authority of the Area around Vargas State (AUAEV)

Multiple Risks
Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State
Unique Authority of the Area around Vargas State (AUAEV)

Risk of Floods
Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State
Unique Authority of the Area around Vargas State (AUAEV)

Risk of Mud-Floods
Plan for the Ordering and Uses for the Protection and Environmental Recovery of Vargas State
Unique Authority of the Area around Vargas State (AUAEV)

Risk of Sismic Movements
Illustration Credits

1.-2. 35mm slide, August 2004. Sonia Parisca.

3.-5. Extracted for the archives of Autoridad Unica de Vargas (AUAEV).


10.-12 35mm slide, Corporación para el estado Vargas, (CORPOVARGAS)


15. Map in Arc View, GIS. Sonia Parisca, 2004


17. 3-Dimensional Model in Arc View, GIS. Sonia Parisca, 2004

18. Mathew C. Larsen, extracted from the USGS
http://www.comet.ucar.edu/resources/cases/venezuels/images/ven1.gif

19.-21. USGS
http://www.comet.ucar.edu/resources/cases/venezuels/images/ven1.gif

22-25. Extracted for the archives of National Cartography of Venezuela

26.-33 Extracted from the Statistics Annex of the publication Estado Vargas. Aspectos Socio económicos, Función Urbana y Opciones de Desarrollo. Instituto de Urbanismo, Facultad de Arquitectura y Urbanismo Universidad Central de Venezuela, UCV.


35. APRA Plan. Autoridad Unica de Vargas (AUAEV).
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