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Dominican Republic Program Priode DO1 Summary Report (REVISED)

Summary Report Environmental Degradation, Disaster Risk Construction and Vulnerability in the Caribbean

Methodology

The **Environmental Degradation, Disaster Risk Construction and Vulnerability in the Caribbean** project was designed to implement a methodology which would allow for interdisciplinary and gender perspectives and for the use of quantitative and qualitative research methods. This implied the analysis of existing documentation and bibliography from the three countries under study regarding their development processes, population trends, environmental degradation processes, and disaster histories, experience and management.

To collect empirical data, a survey, in depth interviews and focus groups were used. The Survey was based on a detailed questionnaire which analyzed household and community socio economic data, hazard information and disaster management information. The survey was applied to a sample of 50 households per community. The criteria for household selection included that these be located in very vulnerable sectors of the communities, that they were occupied by disaster affected population, or that the head of household was a community leader. The questionnaire was prepared with input from all of the member of the research team to allow for the inclusion of different in country perspectives. This questionnaire was translated into French for it's application in Fonds Verrettes. It was a pre coded questionnaire which was then processed and analyzed using the SPSS quantitative analysis software. (See Appendix section for questionnaire)

For the qualitative research, key informants were selected in each community which were interviewed in depth. These interviews complemented the survey, expanding on hazard information and disaster management information and including specific questions directed at acquiring information on topics of interest to the research which were not included in the survey, and which were considered more apt for in depth interviewing and focus groups. These were natural resource management, environmental degradation, gender roles in disasters, household strategies, vulnerabilities, role of the community in disaster situations, key actors, details of disaster experiences, and risk and risk management.

Key informants for interviews and focus groups were chosen with the criteria of:

- . • Capacity to communicate and participate
- . • Disaster experience in the community
- . • Part of a vulnerable group
- . • Community leaders: specifically including those belonging to disaster or

- emergency organizations in the community.
- Elderly members of the community
- Gender balance

The data from these interviews and focus groups was then analyzed using standard qualitative data analysis FOR which categories were created regarding the research objectives related to vulnerabilities, disasters and risk.

(See Appendix section for details) The analysis process includes the following steps :

1. Revision of material / data
2. Establishment of an initial work plan or choreography
3. First level coding of data
4. Second level coding of data
5. Interpretation of data
6. Description of context, subjects, patterns, facts and theories

(Hernández Sampieri et al:2003) The unit of analysis was the interview: individual and group interviews and the segments analyzed within the units were the interventions of individuals organized according to themes. These were then categorized for analysis.

Research Findings

These pertain to the project's main objectives:

- Analyze development, population and environmental policies and models in the three countries in the last decades.
- Develop data in order to analyze natural resource uses and management and environmental degradation processes in the communities under study.
- Develop data in order to analyze risk and disaster conditions and management in the communities under study.

1. Development, population and environment: Cuba, Haiti and the Dominican Republic in the Latin American and Caribbean context

What have been the regional and local development tendencies in the last decades 1980-1990?

Development became the principal theme of Latin American countries after the Second World War. The necessity to satisfy population demands for industrial products forced countries to consider local alternatives, which produced the development model of import substitution. Historically, the implementation of this model had at least two stages: one which encompassed the decades from 1940-1960 and a second from 1960 to 1980, when the model became definitely exhausted and had to be substituted. Amongst the principal manifestations of the exhaustion of the model were the foreign debt crisis and the reduction in economic growth in the countries of the region.

In the decade of 1980 a new development model was put into effect destined to stabilize the economy at the macro level and promote private enterprise activity and elevate employment, so that in this way economic growth in the region, which was weak, could be re initiated. But the model did not satisfy all expectations, and this provoked the phenomenon known in Latin America as the lost decade of the 1980s. During the following decade, the last of the 20th century, there was a regional imposition of another development model, considered more pragmatic, with the clear intention to boost the private sector within a framework in which competitiveness was an essential element. (ECLAC, One World, GTZ, 2005) Since then there have been profound reforms in Latin American societies, which have affected practically all spheres.

Development in Cuba, Haiti and the Dominican Republic

Cuba, Haiti and the Dominican Republic have a long history in common which is interwoven due to the fact that they are neighboring countries. These three nations were the product of the European expansion at the end of the 15th century. In time ties between the countries were strengthened but also, breaches and differences were generated.

After 500 years, these three countries, which share the same historical roots have traveled the same roads, but in many cases have used different sidetracks to effectively maintain their populations on their territories. To a certain extent, the three countries are exceptions in Latin America. Within the Spanish speaking countries, Cuba was the last to maintain slavery and to become independent from Spain. To the contrary, Haiti was the first of the Latin American countries to become independent and abolish slavery and the only one which constituted a state with a population which had just been freed from slavery. The Dominican exception is the continuous change in it's sovereign status from 1795 on, going from Spanish colony to French colony and then back to Spanish. Soon afterwards becoming independent only to become a part of the Haitian state for two decades. The Dominican Republic then acquires it's independence from Haiti only to become a Spanish subject again for four years, after which it's independence was restored and has been maintained until the present. This unstable process had an

important impact on the country's development and also on the formation of its national identity.

Political conditions of the past characterized these three Caribbean nations, which at the beginning of the 21st century continue to present exceptional traits, due in great measure to the development models they have implemented. Cuba is the only country in the region where a socialist model exists. Haiti is the poorest country in the region and its internal political disputes detain the continuity of any development model. The Dominican Republic, according to the country's Human Development Report (PNUD, 2006) is the Latin American country with the highest economic growth in the past 40 years, but which despite this has around 50% of its population living below the poverty line. (Morillo et al, 2005).

The development model in Cuba

After the second half of the 18th century Cuba initiated an expansion of its sugar industry, which would become the basic element of its economy until the present. This phenomenon was due to the commercial aperture promoted by the governing Royal House of Spain, whose first king was Felipe V, in 1714. As Garcia Molina (2005) indicates "...the cultivation of sugar cane became known in Cuba with Spanish colonialism in the 15th century, but its full exploitation was not reached until the end of the 18th century and the first 60 years of the 19th century. The cultivation of sugar facilitated the development of the plantation economy and the modernization of the country".

At the beginning of the 19th century, the fact that Haiti was not a part of the world market, due to the effects of its war of independence, resulted in an expansion of the Cuban sugar industry which in that century became one of the world's largest. But in the 19th century, the development of the Cuban economy did not respond solely to the effects of sugar, but also to the growth of the production of goods such as coffee and tobacco, and mining. Cuba had to go through a prolonged and violent war of independence, which lasted fourteen years, in two stages, and which consequently had very negative impacts on its economy. Despite these obstacles, in the years following the war of independence, the island's economy recuperated, with varying economic outputs. Cuba arrived at the crucial year of 1959, in which a dramatic shift in its social order began. In that year the revolution, which in a short time became socialist, triumphed, favoring a model of centralized development. The transformation of European socialism since 1989, caused great changes in the interior of Cuban society. As occurred in the majority of Latin American countries, in the decade of 1990 Cuba was driven to implement reforms to adapt to the new reality, which consisted fundamentally of the disappearance of its closest economic allies in the socialist field. Keeping the essence of its socialist development model, Cuba took steps in the direction of opening its doors to foreign investment. It also made other reforms including the "liberation and deregulation" of the agricultural and cattle sectors, despite the fact that in this field they were not able to equal the productive levels of 1989. (Álvarez y Mattar, 2004).

Development model in Haiti

The history of Haiti goes back to the 17th century when groups of English, Dutch and French adventurers occupied the western part of the island of Santo Domingo, which had been depopulated by the Spanish authorities (Peña Pérez, Frank, 1985). At the end of the mentioned century, the French had become owners of the western part of the island and exercised political control. At that time, the planting of sugar cane began. Due to the success of this activity, in the following century the colony became the principal world producer, and one of the places of the world with one of the fastest growing economies.

The impact of the French revolution in 1789 was of great importance to Haiti, above all in the social aspect, provoking a long war, which started in 1791 and devastated the colonial economy. That struggle was prolonged until the colony finally became the first independent state of Latin America, in 1804. After the proclamation of its independence Haiti had the possibility of recuperating the colonial productive system of the 18th century. The fundamental cause that impeded this was the acute political confrontation, which has marked the country's existence since its beginning. Approximately a decade ago, Haiti entered into a new phase of acute crisis, and according to the UNDP, 'the acceleration of the socioeconomic degradation ... places the country ... in a situation comparable to one of a natural disaster or an armed conflict (cited in Gilbert, Randolph, 2005). In these conditions, one cannot consider the existence nor of a strategy, or of a development model in Haiti in the last decades. In 2005 the GDP grew 1.8%, and the economy had significant problems generating employment and there was a rise in the cost of living. GDP growth was influenced by sectors such as agriculture, the construction industry and the export textile industry. Despite the country's commercial deficit, remittances from Haitians living outside the country and international donations allowed for some compensation to the situation. (CEPAL, 2006)

Development model for the Dominican Republic

The Dominican Republic exists as an independent state since its separation from Haiti in the year 1844. Since then, it has followed a tortured road in its historic evolution. During the colonial period it belonged to Spain. During this epoch, the production of gold predominated for a brief period, but after the disappearance of the metal and of the indigenous population which extracted it for the Spanish, sugar cane entered the economic scene.

Sugar cane as a productive activity had an age of splendor in the colony, which lasted about 60 years, after which it decayed gradually until the disappearance of the industry. During the 17th century and for a good part of the 18th century the island entered a prolonged state of abandonment on the part of Spain.

The creation of the French colony in the western part of the island had the effect of re establishing a certain dynamism to the economy on the Spanish side, but this was brief due to the impact of the French Revolution in Haiti. After the sugar crisis in the 17th century, the major obstacle that the colony faced was the lack of legal commerce with other nations. This situation began to change in the 19th century, when Haiti invaded Spanish Santo Domingo and converted it into part of its territory. There on after the Dominican Republic remained related to the world market through tobacco and later sugar, coffee and cocoa.

As a consequence of the first war of independence in Cuba, some investors in that country migrated to the Dominican Republic where they installed sugar mills. This marked the beginning of Dominican sugar production. For over a century, the Dominican Republic was characterized by an agro export development model based on sugar, coffee, tobacco and cocoa. After 1968 an industrialization process, of very low intensity and short duration was started in the country to substitute imports. In the decade of 1980 the mentioned model collapsed, under the pressure of foreign debt problems. At the end of the 1980s the Dominican Republic headed a process which marked an era of economic adjustments and reforms in the region. In the mid eighties the country's economy began to be essentially dominated by tourism and the maquila industry of the free export zones. In 2005 the Dominican economy showed a spectacular growth rate of 9.3%. This growth was due to the expansion various sectors such as communications, commerce, transportation, hotels, bars and restaurants, agriculture and cattle industries. Despite this growth, the country's unemployment rate at the time was 17.5% and the country's commercial balance continued to show a deficit mainly due to a 22% rise in imported goods. (Central Bank, 2006)

Demographic dynamics and population politics

Changes in the behavior of demographic patterns began to be seen in Latin America from 1950 on. At the beginning of the 21st century "...it can be corroborated that practically all of the population has been incorporated to the process of demographic transition. In general terms, the transition started with descending mortality rates observed during the first half of the 20th century, and was accentuated during the decade of the 60's through a pronounced drop in birth rates." (Juan Chackiel, 2004). The most important consequences of these changes are reflected in aspects like the diminishing of population growth from 2.7% annually to 1.6%. (Juan Chackiel, *ibid*) Other factors also reflect these changes, such as the rise in life expectancy at birth and the longevity of the population.

The population dynamics observed in Latin America has not been uniform, of course, neither from the point of view of indicators which have been useful in identifying the process, or at national levels, or at the local levels in each country.

In the case of the three countries under study, one can observe that each one of them presents differences in their demographic profiles in the last decades. In that sense, Haiti forms part of a group of nations in which demographic transition is just beginning, the Dominican Republic is at balanced stage and Cuba is at a very advanced stage. (Juan Chackiel, *op. Cit.*). In other words, this means, that despite the fact that the three countries are going through a process of reduction of their principal demographic indicators, this process has just begun in Haiti, while in the Dominican Republic it is in an intermediate stage, while in Cuba the transition is total. Since the fifties, in Latin America different strategies were proposed to bring a change in demographics comparable to that of developed countries. Initially it was believed that strong doses of economic growth would contribute to the improvement of the conditions of the population. This perspective was abandoned when its inconsistency was proven. In the seventies, a step was taken "towards a new era of development" which gave way to what could be called "the era of basic necessities". (Jorge Paz, et al, 2004). This new paradigm emphasized the analysis of problems such as internal migration and unemployment. In the nineties, when the emphasis was centered on the topic of poverty, there was an intent to solve the problems faced by the Latin American populations through policies directed at increasing capacities of the population. In the last years, strategies have been created for poverty reduction. In the concrete case of the Dominican Republic, those strategies have contemplated the following demographic variables: adolescent birth rates, sexual and reproductive health, infant and maternal mortality, spatial distribution, environmental sustainability and vulnerable age groups, such as children and the elderly. (Jorge Paz et al, *ibid*).

2 Environment, degradation and population: As a consequence of the great sugar activity which took place in the islands of Santo Domingo or Saint Domingue and Cuba during colonial times, the degradation of natural resources in the three countries under study can be traced back to this period. In the case of Cuba, preoccupation with the degradation of such an important resource as the forest, can be found in such an early time as the end of the 18th century, when a plantation owner by the name of "José Ricardo O'Farril, laments the destruction which at the end of the 18th century the forests around the capital of the country were being subjected to, foreseeing that if opportune measure were not taken to contain the evil which threatened (the capital), La Havana, in 30 years, would see its forests reaching to a distance of 40 leagues" (Martín Rodrigo y Alhajilla, *Sf.*)

In 1838, José Saco, one of the most re known Cuban intellectuals of the 19th century, based on the worries of O'Farril, was able to prove true his prediction. (Martín Rodrigo y Alhajilla, *ibid*).

In the case of Haiti, the sugar industry, which was the major activity in the 19th century, caused great damage to the environment. To this degrading activity was added that of the cutting of the forest to extract precious woods, like mahogany, which was exported in great quantities to Europe, specially France (Moya Pons, 1994). As was the case in Cuba, by the 18th century there was alarm regarding deforestation, as is evidenced in the book by M.L. Moureau de Saint Mery, of 1796, *Description of the Spanish part of the Island of Santo Domingo*. Despite the problems of the 18th century, the Haitian forest recuperated significantly during the 19th century, in such a way that at the beginning of the 20th century around 4/5 of the country's territory was covered by forests, which started to be very rapidly degraded from 1950 on. (Philip Howard, 1998).

Differently from Cuba and Haiti, in the Dominican Republic, the sugar industry, which had existed during colonial times, as far back as the 17th century, did not have the same impact of environmental degradation. When this activity was again promoted in the country, it prospered in the coastal plains, mostly of the Caribbean Sea in the south, and of the Atlantic Ocean in the north, in a way that the mountain areas were protected from the voracity for land characteristic of the sugar cane industry.

At present it is estimated that the vegetation coverage in Haiti is practically non existent, since the percentage of coverage of the national territory does not rise above 3.5 %. In Cuba the forest coverage has been calculated at 19% for 1991. For the Dominican Republic forest coverage experienced a sudden fall since the beginning of the 20th century which has continued. Statistics are not very precise, but it is calculated that forest coverage is around 16% of the territory, after an improvement in the decade of 1990. Today the existing connection between environmental degradation processes and demographic growth are well known, and much more so when the living conditions of the population are significantly marked by poverty in it's different magnitudes. Differently from what occurred in the past, in which environmental degradation processes where related to deforestation caused by the expansion of productive activities, mainly those related to the sugar industry, in the 20th century, in the three countries, degradation responded to population growth and it's spatial distribution. Also it can be attributed to productive processes necessary for economic sustainability of rural and urban populations. In this regards we must mention the growing importance of the informal productive sector, in the Dominican Republic. This sector represents the most important economic activity and which probably has an important and varied impact on the environment. In the particular cases of Cuba and the Dominican Republic the tourist industry is one of the most recent environment degrading activities, specially where the tourist activity is carried out in marine coastal areas. Other productive activities with important negative impacts on the environment, specifically in the Dominican Republic are agro industries and pharmaceutical industries.

The urbanization process in the Dominican Republic has also had an enormous impact on the environment. This process which started to accelerate from 1960 to 1970 increased internal rural urban migration. Up until 1981 the population in the Dominican Republic was predominantly rural. From then on the urbanization process has been on the increase, characterized by a lack of planning, of policies and the consequences of this, the marginalization of the population. Santo Domingo, the capital city and the largest urban center, has 70% of it's population lacking in basic services. The lack of territorial planning has increased not only he degradation of the environment but also the appearance of new human created hazards, and the construction of new risks. (Meyreles 2001; unpublished)

At the beginning of the 21st century, Cuba, Haiti and the Dominican Republic present an environmental profile characterized by the extreme deterioration of their environment. The three countries present serious problems with their cultivated lands, fresh water sources and forests. In Haiti desertification is acute, and this is also a preoccupation for Cuba, where 60 percent of the territory confronts different degrees of desertification. More so, 69 percent of Dominican territory is also being affected by the same problem. An explanation to this problem can be found without a doubt in certain productive practices, which as the *2nd National Report of the Dominican Republic on the Implementation of the Convention against Desertification and Drought (2002)* states are associated with "...bad soil management, inadequate agricultural practices, deforestation, migratory agriculture, over pasturing and inadequate uses of water..." Despite the unquestionable degradation of the natural resources in Cuba, Haiti and the Dominican Republic it would seem that there is hope of improvement in this field, as CELADE indicates, when the center states that in Latin America "... the fall in population growth has decreased an important source of the pressure on ecosystems and public resources". (CELADE, 1995)

Environmental policy has specific characteristics in each of the countries. Although there have been advances in awareness of the need for policy making in this area, and the fact that a legal framework has been created, in the Dominican Republic and Haiti, there is still a lack of capacity to implement it. The fact that environmental degradation is on the rise in certain areas, shows us that this is the case. Our survey and in depth community interviews tell us this clearly. There is a lack of education, improvement of legal framework, and country specific policies that can deal with specific needs of each of the countries.

3 The Disaster Framework

The topic of disasters gained importance during the second half of the 20th century mainly due to the fact that there has been an increase in the activity of phenomena that cause what are classified as disaster situations: situations of loss of lives and of material loss. Although there are different methodologies to define when a situation of loss is a disaster, the fact is that these situations have been on the increase.

New perspectives in the study of disasters have shifted the traditional explanations and views stemming from the natural sciences where a disaster is analyzed as the physical phenomenon which causes situations of loss, and where focal points of interest were solely related to the specialized analysis of the phenomenon itself. The participation of the social sciences in this field, specifically geography, sociology, anthropology, psychology, environmental sciences and more recently economics has resulted in a different perspective for the comprehension of disaster situations, a perspective which has greatly enriched the field and which has produced important amounts of data. New perspectives accentuating vulnerability, specifically social vulnerability (social vulnerability approach) are becoming dominant.

Disasters are understood through the analysis of various basic concepts. Hazards, the natural or anthropogenic "phenomenon" "which are susceptible of generating a disaster" (Wilches-Chaux: 1998), are not disastrous unless combined with vulnerabilities: "the condition in which a population, can be, or is in danger of, being affected by a hazard of natural or human origin". (Wilches-Chaux: 98; 43) These two conditions generate risk, "the probability of the occurrence of disaster. Risk = hazard x vulnerability"(Ibid; 54). There is disaster when the "risk becomes manifest". (LA RED). The analysis of disaster situations as risk generated and the consequent interest in understanding risk in order to propose ways of managing risk situations and avoiding disasters, has given much importance to the variable of vulnerability.

Throughout the last 20 years, the literature has grown and the importance of the topic has been recognized not only by academics but fundamentally by governments, international organizations and development organizations. The fact that yearly the world is faced with situations which will imply great losses which will affect in important ways their development processes and the investments made in these processes, is beginning to have an important impact on decision makers and financers of development. The fact that these disaster situations will affect different populations in different ways is impacting the way academics study the problem, the way development organizations act and the way funders and financers of development design development projects and the way governments implement them.

Gender and Disasters

Research has shown that as in social life in general, where gender is a fundamental organizing principle, so it is in disaster situations. (Enarson, Morrow, 1998) Traditionally, this aspect of disaster situations was not taken into account in any of the disaster phases, but the afore mentioned new approaches to disaster analysis, the social vulnerability approach for example, has made it mandatory to include a gender perspective in every aspect of disaster work and study. Despite this growing awareness, research shows that in most parts of the world, a gender perspective in disasters is lacking (Enarson and Meyreles, 2004). Gender differences put women and men at risk in different ways. The fact that there is a tendency for women to occupy a lower status in society, tied to specific roles, make women vulnerable in specific ways. There is then a tendency for an increase in women's risk. Domestic and care giving roles tend to place women under certain types of risks during disaster situations. (Enarson: 2005) Cultural and ideological factors will greatly influence women's capacity to prepare, respond and recover from disaster situations. But, research also shows us that these status and roles generate gender specific capacities which need to be considered also. These need to be recognized, used and allowed to be a vehicle for women's empowerment.

The most recent international forum where the disaster topic has been discussed was the United Nations World Conference on Disaster Reduction in Kobe, 2005. Topics discussed and main conclusions help us to see where we stand. The analysis of the causes of disasters, "as result of development processes gone bad" (Wisner, Walker: 2005), the impact of economic globalization, conflict and urbanization, climate change and environmental change are some of these topics. The analysis of response considering different actors involved and possible ways of action and partnerships helped to develop a framework for action that reflects what has been mentioned above: the importance of attention and action in the disaster area due to the increasing impact of disasters on developing countries, and the maintenance of living standards in the developed world. (Wisner, Walker: 2005)

The Caribbean

The Caribbean region is one of the world's most vulnerable regions regarding natural disasters due to the fact that the region is geographically situated in a multiple hazard zone. In the path of the hurricanes which originate off the coast of West Africa and move west during the months of the hurricane season, June to November of every year, the Caribbean basin is also formed by major tectonic plates, whose continuous movement has been the cause of many earthquakes throughout the region's history. The geological formation of the region includes a sub region of

islands of volcanic nature, in which volcanic cones are abundant. (Watts:92) Some of these have been and still are active.

The insular Caribbean, formed by small island developing states, SIDS, is a unique and complex ecosystem, each island with particularities of its own. The Caribbean has had a unique history in " which the relation of environment, its cultural interpretation and ways and methods of development " has impacted greatly in an environmental degradation process (Watts: 92,22). This process has created particular vulnerabilities, which have been diversified due to the rise of new anthropogenic hazards during the last decades of rapid growth and urbanization. Vulnerabilities have increased and these characterize the region regarding disasters.

The increase in risk scenarios and disasters has had an important economic impact in the region. Different studies from different perspectives have shown this (Eclac La RED). Economic Council for Latin America and the Caribbean has developed specialized methodology to assess socio economic impact of disasters and for the last decades has carried out assessments in the Caribbean region. These have shown that, for example, from 1972 to 2001 the total losses due to disasters in the Caribbean region were calculated in millions of dollars at 50,365. (ECLAC, 2001,153) Of these costs, 2,193 million dollars corresponded to the Dominican Republic during that time period, with the passing of Hurricane David in 1979, (118 million dollars) and Hurricane Georges in 1998 (2,193 millions of dollars). Eclac: 2001,153).

Other methodologies, which include the analysis not only of the passing of major natural phenomena such as hurricanes, but the daily damages and losses caused by small every day "disaster" events, or "micro disasters" (LA RED) estimate that there might be the possibility of greater economic impact from these small occurrences. These daily events, caused by "development processes gone bad" which have accentuated vulnerabilities, thus increasing risk scenarios in which traditional hazards and new hazards, such as anthropogenic ones, interact with vulnerabilities of different characteristics. The Red de Estudios Sociales para la Prevención de Desastres de America Latina, LA RED, and the Latin American Social Science Faculty (Flacso) DR Program, created a data base for the Dominican Republic for their Desinventar , disaster inventory data base for the region, analyzing small events from 1960 through 2000. This methodology proposes a different conceptual view and the analysis of other variables such as the informal economic sector, among others. We have given this perspective an important role in our research and this has helped us to "see" aspects of disaster situations at the micro local level. This has influenced our use of qualitative methodologies which are the only ones capable of producing data at this level.

Haiti and the Dominican Republic: disasters and risk scenarios

The Dominican Republic and Haiti, two countries which share the island of Hispaniola have at the beginning of the 21st century very divergent environmental conditions and are subject to the same natural hazards, although their histories and political and economic situations have created diverse anthropogenic hazards and diverse multiple vulnerabilities which manifest themselves in different ways.

Cuba, which has a different historical and political process, is also subject to the same natural hazards, and its vulnerabilities reflect its development situation . Cuba has developed a disaster management process in accordance with its national security program, which has guaranteed successful management of disaster situations. The rest of the Caribbean, especially Dominican Republic, Jamaica and Haiti, have in Cuba an important model.

For our research we have chosen communities which could help us analyze different types of events typical to the region, looking into each countries' disaster history. We want to see hazards and vulnerabilities, the impacts, and also aspects of disaster management, capacities and the strategies implemented by communities to survive. We also wanted to choose cases which would help us see the relation between degradation processes or development processes and disaster risk construction.

In this respect we chose to analyze the case of Hurricane Georges 1998, in the Dominican Republic, in the community of Tamayo, the case of the 2004 floods in Haiti in the community of Fonds Verrettes, and to analyze the 2004 hurricane season and how Cuba managed the impact of major hurricanes in its territory.

3.1 Dominican Republic and Hurricane Georges; Haiti and the flooding of May 2004 ;Hurricane season 2004 in Cuba Dominican Republic

The hurricane season of 1998 was an active one, in which 9 hurricanes affected the region and the island of Hispaniola (ECLAC: 98). Of these, Hurricane Georges, a 2-3 category hurricane on the Saffir Simpson scale, which hit the Dominican Republic on the 22 of September in the morning, entered the city of Santo Domingo at approximately 3:00 pm local time. It seriously affected the southern part of the country and moved west to Haiti near midnight. (Meyreles 2000) The effects of the hurricane were diverse and devastating: 235 deaths, millions of dollars in damage and losses in diverse sectors such as agriculture, important infrastructure, such as bridges and roads and housing, and basic services and varied ecological damage. (Eclac in Meyreles 2000).

Most of the 235 deaths occurred in the provinces of the southwestern part of the country, San Juan de la

Maguana, Azua, Bahoruco and Barahona. These are the poorest provinces in the country. The community of Tamayo is situated in this region, on the border of the Yaque del Sur River. The Yaque del Sur River, is the country's second largest river, 141 kilometers long. This River flooded, seriously affecting thousands of homes, and productive activities in the region. (Meyreles,2000). "Hurricane Georges came to show once more, that there is an intimate relation between development and disasters; the weaknesses of the Dominican political system, and of it's economy, explain why the Dominican Republic had the highest number of deaths of all the countries through which Georges passed. Many reports showed surprise at the large number of deaths of young boys and girls." (Meyreles,2000)

Economic losses were felt mainly in the sectors of agriculture, manufacture and industry, commerce and tourism. (Eclac in Meyreles,2000)

Social sector damages and losses were as follows, according to Eclac evaluation of the Hurricane.

Sector	Damage In thousands \$RD	Reconstruction Costs
Education (includes churches, sports recreational and community centers)	1,031,497 thousands of \$RD	2,252,684 in thousands \$RD
Salud	331,167 thousands \$RD	353,601 thousands \$RD
Vivienda	171,000 Millions \$RD	7,999 Millions \$RD
Transporte Telecomunicaciones	5,225.7 millons \$RD	
Energía	1,333,547.1 thousands \$RD	900,509.6 thousands \$RD
Acueductos Alcantarillados	155,575.09	263,478.16
Sistemas de Riego	90,480.0 millons \$RD	76,760.0 Millions \$RD

Source: ECLAC: 98 in Meyreles, 2000.

Envriionmental damages affected a total of 6,796 square kilometers of protected environmental areas. (Eclac in Meyreles 2000) Regarding damage to forests in protected areas, an average of 40% to 52% of forest cover was affected in the country. Damage in environmental services in protected areas amounted to 2,848 millions \$US. (Ibid, 2000).

Haiti and the May 2004 Floods

Haiti is a country that shares the Island of Hispaniola with the Dominican Republic. Haiti's disaster history is dramatic. Sharing hazard conditions with the rest of the Caribbean, it's socio economic characteristics and political conditions past and present, make it the most vulnerable of the Caribbean countries. The levels of poverty in Haiti estimated at 76% for general poverty and at 55% for extreme poverty (Gilbert:2004) are extreme in themselves. This along with political instability make disaster situations much more probable as Haiti faces multiple natural and human produced hazards, specifically those related to environmental degradation. The World Disasters Report of 2005 mentions that Haiti has lost around 17,000 persons in hurricane caused disasters (only) in the last 60 years. (Wisner, Walker:2005, 50).

Ricardo Zapata, disaster specialist for ECLAC, signifies the fact that the Island of Hispaniola had a large number of deaths in 2004 due to flooding disasters and Hurricanes (Jeanne), but emphasizes that Haiti has the worse conditions, "given its environmental degradation and island wide inappropriate watershed management." (Zapata:2005;5) Referring to the damage caused by Hurricane Jeanne in Haiti, months after the flooding of May of the same year, Zapata mentions again the conditions in Haiti which make "consequences particularly severe in human terms" (Ibid; 34). This is "associated with the levels of poverty and inadequate social, economic and physical infrastructure" and "as a result of a long standing environmental degradation". "In actuality this degradation is the main contributing factor to the disaster..." (Ibid)

Zapata mentions the flooding of 2004 in Haiti and the Dominican Republic as part of the top ten tragedies of 2004 by number of deaths. Haiti occupies the 3rd place on his chart for the flooding with 2,665 deaths and the

Dominican Republic the 6th place with 688 deaths for the same period of flooding. (Zapata:2005,5)

The area affected by the May 2004 floods is "one of the most severely drought stricken regions in the world, where years of deforestation and desperate slash-and-burn farming have left the land without trees" to hold the soil. (Murray: 2005) the compacted soil cannot absorb the water and when the rains sweep through gullies, it washes out roads and floods towns." (ibid)

"The devastating rise of the Solliette-Blanco river, is considered one of the worst disasters in the Caribbean, which caused thousands of deaths (in both countries) due to the fact that the great mass of water that descended the mountains destroyed housing, service infrastructure, agriculture and other in the Haitian town of Fonds Verrettes and on the Dominican side in the town of Jimaní." (Marte et al, 2004) The region which was affected by the excessive rainfall is part of a complex system, with accidental terrains that can rise up to 2,700 meters. This includes the chain of mountains of La Selle in Haiti which is the continuation of the Sierra de Bahoruco in the Dominican Republic. The sierras and ranges are deforested in 90% up to the frontiers where the forest cover rises on Dominican territory" (Cocco Quezada: 2004) There are a large amount of dry river beds which are capable of retaining a large amount of water in this region...this is the case of Mapou and Fonds Verrettes. This town is located in a valley between the mountain chains of La Selle and the Dominican frontier, on the course of the Soliette river. It has a population of about 445,000 dedicated to agricultural activities, with houses built on the dry riverbed." (Ibid) Dams cause water to flow at great pressure. Military and civilian personnel who attended the emergency in Fonds Verrettes mentioned that there were many of these and that they aggravated the level of flooding, carrying with them mud and destructive debris." (Ibid). It is mentioned in these reports that there was a similar situation during Hurricane Georges in 1998, when many people died in this same area. During the march flood 247.8 millimeters of water fell on the Soleitte River (Rio Blanco in the Dominican Republic side of Jimaní) watershed, in less than 24 hours. This caused a flood of water that surpassed " 1,000 cubic meters per second in the speed of it's flow"(Data produced by the INDHRI, DOM REP, cited in Herridge,2004). This implies according to the same authorities, a type of extreme flooding which can be expected in this type of area every 100 years.

At the time of the flooding, the Asociación Dominicana de Mitigación de Desastres from the Dominican Republic, along with Haitian civil protection authorities, national and local, visited Fonds Verrettes and were given a description of the event in which it is clear that "...the rains started 2 days before, and that after a brief stop, re initiated heavily until the night of the flooding. By 12:00 pm the community started to move. By 2 :00 a.m. the town was flooded in 2 meters of water, the whole town was washed away including buildings such as the Catholic church, and 546 houses. This is not the first time this happens. (Hurricane Georges seems to have caused the rising of the river also),although it is the first time it is so extreme and occurs outside of the Hurricane season. People mentioned there was no wind."(Herridge: 2004)

In the Dominican Republic, the tragedy was similar, except it occurred in a bigger town, Jimaní, wiping out various sectors, killing many. The debris from Fonds Verrettes was swept by the Soliette River into the Dominican Republic. There it ended it's journey in the Lago Enriquillo, that is nearby Tamayo. The 293 dead, recognized by the community of Fonds Verrettes (Herridge,2004) were part of the deaths caused by this extreme flooding. There were also 900 bodies of Haitians who had been living without documentation in the hills between Jimaní and Fonds Verrettes.

The World Disasters Report of 2005 mentions the flash floods of may 2004 in Fonds Verrettes and states that "officially, 1,191 died, another 1,484 are still reported missing". (Wisner, Walker: 2005;50).

Cuba and the 2004 Hurricane Season

The 2004 hurricane season in Cuba, ".proved...how effective it is in protecting human life from the worst of the weather". (Wisner, Walker; ibid , 41)

Cuba during the 2004 Hurricane season was hit by 2 major hurricanes: Charley in August and Ivan in September. Homes were very damaged and "2 million people were evacuated " during Ivan (Ibid) but there were only four dead with Charley and none with Ivan. The rest of the major Antilles, Jamaica, Dominican Republic and Haiti, can see in Cuba a model for emergency management.

The 2005 World Disaster Report emphasized the importance of information and its management for successful emergency and disaster managing. In the case of Cuba, differently from Haiti and the Dominican Republic, meteorological information has been upgraded and efficiently produced and given out for many years. Cuba's meteorological institute has 15 provincial offices and closely tied to television and radio, it " alerts the population 72 hours before a storms projected landfall"(Ibid). The local organization of Cuban communities allows for rapid set up of shelters and evacuation by civil protection committees.

The Cuban legal system includes norms for emergency situations and as the World Disaster Report tells us, " in

Cuba, evacuation orders are mandatory- an important distinction from neighboring countries". Resources are available, through the state, to materialize evacuation, equipment of shelters, handling of very vulnerable populations and community organizations, such as the Federación de Mujeres Cubanas play major roles in making procedures efficient.

Shelters are well equipped and even specialized, for example for pregnant women. Hospitals, schools public buildings are used as shelters. And community organization is efficient enough to register vulnerable people at the neighborhood level, people who need special attention. The coordination between small neighborhoods and the national government works efficiently.

Cuban schools teach about disasters and emergency management, and since the majority of the population has access to education at all levels, the population can be considered to be well educated. This is a major difference with the other two countries in our study.

Cuba has an emergency and disaster management which is based on a legal system which supports it, national, provincial, municipal and neighborhood organized system which works, Civil protection committees which along with other local organizations effectively set up all necessary resources, production and efficient use of highly sophisticated technical information which is efficiently given out and wise and efficient use of local empirical knowledge of the population. It has an efficient educational system which allows for a population who is capable of interpreting and using information to its advantage.

3.2 Hazards, vulnerabilities and risk: the cases of Tamayo and Fonds Verrettes

Community descriptions

Fonds Verrettes

Fonds Verrettes is a municipality of the Western Department situated in the frontier axis, not very far from the Dominican Town of Jimaní. It is a predominantly mountainous area and its population is estimated at 29,567 inhabitants, 50.72% of which are women. The population under 18 years of age is estimated at 17,272 inhabitants, 58.44% of the total inhabitants. Fonds Verrettes has a population density of 117 /Km². It is located not far from the municipality of Ganthier in the National Highway No.3. This Highway leads from Port au Prince to Jimaní in the Dominican Republic.

Fonds Verrettes is a part of the pine forest reserve, Forêts des Pins, one of the largest forest parks in Haiti, which due to the extreme activity of the cutting of trees in an exaggerated manner is on the road to being deforested. Fonds Verrettes is located on the borders of a small river, surrounded by mountains. The river, Soliette, was the river which flooded in 2004 up to a distance of 500 meters. This totally transformed the town in a field of stones. Fonds Verrettes is 40 – 50 kilometers from Port au Prince.

Tamayo

This is one of the largest municipalities (341 kms²) in the Dominican Republic, although with a low population density (29 hab/kms²), its total population is 9,8985 inhabitants. From the economic view point Tamayo depends on agriculture, mainly the cultivation of the "platano" plantain, whose production is based on irrigation. Tamayo's climate is dry due to little rainfall during the year.

The municipality of Tamayo is bordered on its southern side by the Yaque del Sur River, which is the key to its dynamic agricultural activity, but also the cause of its disasters.

Tamayo and Fonds Verrettes : Empirical research results

1 Characteristics of the population, households and housing

Heads of Household In the two countries 55% of the interviews were carried out on male heads of households, 29% were women heads of households, and 16% of the interviewed were spouses (wives or husbands) of heads of households.

Population characteristic in households: Regarding the population, the basic characteristics of the homes that were studied is that they are composed of a high number of persons. In Tamayo, 52 percent of the homes studied are made up of six or more persons, while in Fonds Verrettes this same amount of people is found in 63 percent of the

homes.

Sex and Age Regarding the distribution of the population found in interviewed homes in age groups and by sex, it can be said that 9% of the total of homes have no men, this percentage being higher in Tamayo where it is 12% and in Fonds Verrettes 9%. The proportion of households without women is 8% in Fonds Verrettes, slightly higher to that of Tamayo (6%).

Most households have only one male, 59%, a tendency which is more marked in Fonds Verrettes (66%) than in Tamayo (52%). Regarding the amount of women, the 59% of the households there is only one woman, the difference between both communities in this regards is small.

Regarding underage population and sex, in 22 percent of the households there were no boys (28% in Tamayo and 16% in Fonds Verrettes), while 27 percent of the households have no girls in them (34% in Tamayo and 20% in Fonds Verrettes). The majority of homes (62%) are conformed by 1-3 boys (slightly inferior in Tamayo – 60% with respects to Fonds Verrettes 64%). The majority of girls in homes are in the 1-3 year age group, and this proportion is slightly superior in Tamayo (60%) than in Fonds Verrettes (58%). The population of elderly men and women is very low in the households under study. In the case of elderly men only in 11% of the households were they present while elderly women were present in only 10% of the households. In Tamayo, 94% of the households are without elderly men, and 96% of the surveyed households are without elderly women. In Fonds Verrettes elderly people in households are more frequent, and 84% of the studied households' composition included the elderly.

Education : The surveyed population in Fonds Verrettes regarding education gives us information which probably represents the general situation at the national level: 30 percent of the interviewees had no formal education. Of the 70% that did have formal education, 76% had not gone beyond the 6th grade. In Tamayo, of the population which had formal education, 62 % did not have more than a sixth grade education.

Place of birth: The majority of the interviewed persons are originally from the respective communities where they live, in Tamayo 74 per cent and in Fonds Verrettes 56 per cent were born in these communities. The causes of migration to both communities have resulted to be very ample; the principal one in Fonds Verrettes has been marriage and /or union (27%), economic reasons (22%) and in equal proportion, studies. In Tamayo the principal cause for migration to the community has been studies (23%) and then in equal proportion (15%) the family, marriage and /or union and economic well being.

Civil Status: A great majority of the interviewed persons are married or are united; In Fonds Verrettes marriage relationships prevail (64%) while in Tamayo union by consensus prevails (46%). In reference to the permanence of the marriage or union, in Tamayo 70 per cent of married persons or persons living in consensual unions are at the moment living with their partners, and in Fonds Verrettes this is the case in 66 per cent of married couples.

Offspring

With the exception of one case in Fonds Verrettes, all the rest of the interviewed persons have children. The largest number of male children per household was 9. In Fonds Verrettes in 2% of the interviewed homes this was the case. The largest number of daughters per surveyed household is 7, this for 4 per cent of the population of Fonds Verrettes. In Tamayo 72 per cent of the persons with sons have from one to three, while in Fonds Verrettes 63 per cent has the same amount of sons. Regarding daughters, 78 per cent of the surveyed persons in Tamayo have between 1 and 3 daughters, but in Fonds Verrettes only 49 percent have from 1 to 3 daughters. Thirty nine percent of the surveyed persons have between 4 and 7 daughters. Sons are no longer living in 18 percent of the surveyed homes in Tamayo and in 26 percent the daughters have gone. In Fonds Verrettes, in 12 percent of the homes the sons have gone and in 31 percent of the homes the daughters have gone.

Housing

In both countries, 30% of the families have been living in the same homes were they were interviewed for 10 years or less. There are some differences between the countries: in Fonds Verrettes the population has been living for less time in the same houses than in Tamayo. Thirty four percent (34%) of the inhabitants of Fonds Verrettes have been living less than 10 years in the house were they were interviewed, in Tamayo this percentage is 24. In Tamayo 62% have been living in the same homes 20 or more years, while this is the case for 54% of the residents of Fonds Verrettes.

Type of housing Almost the totality of the houses where the population under study resides are built independently, that is the houses are not multifamily structures (94% of the cases). In Tamayo this proportion is more accentuated (98% of the cases) than in Fonds Verrettes (90% of the cases).

Roofing

In a high proportion of the houses the roofing is made of zinc sheets (87%), this material being more commonly used in Fonds Verrettes (94%) than in Tamayo (80%) where 14 % of the houses have concrete roofing.

Walls

In Tamayo 62 percent of the houses where surveys were carried out, are constructed with walls of cement blocks, while in Fonds Verrettes only 40% of the surveyed houses have this material. In this community 42 percent of the houses are constructed with a material as resistant as cement blocks, stones. These houses have sprung up in the community after the disaster of 2004, with the help of international programs.

Floors

The predominant material for floors in the houses studied is cement, in 92% of the cases in Tamayo and 87% of the cases in Fonds Verrettes. In Tamayo, there are few houses with dirt floors (4%) while in Fonds Verrettes this material is present in 14% of the houses. Conditions of the houses according to the evaluation the interviewees made of their own houses, 58% of the houses are new or are in very good condition in Tamayo; in Fonds Verrettes, this is the case for 46% of the houses. The rest of the houses have problems with the quality of their roofing or their walls.

Number of rooms per house

The number of rooms per house: in the case of Tamayo there are 3-5 rooms in 80% of the houses, while in Fonds Verrettes only 54% have this same amount of rooms. In this last community 32% of the houses have one or two rooms, while in Tamayo this percentage is 14. It is important to point out that in Fonds Verrettes there is 14% of houses with 6 or more rooms, while in Tamayo this is the case for only 6% of the houses.

Number of bedrooms

In Tamayo (64%) as in Fonds Verrettes (60%) the majority of the houses surveyed have one or two bedrooms. The same proportion of houses, (36%) in both communities have from 3-5 bedrooms. In Fonds Verrettes 4% of the homes have six to seven bedrooms.

Kitchens

The kitchen as a space within the home is more frequent in the houses in Tamayo (84%) than in Fonds Verrettes (66%).

Economic Characteristics of the Families Labor and Occupation A high proportion of persons interviewed do not have stable employment, 96 percent in Fonds Verrettes and 76 percent in Tamayo, where 91 percent of the employed work for the state. The employed population in both communities earns very low wages. In the case of Tamayo, 41 percent of wage earners perceive monthly salaries under US\$100.00; another 25 percent earn wages below US\$200.00 a month, so only 34 percent earn monthly salaries above US\$200.00, and none above US\$310.00 a month.

Among the employed, only 24 percent had paid work during the week before the survey in Tamayo, while only 18 percent found work in similar circumstances in Fonds Verrettes. The type of work predominant amongst these persons in Tamayo is occasional (33%), street sellers (22%) and technicians (22%). In Fonds Verrettes 66 percent of those that had worked for pay the week before had worked in construction. Most of these jobs generated very low wages. The top salary in the week was US\$36.00. In Fonds Verrettes 57 percent of those who received pay barely made US\$ 10.00 a week. This type of work is the principal economic activity of people in Tamayo, in 89 percent of the cases and in 44 percent of the cases in Fonds Verrettes.

Unemployment within homes amongst couples is a grave problem in both studied communities, although much more grave in Fonds Verrettes, where 95 percent of spouses (husbands or wives) are unemployed. In Tamayo, 84 percent of spouses are unemployed.

Equally, there are few spouses that had some kind of paid work the week before the survey. In Fonds Verrettes, only 7% , and in Tamayo 21 percent. In Tamayo the type of work carried out was in agriculture, construction, painting, and other occasional activities. In Fonds Verrettes the type of work that spouses did was in construction and education. The levels of income of these persons were also very low, the highest did not surpass US\$36.00 a week, the average being US\$17.00 a week. In Tamayo, 67 percent of the persons have carried out the same type of work within the last year, while in Fonds Verrettes, 33 percent has done the same.

Migration

In Fonds Verrettes in the majority of homes people have migrated in the last 12 months. The majority of this emigration (76%) left for the capital Port au Prince and in a less percent outside the country. In Tamayo emigrants were registered in 10 percent of the homes. Their movement was oriented in 60 percent outside the country and the rest to the capital city, Santo Domingo.

Agricultural Activities

Almost the totality of the interviewed persons in Fonds Verrettes (94%) owns a plot of land, while in Tamayo this is so for barely 28 percent. Likewise in the Haitian community, in 74 percent of the homes other members of the household also possess a plot of land. In the Dominican community only 14 percent of the homes are in the same condition. In Tamayo 32 percent of the interviewed persons has planted crops, in their property. Contrary to this in Fonds Verrettes, 72 percent has planted crops in their property. In Fonds Verrettes there is also 34 percent of the

homes in which other members of the household also have planted crops, while this only occurs in 12 percent of the surveyed homes in Tamayo.

Social Organization

The studied population in both communities present a high level of community organization, to a point where in Tamayo 72 percent of interviewed persons said they belonged to a community group, while in Fonds Verrettes 52 percent gave the same answer. The types of groups to which these persons of both communities belong is vary varied. In Tamayo the majority (52%) belongs to religious groups, others to social groups (22%), or political groups (19%). In Fonds Verrettes, one can observe more integration to social groups (50%) and religious groups (31%).

Principal problems in the community

The risk of a natural disaster was considered the principal community problem by the majority of the surveyed population, although with more intensity in Fonds Verrettes (90%) than in Tamayo (66%), where the access to water was considered by 18% of the surveyed population as the main problem. In both communities almost all the persons understand that the solution to these problems is the responsibility of the central government (96% in Fonds Verrettes and 84% in Tamayo). More than 90 per cent of the surveyed population considers that these problems already existed in the communities in the past as far back as their grandparents' time.

Plans of continuing to reside in the community To keep on residing in the community is an undisputable fact for the residents of Tamayo, given that 90 per cent of them do not consider moving from the community. In Fonds Verrettes, the population thinks differently and 54% is planning to move, while only 40% is sure that they will not move from the community. In Fonds Verrettes the principal cause for moving would be the flooding and/or natural disasters and the proximity of the river (79%) and in Tamayo, the flooding and the disasters (75%).

2 Hazards, vulnerabilities and disaster risk

Pripode DO 1 Qualitative Data Analysis Thematic Matrix, Fonds Verretes Haiti

Most frequent themes per category

Category	Most frequent theme/ subcategory	Detail
Environmental Degradation	Forest	Deforestation was the most mentioned theme regarding environmental degradation. Mentioned an average of five times per interview.
Hazard Natural/ Anthropogenic	Flooding/Chemical	Includes mainly the river flooding, and flooding due to rainfall. Mentioned an average of 2 times per interview. Only one mention of the use of propane gas stoves and refrigerators as chemical hazard
Measures	Local	Measures: preventive, mitigation, reconstruction all taken at the local level by organizations and mainly in infrastructure: housing, contention wall. No mention of national authorities involved.
Vulnerability	Environmental	Mentioned an average of 7 times per interview

Gender Roles in disasters Women	Traditional roles	Women's activities around the home and family. Vulnerabilities and capacities
Men	Traditional	Capacities: requiring physical strength
Damages and Losses : Personal/family level	Productive/livelihoods	Loss or damage to business or crops
Community level	Social	Loss of social status. Mental health problems
Strategies	Relocation	Rebuilding houses on higher ground

In the case of the Dominican Republic, most of the interviews (when we refer to interviews they include focus groups) did not mention environmental degradation (ED). (This topic was not analyzed in the surveys) Only 4 interviewees mentioned environmental degradation problems, or referred to the topic. One was an elderly man who had been living in the community's surrounding area all his life and mentioned the differences he noticed regarding natural resources and the environment, specifically what pertains to the river, Yaque del Sur. Others

were persons related to institutions which deal with natural resources. The most frequently mentioned ED problem is climate change. Less rain was mentioned twice, drought, hot winds which did not exist before. The other ED subcategories all were mentioned with the same frequency, deforestation, "the smaller flow" of the river, the change in its course. The quality of the water, saline, was mentioned and the fact that there is no control of sewage water. Also the problem of solid wastes pollution in the town of Tamayo and in the Yaque del Sur river, were mentioned as problems caused by the degradation of the environment. There is probably a relation between the fact that there is flooding in the town, the accumulation of solid wastes and of sewage waters. It is most noteworthy though that most of the interviews, nine, (9 of 13) did not mention environmental degradation, or had nothing to say on the matter.

In the case of Fonds Verrettes, the amount of times that the topic of deforestation appears in the interviews, 20 times, shows the importance the community gives to this topic. Out of 5 individual interviews and a focus group, this frequency is very high. The topic is mentioned related to current disasters, such as flooding. It is also mentioned as a present phenomenon which threatens security. Deforestation is also mentioned as a cause for climate change, specifically changes in rainfall patterns, and the subcategory of climate change is mentioned 3 times. The other ED subcategories mentioned are, erosion, related to deforestation, problems with the soil, lack of productivity and over use of fertilizers.

Pripode DO 1 Qualitative data analysis

Thematic Matrix Fond Verretes Haiti

Category: Environmental Degradation

Sub Categories 1 Environmental degradation	Codes	frequency
Forest	EDF	20
River	EDR	—
Water	EDW	—
Erosion	EDE	2
Soil	EDS	3
Drought	EDD	—
Forest Fires	EDFI	—
Pollution (Trash)	EDPT	—
Climate change	EDC	3

There is an important difference regarding this topic between the two communities under study which may be indicative of attitudes which pertain to each country. The Haitian community of Fonds Verrettes seems to be very conscious of the environmental problem which their community and their country face. There are phrases such as, "the forest used to be dark around the community, it was so full of trees. Now it is not the same". These comments along with others demonstrate a negative perception of the future regarding the environment: the past was better than the present and the present is better than what the future will be. This shows a clear understanding that there is a degradation process going on. Also that this process is the cause of the increase in disasters, such as the flooding experienced in 2004. Both communities mention the lack of environmental policy (Dominican Republic) and of application of existing environmental laws,(Haiti).

Pripode DO 1 Qualitative Data Analysis Thematic Matrix Tamayo, Dominican Republic

Most frequent themes per category

Category	Most frequent theme/ subcategory	Detail
Environmental Degradation	Climate change	Changes in rainfall patterns. Only mentioned four times.
Hazard Natural	Flooding	Mainly river flooding and not due to rains but to mismanagement of the Sabaneta Dam. Mentioned in every interview
Anthropogenic	Infrastructure	Mainly the Sabaneta Dam was mentioned also the badly built contention wall

Measures	Local	Measures: preventive, mitigation, reconstruction all carried out at the local level by organizations and mainly institutional reform and capacity building. No mention of national authorities involved.
Vulnerability	Organizational	Emergency specific organizational aspects: lack of shelters and shelter management; lack of disaster /emergency information/early warning/lack of trained human resources, lack of material resources: life saving equipment etc., no disaster / emergency policy.
Gender Roles in Disasters Women/	Traditional role	Most interviews did not mention this Home and family related activities but seen as capacities. There was the mention of non traditional roles - related mainly to women's community organizations.
Men	Traditional	Activities requiring physical strength, seen as capacities: swimming to save others, carrying heavy objects.
Damages and Losses Personal/family	Material	All material possessions lost, damaged houses and businesses
Community	Material	Important infrastructure lost in the community: water, electricity
Strategies	Networks Material	Family, neighbors and friends networks which saved lives during the disaster, and for recovery took people in, gave shelter and food, international migrant networks sent money. Use of diverse objects and construction of objects to float , save material possessions, for example the building of "barbacoas".

Natural Hazards in the place of residence

Almost all of the surveyed population expressed feeling threatened by some natural phenomenon in their place of residence, more in Tamayo (98%) than in Fonds Verrettes (90%). The principal hazard that they fear is flooding. This was corroborated in the qualitative data analysis. Interviews, individual and in focus groups mention most frequently that the major natural hazard they face is flooding. In Tamayo, the Yaque del Sur River was identified as the principal danger of flooding and in Fonds Verrettes it was the Solliette River. In Tamayo and in Fonds Verrettes, the flooding hazard is related to rain fall and the flooding of the rivers of the communities, the Yaque del Sur in Tamayo, considered in itself a hazard, and the River Soliette in Fonds Verrettes. This was considered a hazard not only during the hurricane season, another hazard mentioned as the second most frequent hazard in both communities, but mainly flooding which occurs from rainfall out of season, "even in drought we have flooding". This is a hazard which the surveyed population in both countries understands affects the whole community. More than 90% of the surveyed persons in both communities understand that this hazard existed in remote times, as far back as their grandparent's generation, although a great proportion of them understand that in the present it has become worse. The totality of the surveyed population assured to have been affected by this natural hazard, the majority in 1998 in Tamayo and in 2004 in Fonds Verrettes. In both countries, the community members interviewed individually and as part of focus groups Other natural hazards mentioned are drought, strong winds in both countries. And in the case of Haiti interviewees mentioned the relation between flooding and deforestation and hazards and deforestation and flooding

Anthropogenic Hazards. Hazards caused by human action

The hazards provoked by human action, such as fires, explosions, etc. were valued in a very different way by both communities. In Tamayo 48% of the surveyed people considered that there is the danger of a disaster of this kind. The main hazard that people fear (92%) are fires originating in electrical short circuits. Also the risk of explosions was mentioned caused by the storage of substances, like gasoline. In Fonds Verrettes, on the contrary only 8% of the persons considered that this type of hazard exists in the community. In Fonds Verrettes the principal hazard caused by human action mentioned is deforestation.

History of disasters caused by human action in the communities

Disasters provoked by human action do not have the same histories in the two communities under study. In Fonds Verrettes, only 8% of the population recognizes that the community has been affected by this type of disaster, identifying only the problem of environmental degradation caused by deforestation. In Tamayo, differently, 78% of the population indicated that the community had been affected by this type of disasters, identifying fires caused by human carelessness (56% of the cases) and fires caused by electrical short circuiting (44% of the cases) as the main hazards.

Regarding anthropogenic hazards, qualitative data from in depth interviews and focus groups show that in the Dominican Republic this was frequently mentioned, specifically the fact that the interviewees consider that the Sabaneta Dam, upriver from them, is a dangerous hazard for their community. They consider this dam, and its management to be a very important, if not the main, cause of the disaster after Hurricane Georges in 1998. They also view this hazard as a "man made" or anthropogenic one, specifically mentioning the fact that it is not well managed and that it is a danger to them even "when there is a drought". Another anthropogenic hazard which we have classified as an infrastructural hazard along with the dam is a contention wall, which the community considers to be a danger to them, specifically to the section of Uvilla. The contention wall, built after Hurricane Georges as part of the reconstruction and prevention of future disasters measures, was left "unfinished" and was badly designed according to interviews due to "corruption of the engineers responsible". This wall now endangers a part of the community of Tamayo and the section of Uvilla because it concentrates the flow of water towards those sectors. Another anthropogenic hazard mentioned but only in one interview, is the high chemical concentration in the soil due to the unregulated use of pesticides and fertilizers in farming.

In Haiti the cutting of trees was considered an anthropogenic hazard, a perspective which is not present in the Dominican Republic. Besides that only one interviewee mentions the use of propane refrigerators and stoves as a danger due to the fact that they have gas escapes. It was mentioned that the fact that they don't have electricity could be a safety asset, since there is no danger of electrical caused hazards as are often seen in the Dominican Republic.

Disaster and disaster management

Both communities were victims of disasters caused by the hazards they mentioned have existed in their communities for a long time. These were Hurricane Georges, which hit the country in 1998, and seriously affected Tamayo as we have seen, and the 2004 flooding in Haiti that seriously affected Fonds Verrettes. Our surveys and in depth interviews detail how these events affected the communities and how they reacted.

Measures:

Measures have been subcategorized as pertaining to prevention, mitigation, emergency, recovery/reconstruction and risk management. Also we tried to analyze if the measures were carried out by international, national, local organizations and or authorities and what specific actions were carried out.

Disaster Warning

The gathered data indicates that in neither of the two communities the population was warned about the possible occurrence of the disasters that affected them. In Fonds Verrettes, in 100% of the surveyed households it was assured that the flood of 2004 surprised them. Equally, in Tamayo in 82% of the surveyed households it was said that they also were surprised by the flooding in 1998 after Hurricane Georges.

Recovery

In Fonds Verrettes, 98% of the families said that they received help after the disaster that affected them, while in Tamayo 22% said that they received no help.

For the majority of the families that received help in Tamayo (64%) the help was considered very good or good. In Fonds Verrettes, the same value was given by 55% of the interviewees; the rest of the persons qualified the help received as regular.

Fears of the repetition of another similar disaster in the future

Very few of the surveyed families in both communities doubt that there will not be a repetition of a similar disaster as that which affected them in 1998 and in 2004 respectively. In Tamayo, 88% of the surveyed population fears the repetition of the disaster, while in Fonds Verrettes this percentage rises to 94%. Regarding attitudes towards authorities, in both communities the majority of the surveyed population (72% in Fonds Verrettes and 68% in Tamayo) think that the local authorities in their respective City Halls, do not worry about the occurrence of another similar disaster, meaning that they are not taking any measures in this respect. In Tamayo, the few persons that consider that local authorities do worry about the occurrence of another disaster like the 1998 one consider that this is reflected in the fact that authorities alert the population (37%), and also due to the fact that authorities are also a part of the local community (25%). In Fonds Verrettes this last argument was also mentioned by the same proportion of persons.

The persons that contrarily think that the local authorities are not concerned that another disaster can be

repeated, base their opinions on a wide variety of ideas. In Tamayo the opinion most shared (22%) is that the disinterest of the authorities is evident in the fact that the contention wall for the river (an important community project with international funding) was left unfinished. In Fonds Verrettes the most shared idea (33%) is that the municipal authorities do not resolve anything or take any measures to avoid the repetition of the tragedy.

There were also questions in the survey which referred to the concern of **national** authorities in relation to the repetition of another disaster in the future. The answers to these questions were more positive, since in the case of Tamayo 66% of the interviewees consider that government authorities at the national level are concerned that such an eventuality could happen. In Fonds Verrettes 46% are of the same opinion. In both communities there were varied opinions to demonstrate the interest of the central government in the topic of disasters. In Tamayo 24% of the persons interviewed spoke of the construction of the wall or the interest of the government to finish this project. Another equal percentage was of the opinion that the government is concerned with the problems of the community. In Fonds Verrettes the opinions were different, 17% considered that the central government is concerned because the flooding is not good for the country, while 13% said that despite the fact that the central government is worried, it has no economic resources to confront a disaster occurring in the future.

The most affected persons in a future disaster

The opinions about which would be the most affected part of the population in a future disaster in both communities the poorest was the most given answer. The elderly, boys and girls and people with discapacities were also mentioned.

Needs of the communities regarding disasters

In both communities there exists practically a consensus on the construction of certain projects for natural disaster prevention. The difference lies in the type of construction projects. In Fonds Verrettes the population waits essentially for the construction of housing ((33%), shelters (20%), or the moving of the community to another place (16%). In Tamayo there exists a marked interest in the intervention of the river (59%), through the construction or termination of the contention wall; the dragging and channeling of the river and the construction of a dam.

Qualitative data analysis corroborates survey data. In the Dominican Republic, as well as in Haiti, it was considered that the national government did nothing during the different phases of Hurricane Georges and the flooding that occurred afterwards, and the flooding in Fonds Verrettes. The actions carried out at different phases were all at the local community level and by local authorities in the case of Haiti, and local organizations in the case of the Dominican Republic. . It is clear that the flooding which caused death and damages was caused by the opening of the Sabaneta Dam and the lack of information or misinformation that the community was the victim of. The interviews clearly show that there was an intent to prepare for the Hurricane, that there was information regarding the Hurricane, but that there was no information regarding the flooding that occurred afterwards, when the dam was opened and that this caught them by surprise.

Measures mentioned include, mostly post disaster efforts to reconstruct with the participation of existing community organizations and the creation of new ones, as well as the intervention of international agencies in different actions such as acquisition of resources to rebuild, new projects for early warning and other prevention activities. Most important was the creation of the Civil Defense and the institutionalization of the Red Cross after the Hurricane. Regarding reconstruction, there was the building of the contention wall, now considered a hazard. There were also capacity building activities. Regarding prevention and mitigation, interviewees mention few of them, that shelters were prepared but that these flooded, since the flooding was not expected.

Pripode DO 1 Qualitative Data Analysis Thematic Matrix

Tamayo, Dominican Republic Category: Measures

	M	frequency
3 Measures Preventive , Mitigation Emergency Reconstruction, Risk Management		
National	MN	-
Local	ML	17
International	MI	-
Organizations	MO	12
Early warning	MEW	2
Shelters prepared	MS	1
Infrastructure*	MI	3
Capacity Building	MCB	3
Institutional reform strengthening	MIR	4

*includes contention wall and rebuilding of houses

In Haiti, pre disaster measures mentioned only include early warning. In this a local radio station played an important role but this was washed away with the flooding. The use of the conch shell for early warning was mentioned. This has been noticed in other research regarding disasters and natural resources in both countries. (Wisner, Walker: 2005; ecost 2006) .

Here also most interviewees mentioned reconstruction activities as the main measures carried out and these were mainly in infrastructure: the building of some new houses by international agencies and the building of a contention wall for the Soliette River, which was mentioned as unfinished. There was some capacity building after the flooding for the community and for some organizations also. The creation of shelters, was mentioned by one interviewee. In both countries, institutional strengthening and signs of creation of a policy regarding disasters was not mentioned.

Pripode DO 1 Qualitative Data Analysis Thematic MatrixFond VerretesHaiti Measures

	M	frequency
3 Measures Preventive , Mitigation Emergency Reconstruction, Risk Management		
National	MN	-
Local	ML	12
International	MI	3
Organizations	MO	9
Early warning	MEW	3
Shelters prepared	MS	1
Infrastructure*	MI	5
Capacity Building	MCB	2
Institutional reform strengthening	MIR	-
Risk Management**	MRM	1

- .* includes contention wall and rebuilding of houses
- .* *the planting of trees...environmental measures as risk management

Vulnerability

For this analysis we are following the vulnerability factors categorized by Wilches-Chaux. In the Dominican Republic, most of the in depth interviews stressed the fact that the community lacked emergency related resources, personnel and actions. This would be categorized as organizational vulnerability, but we specify these answers as organizational disaster specific. These included, lack of early warning, or as interviewees mentioned, lack of timely and efficient information; lack of shelter management, no institutional resources or capacity for disaster management, and lack of an adequate policy framework. This was clear in expressions such as “ disaster prevention and risk management, or emergency work is not on the agenda of politicians, local or national”.

Other factors frequently mentioned were physical ones: the location of the community regarding the Yaque del Sur River, and in relation to the contention wall, also the materials and location of some housing , specifically in Uvilla. Another frequently mentioned factor was the political one: lack of interest of politicians, lack of medical services, water, education, apathy in the population and most important, the mismanagement of the Sabaneta Dam.

Another factor, is the economic one: poverty of the population, small farmers with low technology and very vulnerable to flooding. This is corroborated by the survey data, where we can see employment and wages, these being very low. (see economic characteristics of the surveyed population).

Other factors, cultural or ideological relate to the mention of very vulnerable populations: Haitians and people with discapacities. Lack of disaster specific education in schools was also mentioned.

In the case of Haiti, vulnerability factors frequently mentioned are mainly physical factors: the location of the community in the dry riverbed of the Soliette River. Other actions which have been considered to increase vulnerability in the community is the rebuilding of houses in the dry riverbed after the flooding, and also that important community activities continue to be carried out in the dry riverbed, such as the market and the school.

There are also political factors such as the negligence on the part of authorities and the lack of basic services: medical, electricity. There is a lot of mention of disaster related organizational factors: no

preventive or reconstruction actions from the authorities, no education on disasters, no information, no shelters.

There are economic factors: poverty is always mentioned, lack of economic opportunities and the fact that most people live from small scale farming vulnerable to flooding.

There is an interesting aspect that needs to be mentioned in this part, the environmental factors affecting vulnerability. The interviews let us see that there is a clear perception of the relation of their disaster vulnerability to the fact that they have degraded their environment through the activity of deforestation. Although this is mentioned as answers to questions regarding the environment, there is always the mention that this degradation is responsible for hazards and disasters and that this is worse in the present than it was in the past, and that it will be worse in the future and for the younger generations of the community.

Gender roles in disasters: vulnerabilities and capacities of men and women:

We analyze this aspect of the interviews considering if men and women are mentioned as maintaining traditional roles during the disaster situations both communities lived through, or non traditional ones and if these represent vulnerabilities or capacities. The main point to make here is that there was not much response to this topic in the interviews. People seemed to pass over the topic with no direct answers. But when pressured there were some responses. There are very great differences in these responses in both countries.

In the case of Haiti, there was very little response regarding women's role during disaster. Most of the answers referred to traditional vulnerabilities: women are more vulnerable because they are at home, in charge of the children. Women suffer more because they are at home, women are more emotional, do not know what to do. Some did not mention the topic at all and 2 said there were no differences in vulnerability between men and women. An interesting point that was mentioned most of the dead due to the flooding in the community were women and children. There was no mention of non traditional roles for women. Regarding men there was no mention of specific roles, denoting vulnerabilities or capacities. There is only one mention that men are "stronger and more calm and they save the women."

In the case of the Dominican Republic, the topic received more reactions from the interviewees individually as well as in the focus groups, although the majority did not mention or pursue it as in Haiti. But regarding women, most of the comments made referred to the fact that women play a traditional role during disasters, care taking of children home and extended family. In most cases this was considered as a capacity: women more capable to deal with the disaster situation because they took care of the home and the children and cared for the feeding of the family. Also that the women played out a traditional role which is an important capacity during disasters: the creation and maintenance of family and community networks which function as registry of community and family members, property and activities, manage survival during the disaster, and help in recovery afterwards. Only 2 mentions were made regarding the fact that women are more vulnerable because they do not know how to swim and also more disease prone after disasters. In three cases non traditional roles were mentioned for women, were women participated in decision making during the different disaster phases, specifically through the work of women community based organizations.

Vulnerability/capacities

5 Gender Roles Vul/Caps Women	GWV/C	Frequency
Traditional <ul style="list-style-type: none"> • Caretaking of children, home, extended family <ul style="list-style-type: none"> • Implies: procurement and preparation of foodstuffs, health , maintenance of sanitary conditions, affection, psychological support, security • Creating and maintaining community and family networks for all the above for community members; registry of community members. 	GWV/CT	9
Non traditional Participation in decision making during all phases of disasters and emergencies and regarding risk management	GWV/CNT	3

Regarding men, although in many interviews there was no mention of men's roles during the disasters, it received a bit more attention than women's role in disasters. In most cases men's traditional role in disasters was mentioned: activities requiring physical strength: saving women, carrying women and children to shelters and staying in the homes to care for these, swimming to save women , carrying household goods . Also mention of men's caring of farm plots, "conucos" and procuring foodstuffs from the conucos for the family to secure food during the disaster. One interview remarked that men "cried during Georges". Maybe this could be analyzed as a non traditional role for men.

Damages and Losses

The survey data of the 50 homes analyzed gives us the following information regarding the human loss during the disasters. In Tamayo only one of the 50 surveyed homes was affected by a death, that of a boy. In Fonds Verrettes the mortal victims occurred in 10 of the surveyed homes, and the distribution by sex and age groups is the following:

Fonds Verrettes

	Number of households with death victims	Number of victims
Men	3	5
Elderly Men	1	2
Boys	1	3
Women	1	4
Elderly Women	1	2
Girls	3	7
Total	10	22

This small table shows us that most of the victims were men and girls and quantitatively girls contributed more to the number of deaths, making up 32 percent of the total of deaths.

Wounded due to flooding

The victims that suffered wounds from the two great disasters that occurred in both communities under study and caused by the flooding of the Yaque del Sur river and the Soliette, were as follows: in Tamayo there were persons wounded in six homes and in Fonds Verrettes there were wounded in four homes.

	Tamayo		Fonds Verrettes	
	Number of households with wounded	Number of total wounded	Number of homes with wounded	Number of total wounded
Men	1	1	2	3
Elderly Men	1	1	1	1
Boys	1	1	1	1
Women	4	4	1	3
Elderly Women	0	0	0	0
Girls	0	0	0	0
Total	7	7	5	8

The table tells us that the majority of wounded persons in the surveyed homes in the Tamayo tragedy of 1998 were women. In Fonds Verrettes in 2004 the majority of victims of surveyed homes were of the masculine sex.

Regarding other type of damage and loss, material ones, the surveys tell us that as a consequence of the disaster of 1998, 96% of the surveyed families in Tamayo had material losses, while in Fonds Verrettes this type of damage affected 90% of the households surveyed. In Tamayo the principle losses were in furniture and households goods (85%) and in the houses themselves (12%). In Fonds Verrettes the damage caused by the disaster in 2004 were more diverse, affecting significantly the crops and the houses, being very significant the fact that in 31% of the households the losses suffered were in more than one category, such as housing and crops, housing and animals, etc. This category analyzes material and human damages and loss. We've subcategorized the answers given in the interviews as pertaining to individual households and those pertaining to the community. Damage being considered more immediate affected material elements and loss as more long term affected life aspects.

In the community of Fonds Verrettes in Haiti, the most frequent answer regarding damages and losses following the flooding of 2004, refers to damage and loss in the productive area, at the individual or family level, livelihoods. The interviewees refer to losing their small businesses, and their farms. The next most frequent answer referred to the loss of human lives, and at the individual or family level this was the second most mentioned theme. This was the case of interviewees who had lost a family member or close relative or neighbor. In the interviews we then find material damage and loss as another frequent answer: loss of all material possessions. Damages and loss categorized as social include loss or changes in socio economic status at the individual level. At the community level, damages and loss mentioned were most importantly the human losses, death of children was often mentioned, social loss and damage: the loss of status in the community as a whole, the amount of population who is now psychologically affected with what seems to be post disaster trauma and "wanders through the town aimlessly". Many mentioned how now everyone, especially children are afraid of the rain,; more out migration, towards the Dominican Republic, where people consider they will be mistreated, the increase in prostitution of young girls and the "loss of morality after the disaster" in the community. There is also the mention of material loss and the community level: the increase of poverty, the loss of state revenue due to housing and business washed away by the flooding; the church was lost, so was the cemetery. It was also mentioned that agricultural productivity was lost with the flood.

In the community of Tamayo in the Dominican Republic, damages and losses at the personal and family level were mainly mentioned in the productive category: small businesses, "colmado"; agriculture. The most frequently given answer was that of material loss and damage: houses, all material possessions, and one person mentioned their fear of water after the flooding. At the community level, answers referred to loss of status for the community as a whole; and material damages and losses: loss of infrastructure: the bridge, electricity, water systems, latrines and the cause of disease because of this. In the community of Tamayo there is no mention of human loss.

Strategies

The Strategies category was subcategorized into: networks, production and use of materials for emergency situations, relocation and the building or improvement of infrastructure in the home or in the productive area. In depth interviews and focus groups tell us that, in the case of the Dominican Republic, during and after the disaster, the most important strategy recurred to were the networks, family and neighbors who helped out during the emergency, saving each other, helping to swim to shelter, and in recovery and reconstruction, by taking family and neighbors in even for months until they could reconstruct homes. Also the money from abroad sent by international family networks which helped in this reconstruction. Also it was mentioned often that diverse materials were used during the flood to save themselves or neighbors, such as homemade rafts and the building of "barbacoas" or "soberaos", an extra wood shelf, next to the ceiling, to store material goods and keep them dry. Infrastructure measures were also taken, by building high walls around their homes and "conucos" or plots of farmland. It is very significant that in 5 interviews the interviewees made no comments of any specific strategy used or measure taken during or after the disaster.

In Fonds Verrettes the most frequent strategy or measure taken was to relocate, to move to higher ground after the

flooding passed. This is something the majority of the interviewees express as something they are doing or would like to do in the near future. As was mentioned, there have been construction projects by international agencies, but most people have to relocate for themselves. Networks were mentioned also, family and neighbors who gave shelter, places to sleep and food, for up to 2 years in one case.

Measures taken after the Disaster

After the disaster in Fonds Verrettes, survey data shows that 74 percent of the affected surveyed families took measures to avoid being affected again by a similar disaster in the future. This was not the case in Tamayo, where only 32% did the same. Due to how devastating the disaster was in Fonds Verrettes, 89% of the families took the measure to look for a new house. This was done only by 19% of the few people that took some kind of measure in Tamayo.

Conclusion and General Policy Recommendations:

Disaster risk and disasters are the result of development processes. Natural resource management which leaves a negative impact on the environment, the lack of planning or ineffective planning concerning structural aspects of the development process: economic growth, production and distribution of wealth, urbanization processes, population dynamics and territorial development, deficiencies in education, will result in vulnerabilities, the construction of disaster risk and the occurrence of disasters.

The objective of this research project has been to link development process and environmental degradation to the construction of disaster risk, in order to contribute information to the understanding of this process and the understanding of hazards, vulnerabilities and capacities and disaster risk at the local level.

The main research findings show us that development in the countries under study, though historically tied, has followed different patterns, and this has had diverse effects on disaster risk construction and management. Weaknesses and strengths can be found in the three countries under study which can be used to highlight some general policy recommendations:

Strengthening of institutional frameworks and structures in the countries. Research shows us that for the cases of the Dominican Republic and Haiti, there is an urgent need for institutionalization. This weakness has as a main result the lack of development planning and policies in general. This institutional strengthening includes the improvement, creation, implementation and enforcement of legal frameworks where necessary.

Implement immediate planning and action at the national but specifically at the local level, to deter environmental degradation. Despite the existence of legal frameworks and institutions, degradation activities continue in the countries.

Link disaster risk to development , environmental planning. This link must be institutionalized and research based. It is the awareness of disaster risk and its causes which can result in the awareness of the need to include environmental management into development planning, territorial planning into development planning, urban and population planning. This is the case for three countries under study. Though there are strong points to be made regarding disaster management in Cuba, environmental degradation processes and therefore the creation of disaster risk related to this process exists.

Link environmental management to disaster management at the national and local levels. This implies the creation of the necessary institutions and rules and procedures to make this effective. This must be research based.

Adopt a regional Caribbean perspective regarding development, environment and disasters. One underlying objective of this research has been to strengthen the Caribbean regional perspective in the understanding of our specific problems. This perspective should be part of research and planning initiatives in all areas of interest. It is necessary to understand the countries of the insular Caribbean under a SID perspective. This will help in the creation and implementation of development models suited to our unique environments, cultures and economic and political situations. This would lead to specific recommendations in this respect:

- Strengthen regional development, environmental and disaster related networks that exist in the Caribbean, strengthening relations between the Spanish speaking Caribbean and the rest of the English speaking and French speaking countries. Many networks, organizations and institutions work efficiently and effectively at the regional level, but not all countries are aware of this, or make efforts, at the national state level, to strengthen relations, action and participation.
- More information sharing at the regional level
- More partnerships for development, environment and disaster management at the regional level.
- The countries of the region, specifically Haiti and the Dominican Republic can benefit from lessons learned in Cuban regarding disaster management. Important aspects to consider here are institutional framework and effectiveness, production and dissemination of scientific based local information and intelligent incorporation of

- local expertise and knowledge in disaster warning and management, an effective national-local system, continuous education in disasters at all levels and for the entire population.
- Countries should consider more information sharing at all levels with Cuba in this respect.

Strengthen efforts between the Dominican Republic and Haiti to work on population, environmental and disaster planning with an island perspective, specifically in frontier territories and research based. Both countries share important watersheds and the management of these should be planned taking into consideration plans and actions from the neighboring country. The migratory situation must be given importance.

Strengthen a gender perspective in development planning, environment and disaster management planning based on pertinent research. Gender vulnerabilities and capacities should be taken into consideration in planning processes at all levels. Gender specific capacities have been shown to be an important asset in development process, specifically the capacities of women and women's community based organizations. Gender roles in development planning and implementation regarding environment, population, productive activities, natural resource management, and disaster risk is an urgent necessity. This includes specifics such as:

- Production of gender-disaggregated data
- Creation of gender sensitive indicators and gender aware analysis
- Gender sensitive research

(Enarson,2005)

Implement and strengthen a local perspective in development, environment and disaster risk at all levels: research, information production, planning and management. Community based organizations, community leadership and community knowledge must be incorporated into development. At this level it is important also to stress a gender perspective.

Increase research activity in the areas of development, environment and disaster risk, with a local and gender perspectives.

Some general suggestions at the community level:

Strengthening of local governments. Specifically regarding environmental management and disaster risk management.

Strengthening of community organizations and participation.

Strengthening the participation of women in community organizations and community leadership.

Creation and implementation of community action plans centered around environmental needs and existing disaster hazards, vulnerabilities and risks. Specific areas include:

- Natural resource management, specifically regarding forests and water
- Rebuilding or restructuring of existing infrastructure related to flood contention
- Acquisition of pertinent information on the management of important infrastructure such as the Sabaneta Dam, in the case of Dominican Republic and how this affects the community of Tamayo. Implementation of activities could integrate the community in management activities, specifically regarding education and information.
- Disaster management institutions and personnel and community organization regarding all the disaster phases. Capacity building, acquisition of resources.
- Education at the community level, formal and informal, on disaster risk management and disaster preparedness.