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CARIBBEAN SMALL STATES, VULNERABILITY AND DEVELOPMENT

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Abstract

The paper presents a review of the current discourse around notions of size and vulnerability and addresses the significance of such to notions of the development of small States. It draws on work undertaken by ECLAC in the socio-economic assessment of natural disasters in four SIDS: Grenada, Haiti, the Cayman Islands and Jamaica, and to illustrate the extent of vulnerability of Caribbean SIDS and the implications of that vulnerability on social policy, governance and development, taking into account Sir Arthur Lewis' discourse on development.

The paper was presented at the 6th Annual SALISES Conference on Governance, Institutions and Economic Growth: Reflections on Professor W. Arthur Lewis' Theory of Economic Growth.

1. INTRODUCTION

This paper seeks to examine the impact of natural events on the development potential of four Caribbean small States taking into account the notion of development as discussed by Professor W. Arthur Lewis. In doing so, it will explore the vulnerability of these States to the recent natural events, and how that vulnerability impacts on the countries' capacity to address social dimensions of their development goals.

The Economic Commission for Latin America and the Caribbean (ECLAC) formed the primary research team in the selected countries that undertook the macro socio-economic assessment of the impact of Hurricane Ivan on the Cayman Islands, Grenada and Jamaica and Tropical Storm Jeanne on Haiti during September to December 2004.[1] The ECLAC Methodology was used for the assessments. Analysis of the similarities and differences of the country experiences can enrich the discussions and provide greater understanding of issues related to the development of small States and their vulnerability.

An examination of the impact of natural disasters on the four countries for the period 1980 to 2004, presented in Table 1, indicates that over 8,000 persons lost their lives; nearly six million persons were affected; and US$5.6 billion dollars in damages were sustained. The cost of damage during that period represents twice the total GDP in 2002, of the four countries combined. It should also be noted that US$5.2 billion, or 92 per cent of the cost of the damage during that period, could be attributed primarily to the effects of the disasters which occurred in September 2004.

Table 1
Impact of natural disasters on four selected countries 1980-2004

COUNTRY	DEAD	AFFECTED	IMPACT IN US $
Cayman Islands	2	35,389	**3,432,000,000.00**
Grenada	39	142,000	899,000,000.00
Jamaica	582	1,844,138	192,286,000.00
Haiti	7410	3,761,508	**1,112,114,300.00**
TOTALS	**8033**	**5,783,035**	**5,635,400,300.00**

Source: Drawn from the OFDA/CRED International Disaster Database (sourced on Jan 27, 2005 from www.em-dat.net – *Universite Catholique de Louvain* – Brussels- Belgium; and ECLAC data for Hurricane Ivan.

This paper seeks to place the issue of natural disasters within the discourse of the development of Caribbean small States, based on arguments which suggest that small States can suffer severe setbacks due to the impact of natural disasters with unprecedented consequences for lives, livelihoods and hard-won development gains (Briguglio, 1993; United Nations, 1994; Pelling, 2002; United Nations, 2004). Small States, due to their limited capacities to repair and restore damage caused by natural disasters, can suffer harmful consequences, not only on the immediate quality of life of their affected populations, but also on their long-term development prospects. ECLAC experts, who have been involved in the macro socio-economic assessment

[1] See the ECLAC Disaster Assessment Training Manual for (SIDS) produced by the ECLAC Subregional Headquarters for the Caribbean; LC/CAR/G.660.

of damages to the Caribbean region, have suggested that it could take some countries that were impacted by Hurricane Ivan, from a minimum of 5 to a maximum of 15 years to recover.[2]

2. SIZE AND DEVELOPMENT

The literature, which treats with size and development, is not always in agreement on what constitutes a small State. Generally a number of criteria have been used which speak to the geographic, demographic, economic and political dimensions of the State. Sometimes combinations of some or all of these criteria are used in the categorization process. This leads to various notions regarding what is the best criterion to be used in the inclusion or exclusion of States from that category.

When small States have been defined based on geographic considerations, although land size is one of the primary considerations, other characteristics have been considered such as their insular character or their location on continents resulting in categories 'small island States' and 'land-locked States', respectively.

When population size has been used, various groupings present themselves. These have not been hard and fast groupings as groupings of States with less than a population of one million, or less than 1.5 million, have often included Jamaica despite its population of over 2 million. Briguglio (1997) in developing an alternative economic vulnerability index suggests five categories for States: very small – up to 1.5 million; small- over 1.5 million and under 10 million; medium – over 10 million and under 50 million; large – over 50 million and under 100 million and very large – over 100 million.

When the size of the economy is the defining category, Haiti, with a GDP per capita of US$1,610 (see Table 1), the lowest in the Caribbean region, has found itself included, and some otherwise geographically and demographically defined small island States have been excluded, because of their high per capita GDP.

In the Alliance of Small Island States (AOSIS)[3], Cuba with a population of some 11 million is included, Haiti which occupies part of an island, and Belize, Guyana and Suriname, all continental States are also included because of their low lying coastal zones. Non-independent territories, such as Puerto Rico and the Cayman Islands, have also been included.[4]

The researcher can only conclude that the use of the nomenclature of 'small States' or 'small island developing States' is subjective. Groupings are often based on the nature of the enquiry, the political sensitivity of those engaged in the grouping or the enquiry, and the region of the world in which the enquiry is being conducted. These issues however, have not

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[2] Pelling (2002), citing Day (2000) suggests that Hurricane Mitch, which occurred in 1998, had set back development in Nicaragua by some 20 years.

[3] The AOSIS is a coalition of small island and low-lying coastal countries, comprised of a membership of some 43 States and observers, which share similar development challenges and concerns about the environment, particularly their vulnerability to the harmful effects of global climate change.

[4] The Commonwealth Study on Small States includes Cayman Islands and Puerto Rico and AOSIS includes non independent territories such as Puerto Rico, British Virgin Islands and the United States Virgin Islands. See Annex 1 for a listing of Caribbean States in AOSIS.

diminished the legitimacy of the discourse around small States, or Small Island Developing States (SIDS) in the author's opinion, but makes apparent the '*real politick*' of the twenty-first century and highlights the challenges inherent in the movement towards global integration and liberalization for States of differing capacities. It also keeps to the fore the real threats of climate change for small States and low-lying regions globally and in the Caribbean.

Suffice it to say, there is no difficulty with the identification of the four States selected, as 'small States', in light of their inclusion in numerous categories that have been constructed. In addition, as the discussion proceeds, the similarities of these States, in the wake of a natural disaster, will demonstrate how essentially they are linked to the conditions of SIDS.

Table 2 presents a selected number of indicators, some of which could be used as defining characteristics of small States, such as population size, land size and GDP per capita. The data also demonstrates the diversity of small islands, such that the Cayman Islands and Grenada have land sizes of 259, and 312 sq km, respectively, and population sizes of 42,000 and 102,000, respectively; while Jamaica and Haiti, on the other hand, have land sizes of 10.9 and 27.7 thousand sq km, respectively, and population sizes of 2.6 and 7.9 million, respectively. The per capita income of the islands also varies from US$35,000 to US$1,600. The proportion of population defined as poor is also widely dispersed from 65 per cent to 19.7 per cent. The political status of the four countries is quite different as well. Jamaica and Grenada are independent and have parliamentary democracies; the Cayman Islands is an Overseas Territory of the United Kingdom; and Haiti, the oldest independent republic in the western hemisphere, is currently under the control of United Nations peace keepers, with an appointed interim government.

Table 2
Selected social and economic indicators for four Caribbean SIDS

COUNTRY	SIZE (KM^2)	POPULATION	POPULATION DENSITY (POP/KM^2)	COAST LINE (KM)	POPULATION POOR (%)	GINI CO-EFFICIENT	GDP PER CAPITA (PPP $US) 2002
Cayman Islands	259	42,397	164	…	…	…	35,200
Grenada	312	102,632	329	121	32.0	0.45	7,280
Jamaica	10,991	2,620,000	238	1022	19.7	0.38	3,980
Haiti	27,750	7,929,048	286	…	67.0	0.65	1,610

Source: Population: Population and Households Census 2001 (for all countries except the Cayman Islands, where data from the Labour Force Survey 2004 was used.); Population poor: Cayman unavailable; Grenada Poverty Assessment Report 1999; Jamaica - SLC 2002; Haiti - SLC 2001; Gini Coefficient: Cayman - unavailable; Grenada Poverty Assessment; Jamaica SCL 1999; Haiti SLC 2001

Per Capita Income: HDR 2004; Cayman - CIA fact sheet 2002

It should be noted that although the four selected countries are not as densely populated as Barbados,[5] they have a common factor in that many of their populations are concentrated in low lying coastal locations, thus their populated coastlines make them susceptible to sea surges, and sea-level rise (Nicholls 1998).

[5] Barbados is the most densely populated country in the western hemisphere with 646 persons per sq km.

Sir Arthur Lewis (1955) in his seminal work, Theory of Economic Growth, posits that "the advantage of economic growth is not that wealth increases happiness, but that it increases the range of human choice"[6]. He continues that, "the case for economic growth is that it gives man greater control over his environment, and thereby increases his freedom".[7] Lewis reminds us, however, that although "growth is the result of human effort. Nature is not particularly kind to man; she can overwhelm man with disasters which man wards off taking thought and action".[8]

As we examine the vulnerability of the four selected islands in the Caribbean we will seek to ascertain how they have used 'thought and action' to reduce vulnerability, specifically in the social sector and, in turn, how their vulnerability impacts on their ability to support development.

3. NOTIONS OF VULNERABILITY AND SMALL STATES

Vulnerability is neither a new concept nor one that has transferred easily from its physical and natural science context to that of the social sciences. In the social sciences it is still somewhat of a spectre, with many researchers and policy makers unconvinced or unable to operationalize the concept into tools that are useful for moving individuals, households, communities or nations, along the continuum of development or measuring or predicting their advancement.

Vulnerability is a multi-dimensional concept which encompasses biological, geophysical, economic, institutional and socio-cultural factors (Nicholls, 1998). It is not exclusive to social systems but can be applied to any human or natural system that interacts with its environment (Gallopin, 2003). The notion of vulnerability is associated with the idea of exposure to damage, lack of protection and precariousness (Briguglio, 1998b)[9]; and the risk of being harmed or wounded by unforeseen events (Guillaumont, 1999). Inherent in the notion of vulnerability is a concept of resilience[10] or sustainability, which takes cognizance of not only the impact of the hazard or risk, but the capacity of the system to adapt to or withstand the impact (Brown, 2002). Within the notion of vulnerability, are two additional facets: one which speaks to the probability that a risk or threat will occur and the other which refers to the magnitude of the threat.

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[6] Lewis, Arthur (1955) Theory of Economic Growth. London: George Allen & Unwin Lt. p. 420
[7] ibid p. 421
[8] ibid. p 23
[9] Briguglio (1993) reminds us that the meaning of the word "vulnerability" comes from its Latin root, the verb *vulnerare*, meaning to wound. Thus the word vulnerable is associated with exposure to damage and susceptibility to outside forces.
[10] The World Conference on Disaster Reduction, draft programme outcome document, defined resilience as "the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction, measures". Pg. 6

Figure I
A conceptual framework for vulnerability

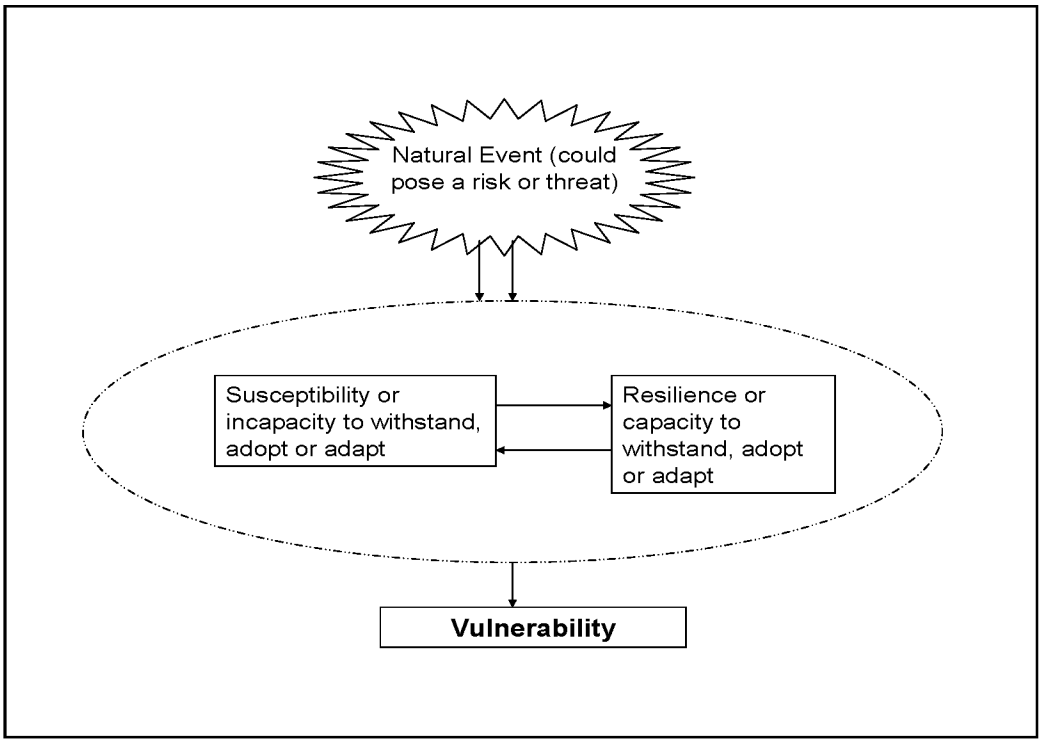

Figure I illustrates a system being exposed to a hazard or threat. The system has two dimensions, one of susceptibility and the other of resilience. It is the dynamic between the two dimensions of the system, its susceptibility and its resilience, and the facets of the threat, its probability of occurrence (or risk) and its magnitude, which results in an expression of the vulnerability of the system. Vulnerability then speaks to the potential of a system to respond adversely or favorably to an occurrence or an event. The World Conference on Disaster Reduction which convened in Kobe, Japan, 18-22 January 2005 defined vulnerability as "the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (United Nations, 2004) .[11]

Most of the work in the area of vulnerability, in the social sciences, has been undertaken in the component of economic vulnerability. It has arisen out of the understanding by economists that small economies may be susceptible to unforeseen events, changes in the external environment or sudden shocks, which occur outside of their ambit of control and are often not of their making (Pelling 2001; Schiff, 2002; Guillomont 1999).

At the Global Conference on Small Island Developing States which convened in Bridgetown, Barbados, from 26 April to 6 May 1994, SIDS were being characterized as possessing limited size, having vulnerable economies and being dependent both upon narrow resource bases and on international trade. Small States were also identified as being entirely or

[11] United Nations (2004) p. 3

predominantly coastal entities. The Small Island Developing States Programme of Action (SIDS POA) (United Nations 1994), also suggested that SIDS had their own peculiar vulnerabilities and characteristics, making their search for sustainable development quite severe and complex.

The SIDS POA argued that there were many disadvantages that derived from small size. These disadvantages included a narrow range of resources, forcing undue specialization; excessive dependence on international trade resulting in vulnerability to global developments; high levels of population density, despite having small populations in absolute terms, thus increasing pressures on limited resources; costly public administration and infrastructure, including transportation and communication; limited institutional capacities; and domestic markets, which were too small to provide significant economies of scale. [12]

Governments in attendance at the SIDS meeting in 1994, in paragraphs 113 and 114, called for "the development of vulnerability indices and other indicators that reflect the status of small island developing countries and integrate ecological fragility and economic vulnerability".[13] At the AOSIS interregional preparatory meeting for the World Summit on Sustainable Development, held in Singapore from 7-11 January 2002, representatives called for "the early operationalization of the economic and environmental vulnerability indices for the promotion of the sustainability of SIDS and other vulnerable States, …as well as international support for the development of a social vulnerability index to complement this work."[14]

It is acknowledged that the use of conventional measures of development, such as GDP/GNP is insufficient when seeking to measure the development of small States (Crowards, 2000). There is growing agreement that a vulnerability index would be useful to reinforce the GNP based threshold in seeking to establish access to official finance by small States and would prove useful in the application of trading rules to small States.[15] Such an index would provide an additional measure of the complexity of development process for small States and would demonstrate their difference as a group in the global market place, hopefully affording them additional space for maneuverability and sustainable development.

This discussion on the vulnerability of small States should not lead the reader to conclude that all is doom and gloom for small States. Small States can avail themselves through the globalizing processes of the new opportunities which technological changes in telecommunications and information technology can provide. Through the use of such technologies, small States can take technological leaps which may reduce cost and increase access and allow efficiency gains in production processes and marketing which were either not possible or very costly, before the new technologies.

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[12] Not all economists are of this view. Authors such as Easterly and Kraay (2000) have argued exactly the opposite, that there are indeed no disadvantages to being small and suggest that, to the contrary, small States have higher income and productivity levels than large States and grow no more slowly than large States. They suggest that any disadvantage caused by the volatility of growth of small States is outweighed by the growth benefits of trade openness.

[13] United Nations (1994) SIDS POA pg. 46

[14] Cited in the foreword to ECLAC (2003) "Towards a Social Vulnerability Index in the Caribbean"

[15] The Joint Task Force of the Commonwealth Secretariat/World Bank, following two high level Conferences, one in February 1999, in Saint Lucia and the other in London in February 2000, concluded that it has been convincingly established that when looking at small States it is essential to look beyond the conventional indices of development.

Bernal (2001) in speaking to the opportunities which exist for small States, suggests that the trade in services, including tourism and financial services, are among the most rapidly growing sectors of the world economy and have become important growth sectors in many small States. There is also general agreement that the key to development in these small States is the human resource factor. Professor Arthur Lewis advanced that "knowledge and its application was the second proximate cause of growth"[16], thus signifying the importance of this factor.

Following is a brief discussion of the ongoing efforts to produce a measure of vulnerability in its economic, environmental and social dimensions. The end result is expected to be a composite index which best captures the most salient features of the vulnerability of small States.

The Economic Vulnerability Index

It is interesting to note that the initial concerns about vulnerability linked ecological fragility and economic vulnerability together. It soon became apparent, however, that the two notions needed to be analyzed separately.[17] This was so, despite the understanding that economic vulnerability could be induced by natural disasters (United Nations, 1999).

The relatively high GNP per capita of some SIDS, resulted in a view of SIDS being economically strong, when in fact it was argued that their economies were quite fragile (ECLAC, 1993; Briguglio 1993). The fragility is derived from the risk of being negatively affected by shocks, such as the rapid decline in the price of a country's major export or the erosion of trade preferences or the proliferation of trade blocs (Byron 2000; Schiff 2002). The risks or difficulties arose from the structure and operation of the markets and the small size of economic entities.

Work to construct a measure of the economic vulnerability of small States was initially undertaken as it was surmised that such an index could present a single-value measure of economic vulnerability which could be considered by donor countries and organizations when taking decisions regarding the allocation of financial aid and technical assistance. In 1993 Briguglio began work to develop a vulnerability index for small island States. This followed a proposal from the Maltese Ambassador during a 1990 United Nations Conference on Trade and Development (UNCTAD) expert meeting on the problems of small island developing states.[18] He used indicators of export dependence, insularity and remoteness, and proneness to natural disasters to measure the degree of vulnerability of small island States.

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[16] Lewis advanced that there were three proximate causes of growth: the first being efforts to economize either by reducing the cost of any given product or by increasing the yield from any given input of effort or of the resources. The second is the increase of knowledge and its application and the third is increasing the amount of capital or other resources per head. (Lewis 1955, pg 11)

[17] Guillamont (1999) posits that losses in biodiversity, which reflect ecological fragility and need to be analyzed for themselves are not necessarily major elements of economic vulnerability.

[18] SOPAC (1999) Report on the Environmental Vulnerability Index (EVI) reported that initial work on the vulnerability of States focused on the economic aspects even though different forms of vulnerability of States have been identified.

Work on the development of an economic vulnerability index began as early as 1997 with vulnerability indices being developed by Briguglio and Pantin[19], which were presented at the ad hoc Expert Group Meeting on Vulnerability Indices for Small Island Developing States in December 1997 (United Nations, 1998). Crowards (cited in United Nations, 1999) undertook an exercise to develop an economic vulnerability index using data from 1993 and variables relating to trade, such as concentration of export and import markets and reliance on key imports, dependence on external sources of investment and relative isolation. The relevant results of his index for 93 countries are presented in Table 3.

The Commonwealth Secretariat undertook work on a Cumulative Vulnerability Index (CVI) which measured the vulnerability of 111 small and large developing countries which was presented as part of the Report of the Commonwealth Secretariat/World Bank Joint Task Force on Small States in 2000 (Peretz et al, 2001).[20] The CVI concluded that in general, small States were more vulnerable to external economic forces and environmental hazards than large States (Atkins, et al 2001). The Committee for Development Policy (CDP),[21] acknowledged the work of the Commonwealth Secretariat, and others to develop an Economic Vulnerability Index. The Committee in its first report, recommended that the five indicators which had been selected as a measure of economic vulnerability: export concentration, the instability of export earnings, the instability of agricultural production, the share of manufacturing and modern services in GDP and population size, be given equal weight in the composite Economic Vulnerability Index. The committee suggested that the Economic Vulnerability Index would need to be progressively refined and supplemented by other aspects of vulnerability which had not been taken into account (United Nations, 1999). In 2003 it was agreed that five components be measured in the Economic Vulnerability Index: small population size; share of manufacturing and modern services in GDP; export concentration coefficient (UNCTAD index); instability of exports of goods and services; instability of agricultural production; and homelessness, that is, the share of population displaced by natural disasters.

Table 3
Economic vulnerability indices for selected Caribbean SIDS by type of index

COUNTRY	COMPOSITE VULNERABILITY INDEX (CVI)	CVI RANK	CROWARD'S INDEX RANK
Cayman Islands	…	…	3
Grenada	7.848	15	…
Jamaica	7.484	18	15
Haiti	4.474	96	14

Source: Atkins et al (2001); Watson (2001); … unavailable

[19] Pantin's study proposed ecological vulnerability indicators that might capture the susceptibility of small economies to damage caused by natural disasters.

[20] Tom Crowards (2001) critiqued the integrity of the CVI, suggesting that its underlying assumptions are flawed, and that the data and methodology employed was questionable.

[21] The Committee for Development Policy (CDP) is a subsidiary body of the United Nations Economic and Social Council which prior to 1999 was named the Committee for Development Planning. The "Committee provides independent advice on emerging cross sectoral development issues such as the role of information technology in development and the role of the United Nations system in supporting the efforts of African countries to achieve sustainable development. (retrieved February 3, 2005 from http://www.un.org/esa/analysis/devplan/cdpbbackgroundnote.pdf)

At the sixth session of the CDP a revised Economic Vulnerability Index was proposed (United Nations, 2004). This one would continue with the use of most of the above indicators, but would include an indicator of remoteness (measured by high transport costs and relative isolation); would remove the notion of export concentration; and would seek to include an indicator of transformation (which would measure the share of manufacturing and modern services) (Guillaumont, 2004). It was noted that the EVI was not a comprehensive vulnerability index and was in use for LDCs with other measures.

The Environmental Vulnerability Index

The Environmental Vulnerability Index was initially developed in early 1999 by the South Pacific Applied Geoscience Commission (SOPAC)[22] to provide an index which described the relative environmental vulnerabilities of small island States. The task was undertaken, just as in the case of the economic vulnerability index, on the recommendation of the SIDS POA and AOSIS. An initial list of approximately 47 indicators was selected and testing was conducted among 15 countries. The environmental vulnerability index was constructed from two sub- indices which related separately to risk and resilience. The sub-index which measured exposure to natural or human risks/hazards was known as the Risk Exposure Index (REI). The resilience index had two components to measure of Intrinsic Resilience Index (IRI) and the measure which sought to capture the present status or health of the environment, the Environmental Degradation index (EDI). The assumption for the inclusion of the EDI was that impacts in the past affect the ability of the environment to tolerate new impacts. The focus of the Environmental Vulnerability Index was on the environment itself and its vulnerability to both human and natural hazards.

SOPAC argued that the environment was susceptible to natural events, the actions of humans and their management strategies. Therefore, overall vulnerability of a State should include measures of both human and natural systems and the risks which affected them. Unlike other previously-developed environmental vulnerability indices, human impact was considered an exogenous factor and human systems not the recipients of the impact, and therefore not the main focus. It was further argued that a State could be considered environmentally vulnerable if its ecosystems, species and processes were susceptible to damaging anthropogenic and natural pressures and these pressures were high. SOPAC suggested that the completion of an Environmental Vulnerability Index would represent an important step towards characterizing the overall vulnerabilities of States, regardless of whether the information was presented separately or merged with other vulnerability indices to develop a Composite Vulnerability Index (CVI).

During the International Meeting on Small Island Developing States to review the implementation of the SIDS POA, concluded in January 2005 in Port Louis, Mauritius, the SOPAC presented the Global Environmental Vulnerability index (GEVI).

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[22] SOPAC is the an inter-governmental regional organization dedicated to providing services to promote sustainable development among its 17 island member States and three associate member States. (retrieved 5 February 2005 from http://www.sopac.org/tiki-index.php?page_ref_id=152)

Table 4
Environmental Vulnerability Index (EVI) for selected Caribbean SIDS

COUNTRY	RANK	EVI	REI	IRI	EDI
Barbados	6	4.17	3.75	3.50	4.90
Cayman Islands	**13**	**3.95**	**2.86**	**5.0**	**4.25**
Dominican Republic	101	3.08	2.71	3.33	3.31
Grenada	**45**	**3.57**	**3.00**	**3.80**	**3.89**
Haiti	**61**	**3.38**	**2.40**	**3.67**	**4.19**
Jamaica	**22**	**3.84**	**3.50**	**3.83**	**4.19**
Guyana	227	1.86	1.57	2.00	2.07

Source: Results for 235 countries of the Demonstration Environmental Vulnerability Index, SOPAC Technical report 356

Table 4 presents the EVI ranking for selected SIDS. The most vulnerable countries in rank order were Barbados, Cayman Islands, Jamaica, Grenada, Haiti, Dominican Republic and Guyana lastly.

The measure presented to delegates represented the culmination of six years of development and the first full evaluation of the environmental vulnerability index. Valid GEVI scores were given for 142 countries and evaluations for 235 countries and territories was presented using data collected for 50 indicators. The results showed that SIDS as a group is generally more vulnerable than other countries and that they are more likely to be data-deficient. The results also showed that the factors leading to vulnerability in countries differed markedly and would require different approaches for protecting and building resilience (retrieved 4 February 2005 from http://www.sopac.org/tiki/tiki-print_article.php?articleId=64).

The Social Vulnerability index

Work on the development of a Social Vulnerability Index (SVI) is relatively new and was undertaken, like its counterparts, based on the SID/SPOA and the AOSIS. It is expected to play a complementary role to its partner indices the EVI and the GEVI and to eventually form part of the composite vulnerability index which would provide one measure of vulnerability.

The ECLAC Subregional Headquarters for the Caribbean accepted the challenge to develop a methodology for the construction of a measure of social vulnerability that could be used globally.[23] Work began in 2000 with a panel of experts to explore agreement on the definition of social vulnerability and methodological approaches best suited to achieve the task of measurement. By February 2003 tentative agreement had been reached around notions of social vulnerability and on the purpose of a measurement. It was agreed that such a measure could be applied at the national level, similar to the EVI or the GEVI, although it was agreed that the measurement could also have relevance to understanding the situation at the level of the person, household, or community. It was further agreed that the best approach to such a measure was one which strove to achieve simplicity, feasibility and parsimony (St. Bernard,

[23] The ECLAC Subregional Headquarters for the Caribbean undertook the task of developing an SVI through financial support from the Kingdom of the Netherlands and with the technical support of the regional academic institutions, UWI and regional intergovernmental institutions such as CARICOM, CDB and National Statistical Offices (NSOs).

2003), as social vulnerability was deemed to be a difficult concept which could, at best, be measured only indirectly.

Important to the notion of social vulnerability is its difference from notions of poverty or economic backwardness (Briguglio 2003, Chambers 1989, Moser, 1996; St. Bernard 2004). One of the key features of this difference lies in the dynamic interplay between susceptibility and resilience inherent in the notion of vulnerability, whereas the lack of resources underpins the notion of poverty.

St. Bernard (2004) suggested that social vulnerability could be considered as the converse of social sustainability. In agreeing with Conway and Chambers, he advanced that:

> *"social vulnerability is the inability of human units (individuals, households or families) to cope with and recover from stresses and shocks, their inability to adopt to and exploit changes in physical, social and economic environments and their inability to maintain and enhance future generations."* [24]

St. Bernard further argued that the nation could be considered as a social system which when functioning in equilibrium, is capable of sustaining itself.

Social vulnerability then can be defined as the extent to which the social system is able to respond favourably or unfavorably to the exposure to a sudden shock or event either of an economic, environmental, or social nature or a combination of those forces, and the society's capacity or incapacity to cope with, adopt or adapt to the impact.

ECLAC's short-term objective of measuring social vulnerability was twofold. One was to test whether data were available for undertaking such an exercise, as all previous attempts to measure vulnerability pointed to the data deficit nature of small States; and the second was to test the hypothesis that small States are inherently more socially vulnerable than large States, or provide information to the contrary.

[24] St. Bernard (2004) p. 4

Table 5
Results of pilot test of the Social Vulnerability Index comparison to other measures of social development by selected countries

SVI RANK	SOCIAL VULNERABILITY INDEX	HUMAN DEVELOPMENT INDEX 1998	POVERTY RATE – HEAD COUNT INDEX	ADJUSTED HUMAN DEVELOPMENT INDEX 1999[25]
5	St. Kitts and Nevis *0.421*	St. Kitts and Nevis *0.798*	Saint Lucia (1995) *25%*	St. Kitts and Nevis *0.457*
4	St. Vincent and the Grenadines *0.456*	Grenada *0.785*	St. Kitts and Nevis (1999/2000) *31%*	St. Vincent and the Grenadines *0.437*
3	Belize *0.473*	Belize *0.777*	Grenada (1998) *32%*	Belize ...
2	Saint Lucia *0.490*	St. Vincent and the Grenadines *0.738*	Belize (1996) *33%*	Grenada *0.396*
1	Grenada *0.496*	St. Lucia *0.728*	St. Vincent and the Grenadines (1995) *38%*	St. Lucia *0.343*

Source: Adapted from St Bernard (2004) Table 6.

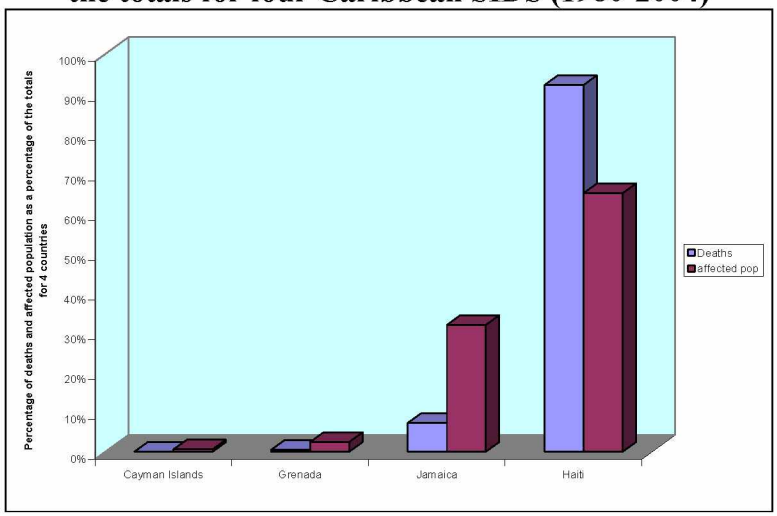
In June of 2004, the results of a pilot test among five Caribbean SIDS was presented to demonstrate the feasibility of the methodology to act as a measure of social vulnerability In undertaking the pilot test St. Bernard (2004) examined five domains for measuring social vulnerability: (i) education; (ii) health; (iii) security, social order and governance; (iv) resource allocation; and (v) communications architecture. It was clear that a far more extensive global study would have to be undertaken to be able to indicate in any way the status of the social vulnerability of small States vis-à-vis their larger counterparts and that additional work would have to be done to refine the indicators. The results of the St. Bernard study are presented in Table 5. It is interesting that the results of the pilot social vulnerability index, like its economic counterpart, also found Grenada, one of the four States under review, to be among the most vulnerable of the islands tested.

[25] See OECS (2002), Table 2.7, Page 63

4. NATURAL DISASTERS AND THE VULNERABILITY OF FOUR CARIBBEAN SIDS

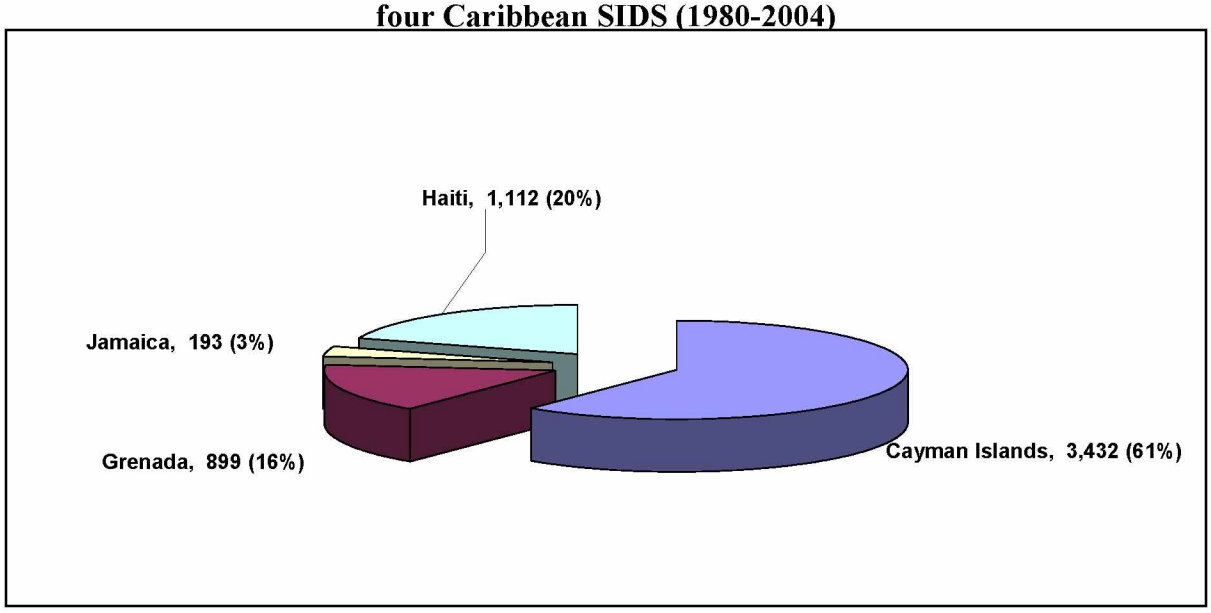
As was mentioned in section one above, in the four countries under review, for the period 1980 to 2004, over 8,000 persons lost their lives, nearly six million persons were affected and damages amounted to US$5.6 billion. Another look at the data as presented in Figures II and III suggest that 92 per cent of the lives lost occurred in Haiti, and 61 per cent of the value of the combined disasters could be ascribed to the assets of the Cayman Islands. The low level of lives lost was not totally unexpected, as householders in the Cayman Islands were better prepared[26] to sustain a natural disaster. The value of their assets, taking into account housing stock and belongings, were greater than those in Haiti. Jamaica, although comprising 32 per cent of the affected population during that period, accounted for only 3 per cent of the value of the assets. This may be attributed to the fact that in many instances during that period, it was agricultural production for the domestic market that was affected and the majority of the affected population could be found amongst the poorest, with the lowest value ascribed to their lost assets.

Figure II
Percentage of deaths and affected population as a percentage of the totals for four Caribbean SIDS (1980-2004)



[26] Caymanian households knew where shelters were located and moved to shelters when requested to do so, unlike the case of Haiti, where shelters were unknown, unavailable and information suggests that persons were not fully aware that they would be in harms way. See Table 9 which outlines the use or non use of a number of vulnerability risk reduction measures by the States under consideration.

Figure III
Damages caused by natural disasters (in millions US$) for four Caribbean SIDS (1980-2004)



Source: Calculated from data drawn from the OFDA/CRED database and ECLAC reports.

Caribbean SIDS can be susceptible to an array of natural events which, due to the geography, physical make up and socio-cultural circumstances of SIDS, have the probability of becoming natural disasters. As was previously mentioned, Caribbean small States are dependent on their coastal zones for settlements and livelihoods, particularly in the tourist sector, and therefore sea-level rise and climate change are an important threat. However the more immediate and primary natural hazards facing the islands are earthquakes, hurricanes, volcanic activity and resulting tsunamis and storm surge, torrential rains resulting in disastrous flooding of low-lying areas, and landslides. Table 6 below details the threats which those natural hazards may pose to the region.

Table 6
Natural events and possible threat

TYPE OF EVENT	THREAT
Earthquakes	All Caribbean countries with the exception of Bahamas and Guyana, lie close to the known tectonic plate boundaries. The North American plate dips from east to west beneath the Caribbean plate along a north-south line just east of the Caribbean arc
Volcanic Activity	Several of the islands of the Eastern Caribbean are volcanic in origin. The volcanoes are considered to be either active or dormant. Kick'em Jenny (just north of Grenada) is an active submarine volcano.
Tsunamis (Sea waves that travel at an average of 500 to 600 km per hour)	Studies suggest that a violent eruption of Kick'em Jenny would result in waves that reach heights of 7 meters on the north shore of Grenada within 5 minutes of the eruption. All other islands of the Eastern Caribbean would experience waves ranging from 1.7 meters to over 5 meters high.
Hurricanes and tropical storms	The Caribbean lies in the North Atlantic Ocean, one of the six main tropical areas of the earth where hurricanes may develop every year. The destructive potential of a hurricane is significant due to high wind speeds and torrential rains that produce flooding and occasional storm surges with heights of several feet above normal sea level.

TYPE OF EVENT	THREAT
Excessive rainfall	The results of flooding depend on type of elevation of facilities in the location of the event. The results may range from loss of equipment and finishes inside flooded buildings to deaths and property damage.
Storm surges and coastal area flooding	Storm surge is associated with hurricanes and consist of unusual volumes of water flowing onto shorelines. Storm surge has been responsible for much of the damage caused by hurricanes, especially in large low-lying coastal settlements. The increase of coastal settlement has put much of our economic investment at risk from sea damage
Landslides	Many landslides in the Caribbean islands are brought about by inappropriate framing practices and road construction in mountain areas, although triggered by natural events.

Source: ECLAC/CDCC Disaster Assessment Training manual for Caribbean Small Island Developing States (2004; ECLAC Manual for Estimating the Socio-Economic Effects of natural disasters (1999); Nicholls, 1998; Gibbs, 1998

Since 1995 the region has experienced an above average number of storms. Between July and September of 2004 there were 153 major events (ECLAC, 2004) and it was not surprising that in September 2004, alone, at least eight States in the Caribbean, and one in the wider Caribbean, Venezuela, were affected by natural events, some worse than others. Table 7 details the characteristics of the events which affected the four countries under consideration. Three of the four countries were affected by Hurricane Ivan, which was considered the most damaging hurricane to hit the Caribbean in 10 years. Ivan was described as a "classical" long-lived Cape Verde hurricane. On 2 September Ivan developed into a tropical depression into a tropical storm and then to a hurricane by 5 September. Ivan then became a major hurricane and passed over Grenada and then North of Venezuela and the Netherlands Antilles toward Jamaica. It strengthened to a category 5[27] hurricane, then weakened to a category 4 as it moved westward south of Jamaica. Ivan briefly regained strength before it reached Grand Cayman on September 11 which experienced the hurricane until the morning of Monday 13 September, whereupon the cyclone proceeded towards the Western tip of Cuba before making landfall in the United States.

Table 7
Description of natural events

COUNTRY	EVENT	DURATION	CATEGORY ON SAFFIR-SIMPSON SCALE	WIND SPEED (KPH)	ATMOSPHERIC PRESSURE	STORM SURGE (M)
Cayman Islands	Hurricane Ivan	11-13 Sept	5	241		3m
Grenada	Hurricane Ivan	6-7-Sep	3	233	1000mb	3m
Jamaica	Hurricane Ivan	9-10-Sep	4	340		20m
Haiti	Tropical Storm Jeanne	18-19 Sept	…	…	…	…

Source: ECLAC reports of the Assessment of the Socio-economic impact

[27] Saffir-Simpson Hurricane Scale is a one to five rating based on a hurricane's present intensity. It is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale. (retrieved on January 25, 2005 from http://www.nhc.noaa.gov/aboutsshs.shtml) See Annex 3 for the full elaboration of the table.

The fourth country, Haiti, was hit by Tropical Storm Jeanne which threw some 550 mm of rains on the *Nord-Quest* and *Artibonite* regions resulting in 3m of mud and flood waters gushing down the mountainsides into the valleys of *Gonavies* and *Port-de-Paix*.

The effects of Hurricane Ivan and Tropical Storm Jeanne were evident everywhere: lives lost, homes without roofs, homes gutted and destroyed by the effects of sea surge and mud slides; schools and churches without roofs and interiors; electricity and telephone lines destroyed; roads and bridges damaged; nutmeg, banana, citrus and root crops destroyed; beaches eroded, unusual sand deposits, coral reefs damaged; and river beds clogged with silt and debris. The full impact of the disaster made itself felt in the destruction of productive capacity and human well-being. The social and economic cost to each country was different as can be seen in Tables 7 and 9.

Table 8 presents an overview of the extent of damage caused to the people living in those territories. It is clear that smaller islands, such as the Cayman and Grenada, had the largest proportion of their population affected, 83 per cent and 79 per cent, respectively, while the bigger States, Jamaica and Haiti had the smaller proportion of their population affected, 14 per cent and 4 per cent, respectively, despite the larger absolute numbers. This has to do as much with dispersal of population as with the meteorological occurrence of the natural event. In the case of Haiti and Jamaica the natural event was contained whereas in the case of Grenada and Grand Cayman the natural event covered the entire island. It is argued that in modern times the pattern witnessed following a natural disaster is a reduction of deaths and injuries, due to better warning systems and other preparedness of the population and an increase in property damage because of the unsuitable building practices and locations used for settlements. Haiti, as can be seen in Table 8, with 3,000 lives lost, as compared to the Cayman Islands, with two lives lost, has not yet arrived at that point of preparedness, as its sister Caribbean territories. There are complex political, economic, environmental and socio-historical factors for Haiti's current situation which, unfortunately, this paper does not have the space or time to address.[28] In regard to property damage, the reason advanced for an apparent increase, has been generally attributed to the fact that the driving force for property development in the Caribbean has been commercial gains and not issues of safety (Gibbs 1998, Pelling 2002, ECLAC 2004).

Table 8
Impact of Hurricane Ivan on Living Conditions of people in four selected countries

COUNTRY	TOTAL POPULATION	AFFECTED POPULATION	PERCENTAGE OF POPULATION	ABSOLUTE NUMBER OF DEATHS	NUMBER OF DWELLING PLACES DAMAGED	PERCENTAGE OF HOUSING STOCK
Cayman Islands	42,397	35,189	83	2	13,535	83
Grenada	102,632	81,553	79	28	28,000	89
Jamaica	2,620,000	369,685	14	17	102,000	14
Haiti	7,929,048	297,926	4	3,000	49,882	3.8

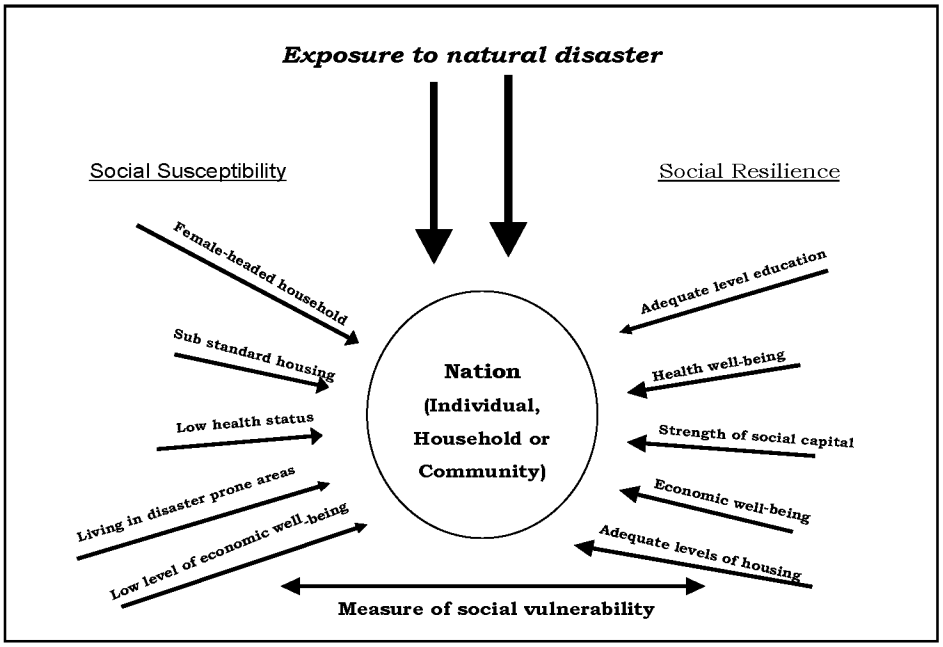
Source: ECLAC Reports of the Assessment of the Socioeconomic Impact

[28] For a deeper appreciation of the Haitian circumstance, the reader may refer to David Nicholls (1985), *Haiti in Caribbean Context,* McMillian Press ltd.

What is it that makes one country more socially vulnerable than others? It can be suggested that in addition to the magnitude of the threat, there is the dynamic interplay among the factors which affect susceptibility and resilience in the social sector that will result in a differential degree of social vulnerability of countries.

Figure IV illustrates the impact of a natural disaster on a national community, and the possible array of factors that may influence the susceptibility or resilience resulting in a degree of vulnerability of the social structure. In the four countries examined, the most common of those factors observed were: the social capital; the quality of housing and location of settlements; the living conditions of female headed households; and the economic well-being of the population.

Figure IV
Framework for the social dimension of vulnerability to a natural disaster



Source: Adapted from Kambon (2002)

Let us look first at the strength of the social capital. This is a central factor both in the preparatory phase to mitigate the effects of the disaster and in response to the reconstruction and return to development following a disaster[29]. It was quite clear in Grenada that those communities which could come together quickly and without outside facilitation would fare well. Those, whose members had a deep sense of connectedness, fared better than those whose population were recent comers to the community.[30] Examples of the first type of the community were villages such as Apres Tout and Rose Hill whose members cleared roads themselves, replaced roofs and rebuilt the homes of the elderly and less secure. Members of these

[29] Pelling (2002) argues that social capital alone does not shape the outcomes of social vulnerability, but because it affects access to social assets such as: political power, and representation, patterns of reciprocity and exclusion, and institutional beliefs and customs, it becomes an important determinant of social vulnerability.

[30] A second visit to Grenada in February 2005, to undertake a gender impact assessment following Hurricane Ivan was undertaken. The report LC/CAR/L.48 is available.

communities still held to the maroon custom of self help and were proud of their independence and capacity. Interestingly, these groups were informed about programmes offered for self improvement and community improvements, offered either by Non-Governmental Organizations or the government, and were poised to take advantage. In the case of the latter communities in which household members did not feel that deep sense of rootedness or connectedness, the slowness to complete the repair process was noticeable. Such communities could be found in the Grande Anse Valley, where recent arrivals, had made their home. They had come mainly from rural communities, in the search of employment and a better life. These groups appeared less informed about available reconstruction programmes and required more assistance in order to better their circumstance.

But this is only one aspect of the social capital equation, that which speaks to trust among members of the community. The other aspect speaks to the trust between the community and its leadership. A trust that is based on the notion that leadership will so structure the use of resources for reconstruction and development that programmes will be initiated and will succeed, and most importantly, will address the strategic and development needs of the population. This link between leadership or policy makers and community is the substance of governance. Lewis suggests that governments need to influence the use of resources because the price mechanism does not always yield "socially acceptable results"[31]. He goes further to suggest that "no country has made economic progress without positive stimulus from intelligent governments"[32]. It is only natural that communities would look to their governments to stimulate the repair process after a natural disaster. All governments had put measures in place to facilitate the repair process. Relief programmes had been well established in all countries under review. They were mobilized and executed jointly through the regional and international community with the national governments, private sector organizations and members of civil society.[33] Recovery and reconstruction, however, in the main were the business of national governments in conjunction with civil society organizations. The execution of these programmes depended on the financial and human resources at the government's disposal. In the Cayman Islands, Jamaica and Grenada, grants were made available to home owners to initiate their own repairs. However, the degree of ease with which those grants reached the intended populations, often depended on the legislative framework and the efficiency of the national level technocrats.

The second factor which affects social vulnerability is the quality of housing and the locations of settlements. Since a significant part of the wealth of Caribbean SIDS is invested in their built environments, damage or destruction of those environments are a serious setback to the development prospects of the country. Such investments can be found in housing, both public and private; schools, hospitals, government buildings: such as libraries, museums and sporting facilities; infrastructure, such as its network of roads and bridges and telecommunications and ports; and its industrial and commercial facilities. It has been suggested that some of the factors which determine the resilience of the built environment, includes appropriate design and location, construction quality and maintenance (CDERA, 2005). Development practitioners following a natural disaster, although anxious to reinvest in

[31] Lewis ibid p. 378
[32] Lewis ibid p. 376
[33] Relief efforts for Jamaica amounted to some US$4.5 million following hurricane Ivan

the 'built environment' may wish to heed Lewis, who warns, that one of the most common faults of development programmes is "to conceive of development too largely in terms of investment in concrete things, and too little in terms of investment in persons".

This paper addresses only one component of the built environment as it impacts on social vulnerability of the nation and that is the private dwelling or housing stock. As can be seen in Table 8, damage to the housing stock has been considerable in the countries under consideration, even where it is small proportionately. Evidence suggests that private dwelling homes in the Caribbean are, in very few instances, built to meet the standard building codes[34], even in countries that have adopted building codes. Table 9 provides some indication as to the status of the four countries in regard to adherence to building codes. It has been suggested that this lack of compliance/adherence has to do with the substantial portion of housing that is built through an informal construction sector. This informal sector has not received adequate or sufficient training to allow its members to be able to adhere or conform to building standards. The result is that much of the housing is vulnerable to the impacts of natural hazards. Definitely, there is need for increased investment to strengthen community capacity in this area of construction and to seek a more responsible role for the private sector. In addition there are many complications in the legal framework of land entitlement and use, which make it impossible for land holders to access adequate funding to construct outside of this informal sector. All of these complications are making support for the repair and rebuilding of damaged homes in Grenada a very slow and cumbersome process.

[34] In 1986 the Caribbean Uniform Building Code or CUBiC was formally accepted by CARICOM Council of Ministers of Health, after two decades of work to develop such a standard. It was developed to provide appropriate building standards for the Caribbean region. To date only three Caribbean countries have made the code mandatory, through laws in Parliament. In the Eastern Caribbean, a model building code, based on CUBiC has been developed to facilitate the introduction of national codes. A project is underway supported by CDB for the revision of the code. Sale and distribution of the code is under the authority of the Council of Caribbean Engineering Organizations.

Table 9
Indicators of the use of vulnerability risk reduction measures

COUNTRY	EARLY WARNING SYSTEMS IN PLACE	EVACUATION OF POPULATIONS AT RISK	ADOPTION AND USE OF BUILDING CODES
Cayman Islands	yes	yes	Adoption and Use of South Florida Building Codes and currently have their standard code : the SBCCI, the Standard Building Code of the Cayman Islands
Grenada	no	no	Adoption of OECS Building Codes (not implemented)
Jamaica	yes	yes	Jamaica National Building Code under consideration (based on CUBiC
Haiti	no	no	No building codes in use

Source: Gibbs (retrieved 1/26/2005 from http://www.disaster-info.net/carib/buildingcodes comparison1.htm; Wason (2001) retrieved 1/26/2005 from http://oas.org/pdgm/document/codemtrx.htm)

In the Cayman Islands where luxury houses were as completely damaged as low income homes, location of the housing was a central factor. The difference of course was in regard to the burden of repair. Not surprisingly, larger proportions of the wealthy had insurance coverage than the poor[35]. However, many who were insured, were underinsured and without insurance to the contents of their household. These groups suffered enormous damage as sea surge and water inundation was the main impact of the hurricane. Even though the type of damage to the housing stock in the Grand Cayman was qualitatively different than that of Grenada, the end result was that over 80 per cent of the housing stock of both countries was destroyed or severely damaged. Table 8 presents proportion of housing stock damaged or destroyed.

In examining the living conditions of female-headed households, development practitioners and policy makers may be guided by Lewis, who suggests that development should benefit women. He argues:

> "In underdeveloped countries woman is a drudge, doing in the household tasks which in more advanced societies are done by mechanical power – grinding grain for hours, walking miles to fetch pails of water, and so on. Economic growth transfers these and many other tasks – spinning and weaving, teaching children, minding the sick – to external establishments, where they are done with greater specialization and greater capital, and with all the advantages of large scale production. In the process woman gains freedom from drudgery, is emancipated from the seclusion of the household, and gains at last the chance to be a full human being, exercising her mind and her talents in the same way as men."

[35] Research in the region suggests that not more than 30 per cent of the private dwellings in any territory in the region are insured.

The living conditions of female heads of households have developed as one of the central factors in Caribbean SIDS, which influences the degree of vulnerability of the society. This is so because of the significantly larger proportions of households in the Caribbean that are headed by women, than other parts of the globe,[36] and the fact that in the Caribbean, female headship is younger and with more children than in the developed parts of the world where female headship is characterized as elderly (ECLAC 1996). In addition, female-headed households in the Caribbean tend to be multi-generational, thus increasing the burden of care on the key provider. In four of the three countries under study – Grenada, Jamaica and Haiti, female headship accounted for 48 per cent, 45 per cent, 38 per cent of the households, respectively.[37] In Jamaica female headed households were overrepresented among the households that were reported to be destroyed or damaged, and in Grenada, it was quite clear that female heads of households were at a disadvantage to participate in income earning activities during the reconstruction processes, as they lacked the skills required for entry into the construction industry and had the burden of care for large numbers of children and the elderly. In addition, female unemployment rates are higher in the Caribbean than male rates and research has indicated that wage differentials are to the disadvantage of females, regardless of educational status.[38] Large numbers of women work in the informal sector, which in countries such as Jamaica, Haiti and Grenada became quite depressed following the disaster as local produce which could be sold were damaged or destroyed.[39] Assets held in small and micro business, such as shops and parlours, run from homes and small kiosks were destroyed and women found themselves doubly in debt. Women were called upon first to pay for lost assets and secondly to pay for assets which they purchased anew to reestablish their businesses. [40]

The economic well-being of the population is another key factor which affects the susceptibility and/or resilience of the population. There are close links between poverty, low-income populations, and communities being disproportionately affected by natural hazards. In the four countries examined, each had significant proportions of their populations living in poverty, as presented in Table 2, Grenada 32 per cent, Jamaica 19 per cent and Haiti 67 per cent. The proportion of the population living below the poverty line in the Cayman was not known as no poverty assessment had been conducted. The disaster assessment reports (ECLAC 2004 a, b, c, 2005) pointed to the fact that the hardest hit were those who lived in the most precarious locations and circumstances due to their livelihoods and low income earning capacities, such as the communities found in Portland Cottage in Jamaica, Watlers Road in the Cayman and Soubise and D'rbeau Hill in Grenada, and parts of Gonaives in Haiti. It was clear that household income was a major factor because even where persons from higher income

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[36] In the World's Women: Trends and Statistics 2000, the Caribbean ranks second with an average of 36 per cent of Female Headed Households (FHH) after Southern Africa, with 42 per cent. The rest of sub-Saharan Africa, Central America and South America have on average of 22 per cent, FHH.

[37] In the Cayman Islands data for headship was unavailable. Headship data from Grenada and Jamaica taken from the ECLAC Disaster Assessment Reports. Headship data for Haiti sourced from ECLAC (1996)

[38] See the discussion of gender inequality regarding income and education in papers prepared by Andaiye and Dr. Barbara Bailey, respectively, in *Gender Equality in the Caribbean: Reality or Illusion,* edited by Gemma Tang Nain and Barbara Bailey for the CARICOM Secretariat (2003), published by Ian Randle

[39] IICA's research on women small farmers in the Caribbean supports the notion that the marketing of domestic agricultural produce is dominated by women.

[40] The United Nations document "Building the Resilience of nations and communities to disasters: Framework for Action 2005-2015" , in paragraph 14 d, calls for a gender perspective to be integrated into" all disaster risk management policies, plans and decision-making processes, including those related to risk assessment, early warning, information management, and education training".

groups were severely affected, such as in the Cayman, along Seven Mile Beach, they were better able to buffer against the ill effects of the disaster through mechanisms such as insurance, savings, family assets and remittances. There is little disagreement that in order to reduce vulnerability, efforts will have to be made at influencing the distribution of wealth, resources and assets[41].

Table 10
Sectoral distribution of the impact of Hurricane Ivan on four selected countries

COUNTRY	IMPACT ON PRODUCTIVE SECTORS IN US$MILLIONS	IMPACT ON INFRASTRUCTURE IN US$ MILLIONS	IMPACT ON SOCIAL SECTORS IN US$ MILLIONS	IMPACT OF SOCIAL SECTOR AS % OF TOTAL SOCIO-ECONOMIC IMPACT[42]	TOTAL SOCIOECONOMIC IMPACT MILLIONS OF US$	IMPACT OF DISASTER AS % OF GDP
Cayman Islands	1117.7	488.4	1810.3	.53	3416.4	138.0
Grenada	539.2	262.4	1588	.66	2389.6	212.0
Jamaica	215.7	112.7	220.7	.40	549.1	8.0
Haiti	83.3	33.9	125.8	.52	243.0	4.5

Source: ECLAC Reports on the Socio Economic Assessments of the Natural Disasters

It is clear from Table 10, above that the social sector which includes housing, education and health, taking account of both infrastructure and services, accounts in most instances for more than 50 per cent of the total socio-economic impact of the disasters. The impact on Jamaica's social sector, for example, was the lowest, 40 per cent, while Grenada had the highest impact, with 66 per cent. Haiti and the Cayman Islands followed with 52 per cent and 53 per cent, respectively. Grenada, where the highest share of the impact of the disaster could be attributed to the impact on the social sector, also had the highest overall impact of the disaster to its GDP, 212 per cent, followed by the Cayman islands 138 per cent. For Jamaica and Haiti the impact on GDP was relatively low, 8 per cent and 4.5 per cent, respectively.

The author would like to suggest that by building resilience in the four areas discussed: (i) the social capital, (ii) the quality of housing and location of settlements, (iii) the living conditions of female-headed households and (iv) the economic well-being of the population, thus reducing the vulnerability in the social sectors, much can be done to reduce the overall vulnerability of Caribbean SIDS.

[41] Lewis in outlining the functions of government which are relevant to economic growth, highlights influencing the distribution of income and ensuring full employment, among other functions such as: maintaining public services, influencing attitudes, shaping economic institutions, influencing the use of resources, controlling the quantity of money, controlling fluctuations, and influencing the level of investment.

[42] The ECLAC methodology requires the estimation of damage and losses at present market value, taking into account the value of direct damage to stocks and inventories and indirect losses due to increased costs as a result of the natural disaster. A full discussion on the methodology can be seen in the ECLAC Disaster Training Manual for Caribbean SIDS (L/CAR/L.12 (2004)).

5. CONCLUSIONS

Professor Lewis outlines nine ways in which governments may bring about economic stagnation or decline: by failing to maintain order; by plundering its citizens; by promoting the exploitation of one class by another; by placing obstacles in the way of foreign intercourse; by neglecting the public services; by excessive laissez-faire; by excessive control; by excessive spending and by embarking upon costly wars.[43] Following a natural disaster, governments in the region would do well to examine their actions against Professor Lewis' checklist.

A natural disaster can be likened to the experience of a war. In one moment households communities and nations are intact and in the next in calamity, experiencing personal harm and loss of material assets. What lessons for development can be learned by the harsh experiences of our neighbours?

There are many, but the author wishes to highlight two types of lessons, for convenience framed as direct and indirect. Neither is easy to resolve nor is without economic or social costs. The direct lessons are:

1. That repair and maintenance plans and schedules for public buildings such as schools, day-care centres, hospitals and libraries need to be formulated and implemented, as these structures provide the infrastructure through which the human resource is formed. For small States, this fashioning of the human resource is critical for development.

2. That the suffering and pain caused by loss of homes, in addition to the costs resulting from damage to the housing sector suggest that more attention needs to be paid to this sector. In each instance it was clear that slight regard for building codes and land use policies were the norm. It was also clear that the region's professional class of architects and engineers seemed not to have been able to take up the challenge of development and create a variety of low cost housing, which meets the aesthetic and safety needs of the population. Adequate housing is a basic right and will reduce State vulnerability to natural disasters; therefore emphasis should be placed on the provision of such.

3. That the necessity for migration into urban centres or what is perceived as such, and the creation of urban slums, with its attendant social problems of ghetto culture, violent crime against the person, gender-based violence, over crowdedness, unsanitary living conditions and a sense of hopelessness, needs to be addressed so as to reduce the vulnerability of the nation State. One way to address the issue is to reduce the development gap between the rural and the urban environment and to engage in programmes of urban renewal and risk and vulnerability reduction.

4. That members of populations, who are unaware and uninformed about a natural event that may pose a threat, are threats to their own safety and that of others. They are unable to take measures for their own safety, and thus increase the burden on the State. It was clear from the review those countries that had pro active systems in place, saved

[43] Lewis ibid p 376.

lives and reduced damage. Early warning systems and mechanisms for the preparation of the populations are therefore essential instruments that protect and save lives, property and livelihoods and contribute to the sustainability of development.

The indirect lessons are structural ones, which affect the very dynamic of national development. They include:

1. The necessity for the inclusion of land tenure and use policies, which are based on equity and social justice, into the national development framework. These policies need to take into account the social susceptibility found among female-headed households and provide the requisite social protection measures. It is obvious that the lack of these policies acts as a constraint to effective and efficient reconstruction and development following a natural disaster. Their absence or inappropriateness increases the susceptibility of the population to natural events, as the most affected are too often found living in precarious locations and conditions.

2. The need for improvements in governance and the institutions of governance. As we are reminded by Professor Lewis, governmental institutions can either delay the processes of moving forward or facilitate it. The review demonstrated the benefits of efficient and pro active governmental institutions, capable of responding to a natural disaster. Examples of such institutions could be found in Jamaica through agencies such as ODPEM, and to a lesser extent in the Cayman Islands, through its Social Services Department. Issues of transparency and accountability were everywhere indicating that all governments could improve management processes, while at the same time being mindful of the issues of trust which are embedded in these notions. All would benefit from deepening local government structures, formal or informal, so that a clearer sense of what is required for reconstruction on the ground is available to the policy makers who function at the centre.

3. Finally, but not unconnected from the above, is the need for Caribbean SIDS to strengthen their capacity to withstand the negative impacts of globalization, particularly in regard to the erosion of social capital, while taking advantage of the opportunities which globalization presents. This would be useful in light of the significance of the role of social capital in the reduction of vulnerability and the enabling of the success of the development project itself.

Annex 1

NATURAL EVENTS FOR THE PERIOD 1980 – 2004 FOR SELECTED CARIBBEAN SMALL ISLAND STATES

DATE	COUNTRY	LOCATION	EVENT	IMPACT	DISASTER CODE
12/Sep/2004	Cayman Islands	Grand Cayman	Wind Storm Hurricane Ivan	1 dead	2004-0462
13/Aug/2004	Cayman Islands		Wind Storm Hurricane Charley		2004-0415
30/Sep/2002	Cayman Islands	Cayman Brac, Little Cayman	Wind Storm Hurricane Lili	300 affected	2002-0626
8/Sep/2004	Grenada		Wind Storm Hurricane Ivan	39 dead 60,000 affected	2004-0462
14/Nov/1999	Grenada	Grand Anse, St John's, St Mark's, Western Carriacou, Petit Martinique, St George's	Wind Storm Hurricane Lenny	210 affected 5,500 (,000) us$ damage	1999-0527
26/Jul/1990	Grenada	South of the Island	Wind Storm Tropical storm Arthur	1,000 affected	1990-0046
4/Aug/1980	Grenada		Wind Storm Hurricane Allen	5,300 (,000) us$ damage	1980-0305
2003	Haiti	Saint Nicolas, Bombardipolis, Baie de Henne Jean Rabel (Far West Region)	Drought	35,000 affected	2003-0758
1983	Haiti		Drought		1983-0326
1982	Haiti		Drought		1982-0287
12/Jun/1981	Haiti	Southwest	Drought	103,000 affected	1981-0132
23/May/2004 1/Jun/2004	Haiti	Fonds Verrettes (West department), Mapou (Southeast department) – Jacmel, Grand Gosier, Bodarie	Flood	2,665 dead 153 injured 31,130 affected	2004-0231
27/Mar/2003 29/Mar/2003	Haiti	Cap Haitien	Flood	 320 homeless	2003-0759
20/Dec/2003 22/Dec/2003	Haiti	Cap-Haitien, Port-De-Paix	Flood	38 dead 150,000 affected	2003-0624
29/Aug/2003 30/Aug/2003	Haiti	Saint-Marc (Artibonite district)	Flood Flash Flood	24 dead 70 injured 12,000 homeless	2003-0439
24/May/2002 27/May/2002	Haiti	Azile, Grand Anse, Les Cayes, Port Salut, Chantal, Cap Tiburon, Department of Sud	Flood Flash Flood	31 dead 38,335 affected	2002-0321

DATE	COUNTRY	LOCATION	EVENT	IMPACT	DISASTER CODE
15/May/2001	Haiti	Petion-Ville, Nord, Artibonite, Grand'Anse	Flood	26 dead 11 injured 5,070 affected	2001-0207
Dec/2000	Haiti	Abricots region (Grand'Anse department)	Flood	12 dead 1,200 homeless	2000-0797
Nov/2000	Haiti	Cap Haitien, Bahon, Parois, Limonade	Flood	4 dead	2000-0722
Feb/1996	Haiti	North, Northwest, Grande Anse, Gonave Is.	Flood		1996-0025
11/Nov/1993	Haiti		Flood	13 dead 5,000 affected	1993-0574
30/Aug/1989	Haiti	Cazales	Flood	 205 affected	1989-0214
23/Feb/1989	Haiti	La Gonave Isl.	Flood	 24,725 affected	1989-0211
8/Oct/1988	Haiti	Leogane	Flood	 200 homeless	1988-0596
30/Sep/1988	Haiti	Port-au-Prince	Flood	12 dead 200 homeless	1988-0596
20/Jun/1988	Haiti	Estere	Flood	 2,500 affected	1988-0594
27/Jan/1988	Haiti	North-West	Flood	15 dead 1 injured 1,000 affected	1988-0060
8/May/1987	Haiti	Delmas, Caradeux, Port-au-Prince	Flood	 105 affected	1987-0256
27/Apr/1987	Haiti	Port-De-Paix	Flood	 655 affected	1987-0256
Dec/1987	Haiti	Southern	Flood	 3,000 affected	1987-0222

DATE	COUNTRY	LOCATION	EVENT	IMPACT	DISASTER CODE
10/Jul/1987	Haiti	Port-au-Prince	Flood	33 dead 150 injured 5,000 affected	1987-0127
23/Oct/1986	Haiti	La Gonave Island	Flood	69 dead 45,000 affected	1986-0125
1/Jun/1986	Haiti	Les Cayes Area	Flood	79 dead 660 injured 13,200 homeless 85,000 affected	1986-0070
16 Oct/1989	Haiti	Port-au-Prince	Slides Landslide	 60 injured 1,000 homeless	1989-0217
17/Sep/2004 18/Sep/2004	Haiti	Artibonite, Plateau Central, Sud, North-West department, Gonaives, Passereine, Portail, Mapou	Wind Storm Hurricane Jeanne	2,654 dead 2,620 injured 14,048 homeless 298,926 affected 21,000 (,000) us$ damage	2004-0473
13/Sep/2004	Haiti	Cap-Haitien, Les Cayes	Wind Store Hurricane Ivan	3 dead 2,500 homeless 4,000 affected	2004-0462
6/Oct/2003	Haiti	Port-au-Prince	Wind Store Store	26 dead 5 injured 150 homeless	2003-0495
30/Sep/2002	Haiti		Wind Storm Hurricane Lili	26 dead 5 injured 150 homeless 250 affected	2002-0657
22/Sep/1998	Haiti	Cap-Haitien, Jacmel, Cayes, Port Au Prince	Wind Storm Hurricane Georges	190 dead 29 injured 12,000 affected 80,000 (,000) us$ damage	1998-0380
23/Oct/1996	Haiti	Henne Bay	Wind Storm Storm	40 dead 115 homeless	1996-0244

DATE	COUNTRY	LOCATION	EVENT	IMPACT	DISASTER CODE
15/Nov/1994	Haiti	Jacmel, Port au Prince, les mones du massif de la Selle, Leogane, Southern Haiti	Wind Store Storm Gordon	1,122 dead 87,000 homeless 1,500,000 affected	1994-0510
27/Jul/1990	Haiti		Wind Store Tropical Store Arthur		1990-0041
11/Sep/1988	Haiti	Anse-a-Veau, Camp-Perrin, Cavaillon, Cayes, Ile-a-Vache, Jacmel, Jeremlie, Kenscoff, Port-Salut	Wind Store Hurricane Gilbert	54 dead 870,000 affected 91,286 (,000) us$ damage	1988-0424
5/Aug/1980	Haiti	South-West, Port-au-Prince	Wind Storm Hurricane Allen	300 dead 330,000 affected 40,000 (,000) us$ damage	1980-0078
Mar/2000	Jamaica		Drought	 6,000 (,000) us$ damage	2000-0138
Feb/1983	Jamaica		Drought		1983-0327
Jan/1982	Jamaica		Drought		1982-0289
Jan/1981	Jamaica		Drought		1981-0209
23/May/2002 31/May/2002	Jamaica	Manchester, Kingston, Clarendon, St Catherine, St Thomas, St Ann, Portland, St Elizabeth	Flood	9 dead 25,000 affected 1,114,300),000) us$ damage	2002-0325
21/May/1993	Jamaica	Clarendon, Portland, St Catherine, Kingston, St Thomas, St Andrew, Westmoreland, Trehawny	Flood	9 dead 82 homeless 4,290 affected 11,000 (,000) us$ damage	1993-0036
21/May/1991	Jamaica	Kingston, St Catherine	Flood	 1,340 homeless 550,000 affected 30,000(,000) us$ damage	1991-0128
29/Jan/1988	Jamaica	Linstead area of St Catherine	Flood	 440,000 (,000) us$ damage	1988-0061
Nov/1987	Jamaica		Flood	9 dead 26,000 affected 31,000 (,000) us$ damage	1987-0326

DATE	COUNTRY	LOCATION	EVENT	IMPACT	DISASTER CODE
15/May/1986	Jamaica	Entire Island, especially the Parishes of Westmoreland, Clarendon and Ste. Catherine	Flood	54 dead 40,000 affected 76,000(,000) us$ damage	1986-0060
11/Sep/2004	Jamaica	Clarendon, Westmoreland, St Catherine, St Elizabeth, St Thomas, St Ann, Trelawny, Kingston	Wind Storm Hurricane Ivan	15 dead 350,000 affected 111,000 (,000) us$ damage	2004-0462
13/Aug/2004	Jamaica	St Elizabeth parish	Wind Storm Hurricane Charley	1 dead 6 injured 120 affected	2004-0415
20/Sep/2002	Jamaica	Westmoreland, Clarendon, Hanover	Wind Storm Hurricane Isidore		2002-0656
30/Sep/2002	Jamaica	St Thomas, St Andrews, St Elizabeth, Claremont, Kingston, St Thomas parishes (Westmoreland)	Wind Storm Hurricane Lili	4 dead 1,500 affected	2002-0627
6/Nov/2001	Jamaica		Wind Storm Hurricane Michelle	19 dead 200 homeless 18,330(,000) us$ damage	2001-0615
21/Nov/1996	Jamaica		Wind Storm Tropical Storm Marco	 800 homeless 3,000 (,000) us$ damage	1996-0266
16/Nov/1994	Jamaica	St Elizabeth, Clarendon, St Catherine, Kingston, St Thomas, Portland	Wind Storm Storm Gordon	4 dead	1994-0516
12/Sep/1988	Jamaica	Entire country	Wind Storm Hurricane Gilbert	49 dead 810,000 affected 1,000,000(,000) us$ damage	1988-0427
18/Nov/1985	Jamaica	Southern, Central (Clarendon, Manchester, St Elizabeth)	Wind Storm Hurricane Kate	7 dead 300 homeless 5,200(,000) us$ damage	1985-0133
5/Aug/1980	Jamaica	North coast	Wind Storm Hurricane Allen	6 dead 9 injured 30,000 affected 64,000 (,000) us$ damage	1980-0079

Created on: Jan-27-2005 – Date version: v12.04
Source: "EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net – Universite Catholique de Louvain – Brussels – Belgium"

Annex 2

List of Small Island Developing States (SIDS) - Latin America and the Caribbean

	COUNTRY	CAPITAL
1.	**Anguilla** 1/ 2/ Population: 13,008 (July 2004 estimate) a/ ; Terrain: flat and low-lying island of coral and limestone; Coastline: 61 km	The Valley
2.	**Antigua and Barbuda** Population: 65,000 (2002); Terrain: low-lying limestone and coral islands; Coastline: 153 km ***Key Document***: *National Assessment Report*	St. John's
3.	**Aruba** 1/ 2/ Population: 108,000 (2002)	Oranjestad
4.	**Bahamas** Population: 312,000 (2002); Terrain: long, flat coral formations; Coastline: 3,542 km ***Key Document***: *National Assessment Report*	Nassau
5.	**Barbados** Population: 269,000 (2002); Terrain: flat, central highland; Coastline: 97 km ***Key Document***: *National Assessment Report*	Bridgetown
6.	**Belize** Population: 272,945 (July 2004 estimate) a/ ; Terrain: flat, swampy coastal plain; low mountains in south; Coastline: 386 km ***Key Document***: *National Assessment Report*	Belmopan
7.	**British Virgin Islands** Population: 22,187 (July 2004 estimate) a/ ; Terrain: coral islands relatively flat; volcanic islands steep, hilly; Coastline: 80 km	Road Town
8.	**Cuba** Population: 11,273,500 (2002); Terrain: terraced plains, small hills, mountains; Coastline: 5,746 km	Havana
9.	**Dominica** Population: 70,000 (2002); Terrain: rugged mountains of volcanic origin; Coastline: 148 km ***Key Document***: *National Assessment Report*	Roseau
10.	**Dominican Republic** 2/ Population: 8,639,000 (2002)	Santa Domigo
11.	**Grenada** Population: 94,000 (2002); Terrain: volcanic in origin, central mountains; Coastline: 121 km ***Key Document***: *National Assessment Report*	St. George's
12.	**Guyana** Population: 705,803 (July 2004 estimate) a/ ; Terrain: mostly rolling highlands; low coastal plain; savanna in south; Coastline: 459 km ***Key Document***: *National Assessment Report*	Georgetown
13.	**Haiti** Population: 8,400,000 (2002) ***Key Document***: *National Assessment Report*	Port-au-Prince

	COUNTRY	CAPITAL
14.	**Jamaica** Population: 2,621,000 (2002); Terrain: narrow coastal plains, mountains; Coastline: 1,022 km ***Key Document***: *National Assessment Report*	Kingston
15.	**Montserrat** 1/ 2/ Population: 9,245 (July 2004 estimate) a/ ; Terrain: volcanic island, mostly mountainous, with small coastal lowland; Coastline: 40 km	Plymouth
16.	**Netherlands Antilles** 1/ Population: 219,000 (2002); Terrain: hilly, volcanic interiors; Coastline: 364 km	Willemstad
17.	**Puerto Rico** 1/ Population: 3,897,960 (July 2004 estimate) a/ ; Terrain: mostly mountains with coastal plain belt in north; mountains precipitous to sea on west coast; sandy beaches along most coastal areas; Coastline: 501 km	San Juan
18.	**Saint Kitts and Nevis** Population: 38,000 (2002); Terrain: volcanic, mountainous interiors; Coastline: 135 km ***Key Document***: *National Assessment Report*	Basseterre
19.	**Saint Lucia** Population: 151,000 (2002); Terrain: volcanic, mountainous with broad valleys; Coastline: 158 km ***Key Document***: *National Assessment Report*	Castries
20.	**Saint Vincent and the Grenadines** Population: 115,000 (2002); Terrain: volcanic, mountainous; Coastline: 84 km ***Key Document***: *National Assessment Report*	Kingstown
21.	**Suriname** Population: 436,935 (July 2004 estimate) a/ ; Terrain: mostly rolling hills; narrow coastal plain with swamps; Coastline: 386 km ***Key Document***: *National Assessment Report*	Paramaribo
22.	**Trinidad and Tobago** Population: 1,306,000 (2002); Terrain: flat, hilly, mountainous; Coastline: km ***Key Document***: *National Assessment Report*	Port-of-Spain
23.	**United States Virgin Islands** 1/ Population: 124,000 (2002); Terrain: hilly, rugged, mountainous; Coastline: 188 km	Charlotte Amalie

Source: Small Island Developing States Network. http://www.sidsnet.org/sids_list.html, 1/29/2005.

1/ Associate Member of a United Nations Regional Commission
2/ Not a Member or Observer of the Alliance of Small Island States (AOSIS)
3/ States non-Members of the United Nations
NOTE: Population figures were obtained from the World Statistics Pocketbook, Small Island Developing States, United Nations Department of Economic and Social Affairs (containing data available as of 31 March, 2003).
a/ Population Figures Obtained from the CIA Factbook

Annex 3

The Saffir-Simpson Hurricane Scale

CATEGORY	DESCRIPTION
Category One Hurricane:	Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage. Hurricanes Allison of 1995 and Danny of 1997 were Category One hurricanes at peak intensity.
Category Two Hurricane:	Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings. Hurricane Bonnie of 1998 was a Category Two hurricane when it hit the North Carolina coast, while Hurricane Georges of 1998 was a Category Two Hurricane when it hit the Florida Keys and the Mississippi Gulf Coast.
Category Three Hurricane:	Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required. Hurricanes Roxanne of 1995 and Fran of 1996 were Category Three hurricanes at landfall on the Yucatan Peninsula of Mexico and in North Carolina, respectively.
Category Four Hurricane:	Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km). Hurricane Luis of 1995 was a Category Four hurricane while moving over the Leeward Islands. Hurricanes Felix and Opal of 1995 also reached Category Four status at peak intensity.
Category Five Hurricane:	Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required. Hurricane Mitch of 1998 was a Category Five hurricane at peak intensity over the western Caribbean. Hurricane Gilbert of 1988 was a Category Five hurricane at peak intensity and is one of the strongest Atlantic tropical cyclones of record.

Source: National Weather Service, Tropical Prediction Centre, National Hurricane Center. http://www.nhc.noaa.gov/aboutsshs.shtml, 1/25/2005

Annex 4
Social and Economic consequences of a Natural Disaster

Type of disaster	Short-term migrations	Permanent migration	Loss of housing	Loss of industrial trial production	Loss of business production	Loss of crops	Damage to infrastructure	Disruption of marketing systems	Disruption of transport systems	Disruption of communications	Panic	Breakdown of social order
Earthquake			X	X	X		X	X	X	X	X	X
Hurricane/Cyclone			X	X	X	X	X	X		X		X
Flood	X		X	X	X	X	X		X	X		X
Tsunami			X	X	X	X	X			X	X	X
Volcanic eruption	X		X			X		X			X	X
Fire	X		X	X	X	X	X			X	X	X
Drought/Famine	X	X				X						

Source: Adapted from ECLAC Manual for Estimating the Socio-Economic Effects of Natural Disasters (1999)

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