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DISASTER ASSESSMENT IN THE SUBREGION: ECLAC's METHODOLOGY

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Summary

The objective of this paper is to briefly present the disaster assessment methodologies, mainly emergency situation ones, available and used in the subregion and to compare them with the disaster assessment methodology developed by the Economic Commission for Latin America and the Caribbean (ECLAC), which has a more pronounced post-disaster, long-term focus and has been perfected by its use for more than two decades in several countries in the region. This comparison is exemplified by the presentation of the results of two recent ECLAC missions to hurricane-stricken countries in the subregion during which this methodology was used.

Introduction

As we know, the Caribbean is a disaster-prone area 1/. Yearly, the so-called "hurricane season" systematically wreaks havoc in the subregion, most notably among the countries of its outer Atlantic arch, causing heavy damages in human and economic terms, disrupting economic activities, destroying the existing infrastructures, exerting a heavy toll in terms of human lives. Additionally, other types of natural disasters, most notably the recent series of volcanic eruptions in Montserrat, also happen in the subregion. Therefore, a disaster-related structure must be seen as indispensable in the subregion.

1/ Estimates made by ECLAC indicate that in an average year natural disasters in Latin America and the Caribbean cause material and production losses valued at more than US$1,500 million as well as more than 6,000 deaths. See Jovel, R., *Natural Disasters and Their Economic and Social Impact,* CEPAL Review, n° 38, Santiago, Chile, 1989. In 1995 the number of losses due to natural disasters surpassed US$1,100 million in two islands in the subregion, with no official casualties. See ECLAC, *"The Macro-Economic Effects and Reconstruction Requirements Following Hurricane Luis in the Island of Anguilla"*, LC/MEX/L.289, LC/CAR/L.462, 1995 and *"The Macro-Economic Effects and Reconstruction Requirements Following Hurricanes Luis and Marilyn in Sint Maarten, Netherlands Antilles"*, LC/MEX/L.290, LC/CAR/L.463, 1995.

Reflecting these needs, the Caribbean already has a relatively sophisticated regional disaster-management structure in place, the so-called "Regional Response Mechanism" (RRM)1/, that embraces all the National Disaster Coordinators (NDCs) of its member countries, the Eastern Caribbean Donor Disaster Coordination Group 1/ (chaired by the United Nations Development Programme (UNDP), Barbados), the Caribbean Disaster Relief Unit (CDRU) and the Caribbean Disaster Emergency Response Agency (CDERA) whose participating States include BVI, Barbados, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts/Nevis, St. Lucia, St. Vincent and Grenadines, Trinidad and Tobago, Turks and Caicos. This regional mechanism also has ties with a set of international agencies and organizations that work in the subregion with a traditional or institutional role in this area (among others, the UNDP, the Office of the United Nations Disaster

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2/ In the Caribbean Basin, as a whole, several disaster-related agencies and systems actually coexist. The non-independent territories usually have their National Disaster Coordinators (NDCs) linked to the respective agencies in their mother countries (like the USA's FEMA) and Central America has a joint organization that is part of the Central American Integration System, the Centro de Coordinación para La Prevención de Desastres Naturales en América Central (CEPREDENAC), with headquarters in Panama and national commissions in each member country.

3/ Members, by category, are as follows: Chairman - UNDP; Response agencies - CDERA, RSS (Regional Security System); Support agencies - IDB (Inter-American Development Bank), OAS (Organization of American States); Donors - BDD (British Development Division), CDB (Caribbean Development Bank), CIDA, EU, PAHO, UNICEF (United Nations Children's Fund), USAID; Local response agencies - BARMET (Barbados Meteorological Office), BDF (Barbados Defense Force), CERO (Central Emergency Relief Organization); Joint disaster response agencies - FAO (United Nations Food and Agriculture Organization), ITU (International Telecommunications Union), UNCHS (United Nations Centre for Human Settlements), UNV (United Nations Volunteers), WFP (World Food Programme).

Relief Coordinator (UNDRO), Pan American Health Organization (PAHO), International Federation of Red Cross and Red Crescent Societies (IFRCS), U.S. Office of Foreign Disaster Assistance (USAID/OFDA), Canadian International Development Agency (CIDA), the European Union (EU) and the United Kingdom's overseas development agency, the BDD.

The subregional agency inside the Regional Response Mechanism responsible for the disaster-assessment procedures is CDERA. The Barbados-based CDERA uses a disaster assessment methodology 1/ based on that of UNDRO.1/.

4/ See UNDP/UNDRO, *Disaster Management Manual.* Actually the UNDRO was one of the organizations involved in the creation of the CDERA and RRM structures, through the Pan Caribbean Disaster Preparedness and Prevention Project (PCDPPP) in the early 1980s, and it still participates in regional disaster-related efforts and organisms.

5/ See UNDRO, *Disaster Prevention and Mitigation: A Compendium of Current Knowledge,* New York, 1979.

UNDRO's disaster-assessment methodology is a traditional, mostly "static" one. Its main concern lies in assessing the damage immediately caused by the natural disaster, since its first objective is to establish the needs for immediate emergency measures *to save and sustain the lives of survivors*. In other words, it is mainly a phase-one - *emergency* - methodology. Assessment of this type provides the necessary information support for emergency decision makers, a specific user or group of users who are making decisions about emergency resource-allocation in what is usually a fast-changing and stressful environment, in the immediate post-disaster phase. Identifying the losses and possibilities for facilitating the long-term recovery and development needs is perhaps understandably considered only as a secondary priority in this kind of situation 1/.

Usually in underdeveloped countries the loss of life and limb is considerably greater than the losses in terms of capital and infrastructure, contrary to what happens in developed countries. This is due to the greater degree of capital accumulation and the existence of a previous warning and disaster-management structure in the latter. The Caribbean, in this respect, has a pattern that conforms more with that of the developed countries: it already has the relatively sophisticated

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5/ See UNDP/UNDRO, *ibid.*

warning and disaster-management structures both at national1/ and regional1/ levels described above and, partly as a result of this, the economic losses are usually greater than the human casualties1/.

ECLAC's Methodology

ECLAC's disaster-assessment methodology 1/, on the other hand, has a more post-disaster focus, trying to identify basically the long-term social and, especially, economic effects of a natural disaster. In other words, its main concerns lie in phase two - *rehabilitation and recuperation*, also called *transition* - and phase three - *reconstruction* - of the post-disaster situation 1/.

7/ As an example of the high level of preparedness in some more developed Caribbean countries, see NEMA (National Emergency Management Agency) - the NDC for the Republic of Trinidad and Tobago - national plan for disaster situations (See NEMA, 1996 (a)).

8/ Including regional disaster-resistant construction codes for some of the regional groupings, like that of the OECS - one of the outcomes of a joint UNDP/UNCHS/OECS project - (See NEMA, 1996 (b)) and CARICOM's Caribbean Uniform Building Code (See NEMA/CARICOM, 1996).

9/ Also the type of natural disaster that affects most of the region contributes to this - disasters of a meteorological nature cause less victims on average that those of a geological nature.

10/ See ECLAC, *Manual Para la Estimación de Los Efectos Socioeconómicos de Los Desastres Naturales*, Santiago, Chile, 1991.

11/ It must be noted that this is actually more of a difference in the intensity of the focus of these different analytical approaches. UNDRO (See UNDRO, *ibidem*, and UNDP/UNDRO, *ibidem*) works clearly recognize the importance of the indirect and secondary costs and effects of disasters, and

ECLAC's methodology itself is based in some methodological and conceptual breakthroughs from UNDRO's works in the late 1970s (See UNDRO, *ibidem*).

ECLAC's procedure has, in this respect, some major advantages, notably its attempt to evaluate the economic losses not only in the usual static manner, namely, assessing the destroyed and lost infrastructures, but also in a dynamic and sectoral perspective, that is, calculating future losses derived by the destruction of productive structure and forfeitures of business opportunities and its middle/long-term effects in terms of growth rate, employment figures, inflation level, trade and fiscal balances. It should be added that the importance of these secondary and indirect effects is usually greater in developing countries, due to the fact that these countries have comparatively fewer available resources than developed countries to bring their economies back to its previous growth path.

An additional important feature of this methodology is that it also aims to enable its users to try to define *if and which type of international cooperation* the country affected may need. A precise knowledge of the sectoral damages and losses, present and future, suffered by the countries, enables its government to make a more precise targeting of the reconstruction projects and a more adequate eventual negotiation with the international donor community.

A definition of direct, indirect and secondary effects will make the methodological differences of the approaches clear:

- **Direct effects:** They include all types of assets and stocks affected or destroyed immediately by the disaster, including crops, adding the costs of cleaning and demolition of the affected areas (since this is considered a necessary direct cost to the resumption of activities) 1/;

- **Indirect effects:** They refer basically to the flows of goods and services, on a sectoral basis, that fail to be produced from the period after the disaster due to reasons imputable to it, including things like the increased transportation costs incurred by the firms to the destruction of the transportation network, the taxes that fail to be collected by the government due to the reduced level of economic activity, etc.

- **Secondary effects:** They represent the effects of the disaster on the behaviour of the main macroeconomic variables in the middle to long run (i.e., between two and five years), like the

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12/ Even though it is recognized that the value of lost assets is less than their replacement cost, the latter is a truer measure of the manner in which the national economy will be affected as a result of the reconstruction programme to be undertaken. Replacement also includes some elements of improved technology for some items, such as higher-quality specifications for low-cost housing.

gross domestic product - total and sectoral -, the current and capital accounts, the public finances, the investment and interest rates, the price and employment levels. To make such comparisons, previous baseline scenarios for the economy must, of course, be available.

Direct and indirect effects can be aggregated, and together they give a real picture of the losses and damages attributable to any given disaster. The same cannot be done with the figures for secondary effects, since they can be considered as the side-effects of the two first categories in the economic structure, in the short to long term. They can also be understood as an appreciation of the direct and indirect effects from another - macroeconomic, long-term - point of view.

The realization of such calculations is only feasible upon the availability of data, which indicates that this evaluation should be made shortly after the disaster, once the emergency phase *per se* is already over but when its effects are still clear, since a disaster situation usually puts such a level of pressure on a country's government that not much time is left to deal with questions of data availability. This is specially true if the administrative capital of a country was itself affected by the disaster.

An example

As a practical demonstration of the quantitative importance of middle/long-term indirect and secondary effects when compared to the short-term direct effects, we will present the cases of Anguilla and Sint Maarten. Both Anguilla and Sint Maarten were heavily affected by the 1995 hurricane season - the most active in the subregion in registered history. At the request of the respective governments, ECLAC carried out evaluation missions in late 1995 in both countries. The following tables illustrate the damages by sector suffered by both countries according to the missions' calculations:

Table 1
SUMMARY OF DAMAGES AND LOSSES CAUSED BY HURRICANE LUIS IN ANGUILLA
(Thousands of US Dollars)

Sector and subsector	Estimated damages and losses			Insurance recovery */
	Total	Direct	Indirect	
Total for island	55,321	45,522	9,799	21,507
Social sectors	8,402	8,295	107	...
Housing	7,571	7,571	-	
Health	308	218	90	
Education	523	506	17	
Infrastructure	13,422	9,827	3,595	2,342
Water Supply	41	41	-	
Electricity	3,426	1,817	1,609	987
Ports and airport	1,465	1,285	180	373
Communications	6,540	4,775	1,765	982
Roads	1,950	1,950	...	
Production and services	33, 094	26,997	6,097	19,165
Agriculture/livestock	1,719	747	972	75
Fishery	1,260	775	485	30
Industry	165	125	40	50
Commerce	500	300	200	10
Tourism	29,450	25,050	4,400	19,000
Other sectors	403	403	-	
Sports & recreation	138	138	-	
Churches	265	265	-	

*/ When available.
Source: ECLAC.

Table 2
SUMMARY OF DAMAGES AND LOSSES CAUSED BY HURRICANES

LUIS AND MARILYN IN SINT MAARTEN
(Millions of US Dollars)

Sector and subsector	Estimated damages and losses			Insurance reimbursement */
	Total	Direct	Indirect	
Total	1,070.4	571.1	469.3	409.3
Social sectors	216.3	197.2	19.1	22.0
Housing	192.3	179.8	12.5	
Education	15.6	13.3	2.3	
Health	8.3	4.1	4.2	
Basic services	61.7	33.2	28.5	12.0
Water supply and energy	14.8	5.9	8.9	
Telecommunications	37.7	20.1	17.5	
Cable television	7.6	5.6	2.0	
Postal services	1.6	1.6		
Infrastructure	26.5	14.1	12.4	9.9
Airport	9.2	1.3	7.9	
Ports	15.4	10.9	4.5	
Roads	1.9	1.9		
Productive sectors	762.6	353.3	409.3	363.9
Commerce	271.5	79.0	192.5	
Tourism	490.7	274.1	216.6	
Other sectors	0.4	0.2	0.2	
Other damages	3.3	3.3		1.5

*/ When available
Source: ECLAC.

As is evident, the indirect damages were not only very substantial in both cases (18 per cent of the total damages in Anguilla and 44 per cent in Sint Maarten, and 54 per cent of the losses for the productive sectors in the latter island), but in the case of Sint Maarten they were almost as substantial as the direct ones.

In terms of secondary effects, the tables on the following pages provide the forecasted consequences for GDP growth and tax revenues for both countries:

EFFECTS OF THE DISASTER ON ANGUILLA GROSS DOMESTIC PRODUCT
(Thousands of US Dollars)

	Projections for 1995		
	1994	Without disaster	After the disaster
Gross domestic product (factor cost, constant prices)	58,474	60,251	51,620
Agriculture	2,464	2,254	1,630
Fisheries	1,626	1,351	1,026
Manufacturing	445	461	421
Mining and quarrying	351	344	344
Construction	6,785	6,785	8,142
Wholesale and retail	3,585	3,743	3,585
Hotels and restaurants	21,570	24,413	19,530
Electricity and water	1,404	1,350	1,080
Transport	3,509	4,074	3,258
Communications	5,732	6,724	5,379
Banks and insurance	5,777	6,524	5,220
Real estate and housing	2,174	2,228	2,005
Government services	7,709	8,102	9,722
Other services	898	925	185
Less, imputed service charge	-5,555	-7,104	-6,100

Source: ECLAC, based on available information and on its own projections.

Table 4
ESTIMATED EFFECTS OF THE HURRICANE ON ANGUILLA GOVERNMENT FINANCES
(Thousands of US Dollars)

	Projections for 1995		
	1994	Without disaster	After the disaster
OVERALL BALANCE	-2,521	-970	-13,170
Current balance	1,287	162	-11,775
Current revenue	15,808	16,969	17,633
Tax revenue	10,653	10,900	10,957
On property	49	123	37
On domestic goods/services	2,332	2,681	1,993
Accommodation tax	1,849	2,264	1,572
Bank deposit levy	355	302	297
Other	128	115	124
On international trade and transactions	8,272	8,096	8,927
Import duty	6,921	6,604	7,595
Foreign exchange tax	475	566	532
Embarkation tax	604	642	544
Other	272	284	256
Non-tax revenue	5,155	6,069	6,676
Current expenditure	14,521	16,807	18,488
Capital expenditure	3,808	1,132	1,358

Source: ECLAC.

As is evident, the disaster lowered the country's GDP by almost 12 per cent when compared to 1994 figures (i.e., back to its 1991 level), with effects also on the projected GDP for 1996. The government deficit worsened by more than 1,350 per cent when compared to its 1995 previous projected value. Negative effects due to the disaster on the external sector (overall balance) and on employment figures were also forecasted.

Table 5
EFFECTS OF THE DISASTER ON GDP OF ST MAARTEN
AND THE NETHERLANDS ANTILLES
(Millions of US Dollars)

	1991	Projections for 1995	
		Without disaster	After the disaster
Netherlands Antilles			
National gross domestic product (factor, cost, constant prices)	1,863.4	2,129.2	2,073.5
Sint Maarten			
Sint Maarten GDP	335.7	464.1	408.3
Agriculture, fishing and mining	1.2	1.6	1.5
Manufacturing	8.9	12.2	11.8
Electricity, gas and water	13.1	17.8	15.7
Construction	27.5	37.3	34.3
Wholesale and retail trade	109.9	141.8	131.7
Hotels and restaurants	43.9	63.2	50.5
Transport, storage and communications	51.9	74.6	64.5
Finance and other business services	59.1	85.0	74.0
Social and personal services (including Government services)	39.4	56.7	46.2
Less, imputed bank charges	-19.2	-26.1	-21.9

Source: ECLAC, based on available information and on its own projections.

Table 6
ESTIMATED EFFECTS OF THE HURRICANE ON SINT MAARTEN GOVERNMENT FINANCES
(Thousands of US Dollars)

	1994	Projections for 1995		1996
		Without disaster	After disaster	
Total taxes	62.20	62.80	47.99	68.67
Profit tax	13.46	12.07	10.97	13.71
Wage tax	36.22	32.91	26.32	35.65
Income tax	4.62	6.58	3.95	7.13
Other taxes	7.90	11.25	6.75	12.19

Source: ECLAC, based on available information and on its own projections.

The impact of the disaster was very substantial: Sint Maarten's GDP fell almost 14 per cent from its previously forecasted 1995 value, affecting not only the island itself but also the whole economy of the Netherlands Antilles (of which Sint Maarten represents 20 per cent), both in 1995 and also during the following year. The island's government revenues fell almost 25 per cent. Negative effects in the external sector, somewhat mitigated by capital inflows linked to the reconstruction efforts and insurance payments, and in unemployment rates are also expected.

Based on the previous estimations, an indicative list of reconstruction projects was also elaborated and supplied to the respective countries' governments in question.

Conclusion

The non-estimation of the middle/long-term indirect and secondary effects of natural disasters may grossly misrepresent the extension of the damages inflicted by these disasters. A more adequate and representative assessment of these economic losses must, therefore, take into consideration also the indirect and secondary effects. A clear picture of these other types of effects also helps the affected country in the process of deciding if international cooperation is necessary for the reconstruction of its economy, and, if so, in which areas and under which conditions it should happen. Such evaluation makes the contact with international cooperation institutions easier. Those elements are what ECLAC's disaster assessment methodology strives to provide.

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