

# **T**he 2004 hurricanes in the Caribbean and the Tsunami in the Indian Ocean

*Lessons and policy challenges for  
development and disaster reduction*

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NACIONES UNIDAS



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## Summary

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Are there lessons to be learned from the recent disasters at the global scale? Are the numbers of disasters increasing and is their impact more severe? Is there a difference to be established among hazard exposure and the resilience, fragility and brittleness of human-made vulnerabilities? How do countries and societies manage risk, transfer it or disperse it.

This document will not answer all of these questions, but they have come to the forefront after the tsunami in the Indian Ocean and the Caribbean hurricane season, both in terms of the outcome of the 2004 and the perspective for 2005. Furthermore, these questions beg for a link to more global issues such as sustainable development, the achievement of the Millennium Development Goals, and the increasing evidence of serious impacts associated with climate variability, climate change and the vulnerabilities to extreme events.

This document —which reflects the author’s personal involvement in conducting and supporting disaster assessment missions using the ECLAC methodology for the socioeconomic and environmental assessment of disasters— first indicates (section I) the differentiated impact that recent events such as the tsunami and hurricanes have on different countries, sectors, communities and localities. Section II provides examples, going into some detail on the 26 December tsunami, and Section III tackles the impact of the 2004 hurricane season in the Caribbean. The final section (IV) offers some personal conclusions and possible policy proposals as food for thought and further discussion.

An appendix presents a summary brief description of the conceptual framework, components and results expected of the ECLAC methodology for the socioeconomic and environmental impact of disasters.



## Introduction

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The following reflections are based on the author's first-hand experience in evaluating some recent disasters in which he participated in assessing damage and losses caused to countries of different sizes and levels of development.<sup>1</sup>

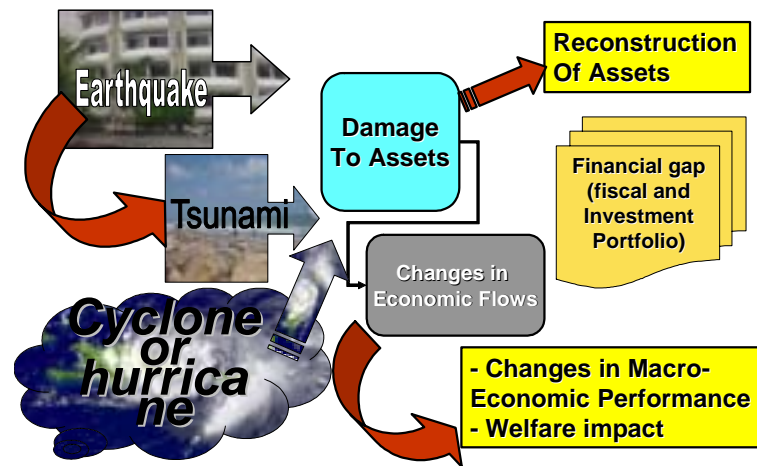
The methodology, used and developed by ECLAC, is based on a sector by sector stock and flow analysis of the effects caused by the event in question. Damage to infrastructure, destruction of capital and stocks, losses of production and income, increased expenditure and costs, and reduced business activity affect peoples' livelihoods in terms of employment, welfare, and the main economic variables. Cross-cutting issues are considered in a systemic perspective, in addition to the sector approach to damage and losses.<sup>2</sup> These include the macroeconomic and fiscal gaps, the environmental consequences, a gender perspective and livelihoods and welfare (see Diagram 1).

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<sup>1</sup> The author coordinated assessment studies of the 2004 hurricane season in the Caribbean and provided methodological and technical advice to two evaluations of the 26 December Tsunami that affected countries in the Indian Ocean. In the Caribbean, the studies were the ECLAC assessments for the Bahamas and Haiti (done with IDB's support), Dominican Republic, Caiman Islands and Jamaica (with the support of UNDP), and Grenada in a joint effort with the OECS, where the ECLAC methodology was followed. In the Tsunami the author participated directly in the World Bank led assessments of Indonesia and India (in this latter one jointly with the Asian Development Bank and United Nations). The methodology was partially applied also by the World Bank teams in Sri Lanka and the Maldives.

<sup>2</sup> Social sectors include housing (although from the perspective of financial institutions housing reconstruction is seen as infrastructure), and the basic social services of health, education and potable water. The infrastructure category includes the sectors of communications (roads, bridges, ports, airports), energy (production and generation, transmission, distribution and stockpiling of fuel) water, sanitation, and drainage and waste disposal as well as other relevant public works including public service buildings. The production sector includes the actual production of goods and services (from the primary activities of farming, planting, sowing, animal raising, forestry and mining to manufacturing and the service sector, including commerce (intermediation, wholesaling, retailing), financing and other relevant economic activities such as tourism, in bond processing and new emerging activities such as data processing or information technology). See Appendix I.

Diagram 1  
ASSESSMENT METHODOLOGY



The Caribbean hurricanes and the Indian Ocean Tsunami illustrate major differences both in emergency response and disaster management and in the impact that a particular disaster may have on the economy. Though they have a similar global economic impact, the human impact and the consequences over livelihoods are radically different. In the case of the Caribbean islands economic damage and losses the figure estimated by those cases assessed by ECLAC the amount exceeds US\$ 6,000 million<sup>3</sup> and in the Indian Ocean Tsunami partial estimates of damage and losses in Indonesia, Sri Lanka, India, Maldives and Thailand point to a similar figure, while the loss of life and impact on the livelihoods of large number of persons and communities is vastly different between the two regions. Funds pledged for the needs of the reconstruction process exceed US\$ 6,400 million.

<sup>3</sup> One thousand million is equivalent to one billion in US notation.

## I. Differentiated impact

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It is worth noting that damage (or the risk that damage and losses will be incurred) is the result of the interrelation of hazard (as the probability of an extreme event happening in a certain place within a certain period of time) and the underlying vulnerabilities in that place when an event occurs. The severity of the damage –be it economical or in terms of life loss and livelihood disruption— is more closely linked to the vulnerabilities than to the severity of the event. Thus, there is a growing recognition that disasters are a developmental issue and that risk bearing instruments and infrastructure are crucial for reducing the impact of disasters. That is to say that under certain conditions the impact of disasters becomes a problem for development. It is not the absolute amount of damage and losses but the capacity to face these and, in some instances, benefit from investment and reconstruction and the resiliency increase that becomes a problem for the development process. Size, diversity, built-in vulnerability, and environmental, economic and social sustainability are internal factors that define the differentiated impact of disasters. It is not the type of event (climatic, hydro meteorological, seismic or geomorphological, industrial or chemical)<sup>4</sup> as much as resilience or lack thereof that defines overall impact.

The 26 December 2004 Tsunami, which has grabbed the attention of the international community in an unprecedented manner, is a clear illustration of the above. Given the press coverage it has

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<sup>4</sup> Although it is true that “dry” (earthquakes and volcanic eruptions, fires and landslides) or “wet” (cyclones, floods) have a different weight in terms of assets’ damage and losses, as can be appreciated when comparing different assessments made by ECLAC over time.

received and the extent of damage and number of lives lost and people left in dire conditions, it has called attention to the emerging humanitarian needs in terms of rescuing, sheltering, feeding and caring for victims. In a way it has shifted the focus, once again, to disaster management, emergency response, and early warning, and away from the more fundamental issues of risk management.

The case of the 26 December Tsunami certainly requires taking a closer look at the disaster management process and way in which low probability events (i.e., events that rarely repeat: the statistical probability is that it will not recur for hundreds of years) are not adequately foreseen in terms of warning and response mechanisms.

Circumstances, nevertheless, vary in each of the countries and communities affected. The proximity to the phenomenon (as in the case of the north-western coast of Sumatra in the Aceh Province and the small islands along that coast) and the magnitude of the initial trigger (a record-breaking undersea earthquake along the fault in two subducting tectonic plates) had a major impact on the physical damage caused. It is quite illuminating that, even at the same proximity and severity, some communities responded more appropriately than others. Thus, the lead time to prepare for the event and the apparent lack of response to early warning do not fully explain the differences.

A factor to be considered is the disregard or loss of cultural conduct patterns from the indigenous population. Thus, in looking for future courses of action, the recuperation of indigenous cultural traditions is relevant alongside the use of modern technology and scientific knowledge. Relevant scientific literature and studies (from research institutions both at the international level and in some of the affected countries) pointed out the probability of such an event occurring, given the period of pressure accumulation along the tectonic fault. It is the link between this scientific knowledge—and in some cases the actual disregard of this evidence or minimizing its relevance to avoid negative economic consequences, for example in the tourism sector—and actual preventive measures that is of concern.

Another factor that explains the differentiated impact of a disaster is the link between damage and losses to the level, breadth and depth of the development process. There is an obvious link between vulnerability and poverty, but beyond the obvious, the level of infrastructure development and maintenance is a major factor of vulnerability leading to differentiated damage. Additionally, the diversification of an economy (less dependence on a few basic primary activities and more value added in numerous sectors that are more linked to services) and the ensuing risk-bearing mechanisms explain a large portion of differentiated impact. Level of development does not only mean economic diversity, size and dynamism; it also includes appropriate social cohesion, functioning social networks and governance in terms of accountability and shared social goals. These are crucial elements to face and prevent potential damage and losses.

Differentiated impact of similar events is also caused by the lack of risk appropriation (ownership) by individuals and communities. If individuals (be it private citizens, enterprises or states as a whole) do not assume their risk and can “externalize” it to the government, to charitable institutions or (in the case of countries) to the international community, there will be a deficit in capability to face the disaster. In other words, the lack of risk appropriation will lead to a lack of risk management and vulnerability reduction, and increased risk transfer. Risk will be transferred spuriously and will not be factored into the cost-benefit analysis of any social and economic activities.

## A human tragedy is not necessarily an economic one

The 26 December disaster is undoubtedly a great, almost record breaking, human tragedy. It engulfed more than a dozen countries on two continents. The latest human toll estimate points to over 2.4 million affected, with 286,000<sup>5</sup> dead and more than 7,800 missing. Table 1 (developed by CRED-OFDA) lists the major disasters of 2004 in terms of number of deaths.

It is worth noting that, although by far the largest number of deaths occurred in 12 countries (with 80% of the deaths in Indonesia), the second, third and fifth top disasters in terms of victims, occurred in a very exposed, vulnerable location in the Caribbean: on the island of Hispaniola, namely in Haiti, given its environmental degradation and island-wide inappropriate watershed management.

However, this ranking differs markedly from the most important or most severe events in terms of economic and physical damage (see Table 2).

**Table 1**  
**TOP 10 BY NUMBER OF DEATHS**

<b>Tsunami (December)</b>	<b>12 countries affected</b>	<b>304 201</b>
Hurricane Jeanne (September)	Haiti	2 754
Flood (May-June)	Haiti	2 665
Flood (June-August)	India	1 195
Tropical storm Winnie (November)	Philippines	717
Flood (May-June)	Dominican Republic	688
Dengue Epidemic (January-April)	Indonesia	658
Flood (June-August)	Bangladesh	628
Earthquake (February)	Morocco	628
Meningitis epidemic (January-March)	Burkina Faso	527
Cyclone Galifo (March)	Madagascar	363

**Source:** OFDA-CRED database, CRED, Louvain University, Brussels.

The hurricane season in the Caribbean figures prominently in this ranking as the sum of three of the four hurricanes that affected Florida have direct damage (in terms of assets affected) in excess of US\$ 18,200 million. The December 2004 disaster appears in both tables but the economic damages pale next to its human toll. Sections II and III deal at some length and in detail with the economic and social implications of the two clusters of events.

<sup>5</sup> Actual number of deaths differs from different sources and in different countries, and on factors such as whether missing persons are included in the number of deaths or if the official count of registered deaths is a fragment of total figure given that some corpses never surfaced or appeared and actual identification of victims is still an ongoing process in some countries.

**Table 2**  
**TOP 10 ESTIMATED DAMAGES**  
*(US\$ million)*

<b>Earthquake (October)</b>	<b>Japan</b>	<b>28 000 000</b>
Typhoon Tokage (October)	Japan	7 500 000
Hurricane Jeanne (September)	United States	7 000 000
Hurricane Charley (August)	United States	6 800 000
Typhoon Songda (September)	Japan	6 000 000
Tsunami (December)	Indonesia	4 450 000
Hurricane Frances (September)	United States	4 400 000
Flash Flood (June-August)	Bangladesh	2 200 000
Typhoon Rananim (August)	China P. Rep	2 000 000
Typhoon Chaba (August)	Japan	2 000 000

**Source:** OFDA-CRED database, CRED, Louvain University, Brussels.

## II. The 26 December Tsunami

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The 26 December Tsunami received unprecedented attention due to the time of its occurrence (during a global holiday season right between Christmas and New Year), its magnitude (a record-breaking earthquake followed by a ripping of the fault as subsidence occurred between two tectonic plates, leading to a massive tsunami chain reaction that covered the entire the Indian Ocean),<sup>6</sup> its global impact (affecting countries on three continents: directly, through the earthquakes as in Indonesia and the Andaman and Nicobar Islands, and successive waves over several hours along the shores of the Indian Ocean and reaching the African coasts of Madagascar; and more indirectly by killing people from all continents sojourning in tourist spots, especially in Thailand), and the infrequent nature of this type of phenomenon in that particular region.

The human toll can be summarized as follows (as of the end of January 2005; later figures changed as missing persons were incorporated into the death toll), not including Thailand or countries affected in Africa:<sup>7</sup>

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<sup>6</sup> A number of scientific papers both in the affected countries and in specialized institutions dealing with internal geomorphologic dynamics had been pointing to the probability of such an event occurring about this time.

<sup>7</sup> Quoted in World Bank, *World Bank Response to the Tsunami Disaster*, 2 February 2005. Notes on each country reflect situation as of that date.

<sup>a</sup> Figures provided by Government of India, Ministry of Home Affairs, 1/18/05.

<sup>b</sup> BAKORNAS (31/01/05).

<sup>c</sup> Figures for loss of life and missing provided by Maldives National Disaster Management Center, 1/18/05; displaced figure provided by UNOCHA, 1/20/05.

<sup>d</sup> Figures provided by UNOCHA, 1/14/05.

<sup>e</sup> Figure for loss of life provided by UNOCHA, 1/14/05; displaced figure provided by UN/Seychelles and USAID, 1/12/05.

*Note:* These figures relate to countries that had to date sought World Bank assistance; other countries also suffered human losses, such as Thailand, which had loss of human life in excess of 8,000 people, and Myanmar.

**Table 3**  
**TSUNAMI HUMAN TOLL**

	India	Indonesia	Maldives	Sri Lanka	Somalia	Seychelles	Total
Loss of Life	10 479	108 240	83	30 956	150	3	149 911
Still Missing	5 640	127 773	25	5 637			139 075
Injuries	6 913		1 300	15 196			23 409
Displaced	647 599	426 849	21 633	408 407	5 000	40	1 509 528

Source: ECLAC.

Current estimates put the overall economic loss at over US\$ 10,000 million (a higher figure than that estimated by OFDA-CRED), and the insured loss at approximately US\$ 1 to 2 thousand million.<sup>8</sup> Less than 20% of assets were covered by any type of insurance and loss of business or economic impact had little or no coverage.

The medium to long term effects of the tsunami are of interest not only in terms of the affected communities' capacity to respond and rebuild, which varies greatly among countries and locations, but it has called into question the international community's willingness and capacity to respond. At first some donor governments tried to act directly instead of through the established international mechanisms of humanitarian assistance within the United Nations and non-governmental organisations. Later, pressure from civil society and non-government organizations in both donor and affected countries swayed governments into appropriate action and commitment of resources, and response to the crisis was mixed with attention to pre-existing crisis or conflict situations in others. In response, there has been massive humanitarian assistance and resources for relief from many sources, and this has led to two main concerns: the capacity of affected localities to absorb and use those resources effectively, and the overarching emphasis on relief and reconstruction under new parameters that reduce exposure to future tsunamis. This has led to some concern about having such a response shift the emphasis of donors and the international community back towards post-disaster action instead of focusing on more proactive pre-disaster planning in the face of multi-hazards, constantly changing vulnerability patterns, and the need for appropriate risk management.

Another increasing concern is that, given the magnitude of the tsunami's effects, it will lead to overarching proposals that do not take appropriately into account local conditions, the multi-hazards faced (in the context of which a tsunami, no matter how devastating this one was, has a low probability of occurrence and a long return period), and the varying vulnerabilities and resilience of affected communities. That is why bottom up solutions, dialogue and consensus building mechanisms for the recovery process are being emphasized and the role of foreign assistance and central government participation has to be critically weighed, particularly in those communities that had underlying unresolved conflicts.

One such case in point is the big emphasis placed in the wake of the event on early warning and alert systems, generating in the Indian Ocean a system similar to the tsunami alert system existing in the Northern Pacific. Although there is no doubt that early warning and appropriate monitoring of the potential for such events happening is important, particularly given the unstable

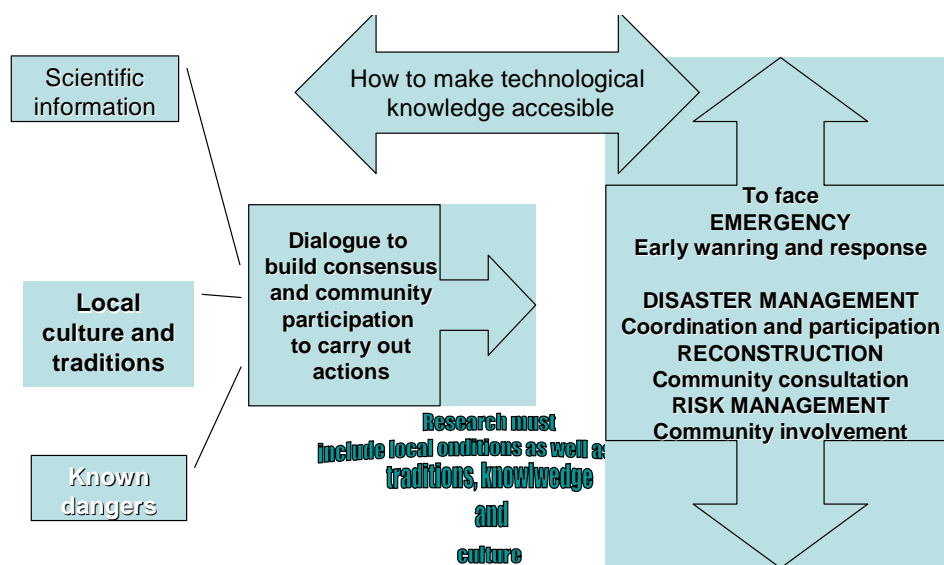
<sup>8</sup> As indicated in the Munich Re study "*Topics Geo – Annual Review: Natural Catastrophes 2004*", 24 February 2004. This study concludes that the experience gained from the tsunami points out some relevant conclusions. The consequences that ensue for the field of science, politics, and the insurance industry include the following: (a) Improving knowledge on how tsunamis are generated and the threat they pose to coastal regions, (b) Enhancing risk awareness among the population potentially affected and among decision-makers, (c) Setting up efficient warning systems, not only for the Indian Ocean, (d) Creating communication structures that facilitate a speedy and appropriate response when the alert is given, (e) Regulating land use particularly in highly exposed coastal areas, and (f) Reviewing and analyzing the covers in all the lines of insurance involved.



condition generated in the tectonic plates by this event itself, the technological component is only part of the necessary system. Two critical aspects to be emphasized—which do not necessarily increase the cost of the system significantly—are the compatibility and connectivity among the future regional scientific and monitoring base and national ones, both in terms of scientific analysis and institutional arrangements; and local participation in it.

The “last mile” consists of the local adoption of the system in terms of ownership (trust in the science based monitoring and understanding of it), and the training and adoption of response actions (what to do, how and how fast) once the alarm is received. This is not just a top-down training or telling the local communities what to do, but rather communities must be involved in the process of local hazard recognition using local knowledge, traditions and ancestral culture, including patterns of development, building and economic activity, as a springboard for change, in a bottom-up approach. This further means using non-formal authority figures in the community along with formal institutional arrangements to generate risk management guidelines. Contrary to the usual notion that a risk management culture has to be built by having the “knowledgeable” officials and scientist tell the community what to do, the flow is in reverse: use local cultural patterns to introduce risk management (see Diagram 2).

**Diagram 2**  
**HORIZONTAL VS. VERTICAL RISK MANAGEMENT: CROSS CUTTING AND BOTTOM-UP INSTEAD OF TOP-DOWN APPROACH**



Given the author’s direct participation in the cases of Indonesia and India these two assessments will be dealt with in more detail. This does not imply that similar or more severe problems did not occur in other countries such as Sri Lanka or the Maldives, or that the Thailand impact was not equally as relevant.

A general consideration in terms of response and appropriate measures for risk managements is that the tsunami had such a large human impact due not only to insufficient preparation at the response level and lack of technical and scientific information, but also due to lack of community involvement in the risk management process. In the wider sense community participation involves not only the population at large, giving appropriate consideration to local culture and historical traditions, but the private sector “ownership”. This involves the internalization of risk management

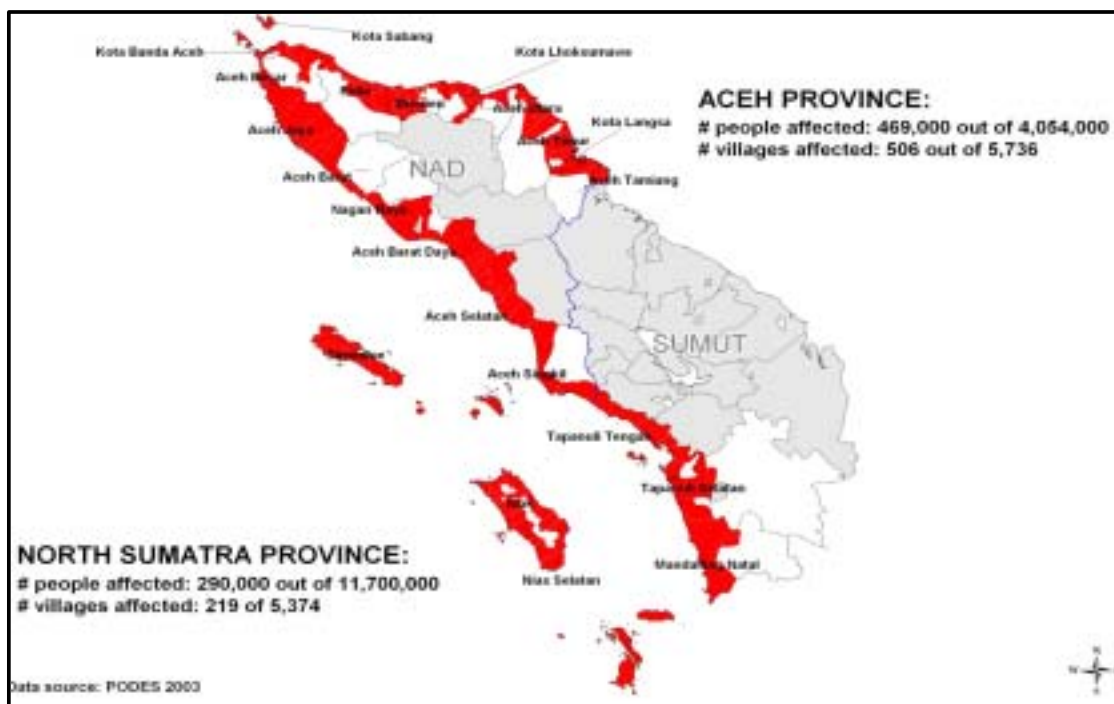
in economic activities and their profitability, as well as the appropriate preparation for multi-hazards and emergencies, including providing information on emergency procedures to those potentially affected.

Risk management—and risk transfer—are not only vertically directed policies but, mostly, consist of sharing of information horizontally, leading to “ownership” that promotes active participation at all levels. Technical and scientific research and information, appropriate response training, and acceptance of individual and collective responsibility are indispensable parts of the risk management process.

## 1. Indonesia: a compounded human tragedy

Map 1 shows the affected geographical area in the case of Indonesia,<sup>9</sup> which is a large discontinuous territory constituted by more than a thousand islands. The Tsunami affected one of the major islands (Sumatra) along parts of its western and north-eastern coast.

Map 1  
AFFECTED GEOGRAPHICAL AREA



**Note:** The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

A number of factors contributed to a dual phenomenon: a large human life loss, given the high population density along the coastline of Aceh province, and a major livelihood distortion for fishing communities, due to major destruction in a city ill prepared for such a deadly combination of earthquake and tsunami, and a relatively minor impact on both the province’s economy (whose

<sup>9</sup> See the Indonesian report, along the other countries’ ones in the World Bank’s webpage ([www.worldbank.org](http://www.worldbank.org)), under the specific countries.

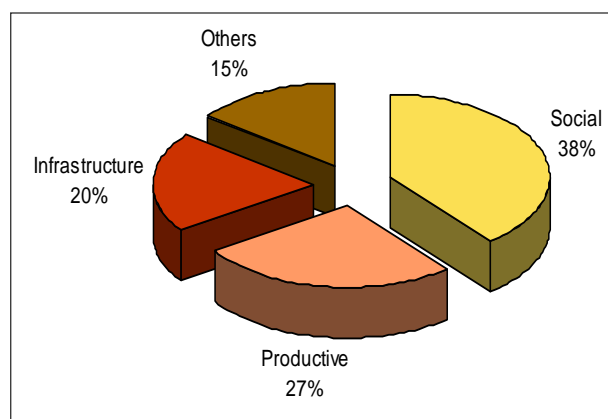
income is highly linked to oil exploitation in the south-eastern portion) and the country as a whole. The human toll of the earthquake and tsunami for Nanggroe Aceh Darussalam (NAD) was of over 170 thousand deaths, once the missing were fully incorporated in the figure since not all the bodies were recovered. Most relevant for the reconstruction process, over 400,900 people were displaced. Some communities were almost totally destroyed and in some cases entire villages were wiped out. A full third of the city of Banda Aceh was totally destroyed, and a similar proportion of its population died. For North Sumatra Province, BAKORNAS (the government disaster management agency) reported that 19,620 people are displaced, and the number of dead and missing was under 1,000.

**Table 4**  
**INDONESIA: SUMMARY OF DAMAGE AND LOSSES**  
(US\$ million)

	Damage	Losses	Total
Social sectors	1 674.9	65.8	1 740.7
Housing	1 398.3	38.8	1 437.1
Education	110.8	17.6	128.4
Health	82.5	9.4	91.9
Religious and culture	83.4		83.4
Infrastructure	636.0	240.8	876.8
Transport	390.5	145.4	535.9
Communications	18.9	2.9	21.8
Energy	67.8	0.1	67.9
Water and sanitation	26.6	3.2	29.8
Flood control	132.1	89.1	221.2
Productive sectors	351.9	830.2	1 182.1
Agriculture	83.9	140.9	224.8
Fisheries	101.5	409.4	510.9
Industry and trade	166.6	280.0	446.6
Cross-sectoral	257.6	394.4	652.0
Environment	154.5	394.4	548.9
Governance and administration	89.1	...	89.1
Bank and finance	14.0	...	14.0
<b>Total</b>	<b>2 920.0</b>	<b>1 531.2</b>	<b>4 451.6</b>

Source: ECLAC.

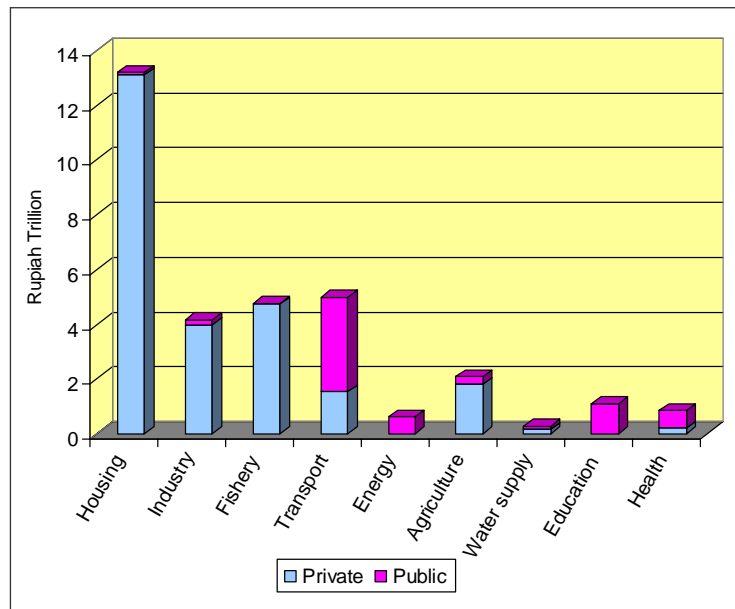
**Graphic 1**  
**SECTORAL BREAKDOWN OF IMPACT**



Source: ECLAC.

Graphic 2

**IMPACT ON PRIVATE AND PUBLIC SECTORS**

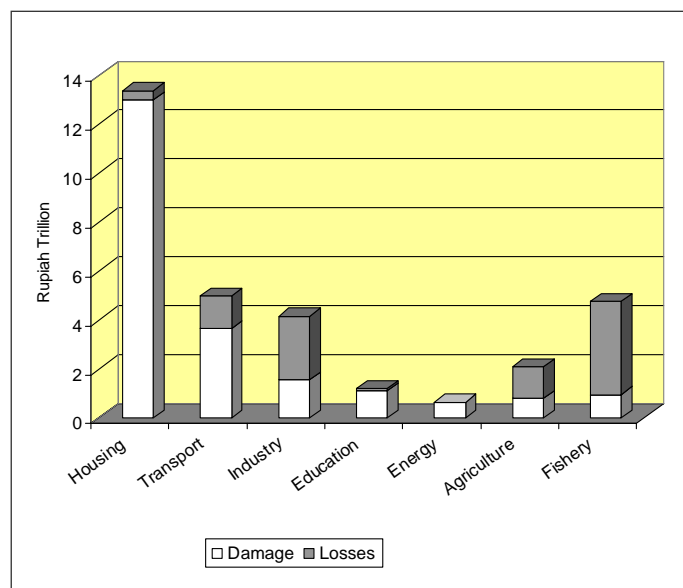


Source: ECLAC.

Given the subsidence of the tectonic plaques due to the earthquake, portions of the island territories will remain under water (see Figure 1). The impact of the tsunami (2.2% of the national GDP) does not pose a serious threat to the Indonesian economy, in good measure due to the diversified nature of its economy, so the tragic event did not affect its strategic industries and exports. The potential effect on GDP will be minor either way. It is assumed that GDP growth in 2005 could be impacted from 0.1 to 0.4 percentage points. This could vary substantially on the basis of the reconstruction efforts, which will hopefully more than offset such a trend.

Graphic 3

**SECTORAL DAMAGE AND LOSSES**



Source: ECLAC.

The composition of damage and losses (as seen in Table 4) shows this particular profile. Most of the impact is borne by the social sectors and a large portion of it falls on the private sector. Most of the damage to assets is on housing infrastructure and most losses are expected in the productive sectors. This is what defines the heavy impact on livelihoods. Thus, reconstruction efforts will focus more on livelihoods than on actual physical infrastructure.

As indicated, the earthquake and tsunami were highly concentrated, primarily in Aceh and some areas of North Sumatra where impact on local economies was massive. Damage and losses for Aceh province was equivalent to approximately 100% of its GDP. Despite that oil and gas were not affected, most people in Aceh depend on precisely the affected sectors. In social and political terms the event is “a triple double whammy” for Indonesia, as the effects of a complex event tend to be. Firstly, it was a tsunami on top of an earthquake, secondly, a disaster on top of a crisis (conflict with the Free Aceh Movement (GAM) and mistrust of Java in Sumatra), and thirdly and most importantly, there was a human tragedy that far overshadows the economic consequences, due to the proximity to the actual natural phenomenon. In this case no early warning system could have avoided the heavy losses. Unlike in other countries where several hours elapsed between the initial earthquake and the tsunami waves, the Aceh coast was hit by the first wave less than 15 minutes after the quake, at which time a number of structures and buildings had already been destroyed by the earthquake (see Figure 2).

Over 80% of all deaths caused by the tsunami were in Indonesia. It took over a month and a half to compile the list of dead and missing, which consists of over 180,000 people. To recover, Aceh and North Sumatra will require substantial assistance from the government, its fellow citizens and the international community. Figure 3 illustrates part of the tsunami damage and the extent and strength of the waves that hit this coast – the most damaged area – three times in a span of several hours.

## **2. India: Limited damage, overarching vulnerabilities that require site specific solutions in multi-hazard framework**

In the case of India,<sup>10</sup> the affected areas were limited both in geographical area and extent of socioeconomic and environmental damage. It affected mostly the islands in the Union Territories of Andaman and Nicobar and the states of Andhra Pradesh, Kerala, Tamil Nadu and the Union Territory of Pondicherry. The evaluation mission covered those districts in the mainland states and the territory.

The tsunami affected a large expanse of the eastern coast, the Southern tip of India and some small portion of the western coast. A dramatic case in point was Kanyakumari, a very important geographical, religious and symbolic location, where three seas meet: the Indian Ocean, the Persian Sea and the Bay of Bengal. Socially also the extent of the damage was focalized, affecting less developed, poorer communities along the shore mostly involved in primary activities and their related trades: fisheries and agriculture.

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<sup>10</sup> Where a joint ADB, UN, and World Bank Mission was carried out at the request of the government.

Figure 1  
SUBSIDENCE IN THE COASTAL BANDA ACEH



**Figure 2**  
**EARTHQUAKE DAMAGE**



Figure 3  
COMPOUND EFFECT OF TSUNAMI AND EARTHQUAKE





**Figure 3 (Conclusion)**

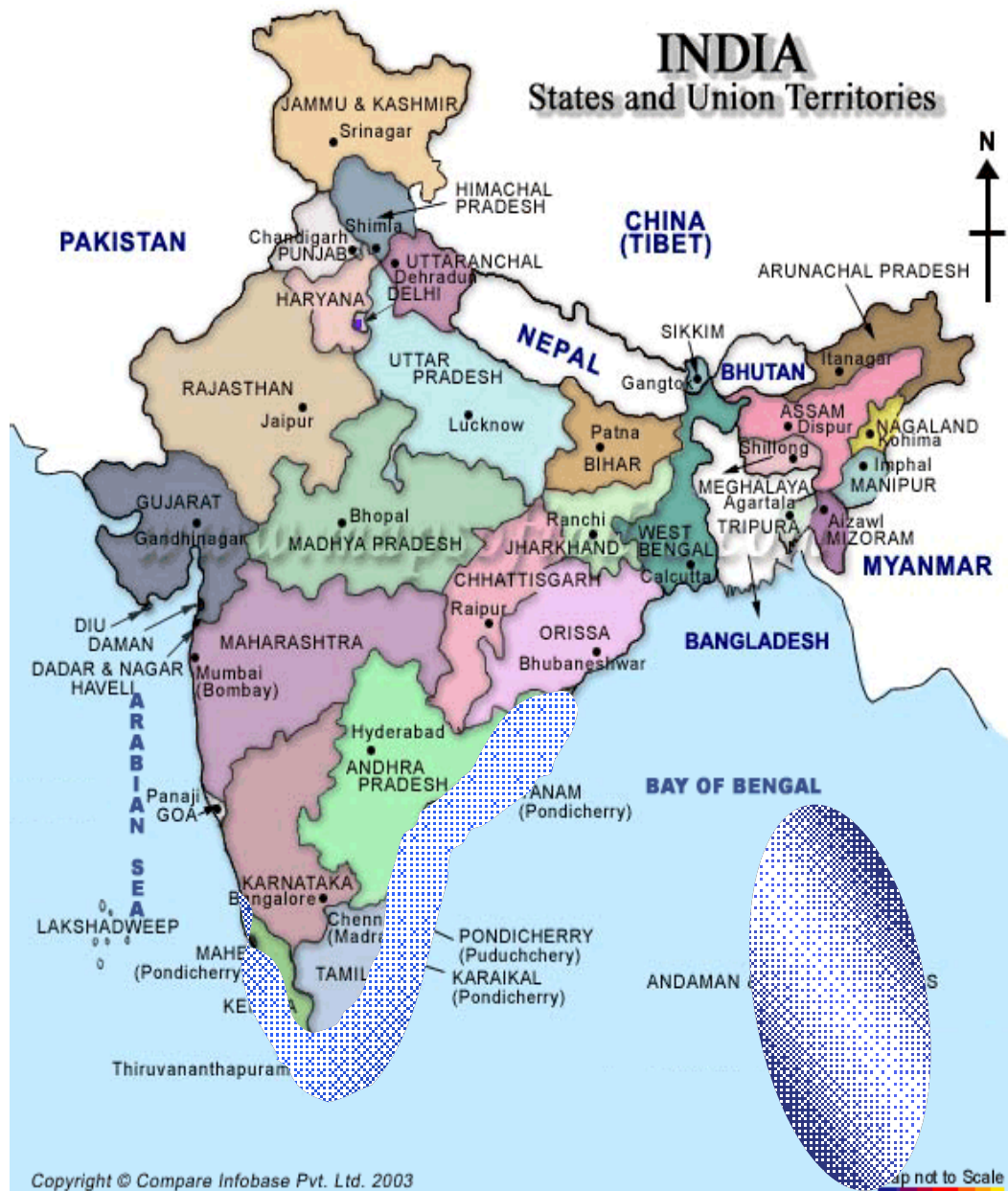
With regard to the human toll, beyond the numbers (see Table 5) livelihoods were impacted in terms of housing and sustainable economic activity and these will continue to be affected for an extended period. In the case of fisheries, loss of vessels and movement of the catch will impede full recovery of the activity for some time. This aggravates conditions in an already embattled fishing sector that was facing structural problems due to over fishing and large trawlers capturing most of the fish, thus affecting livelihoods of small fibre glass boats and smaller wooden “catamarans” (logs tied together in a traditional artisan way).

In the agricultural sector, at least two harvests will be affected due to salination and sand deposits in water sources and soil. In the case of coconut and other plantations, recovery will depend on the number of trees destroyed since replanting would mean several years till full production is restored. Table 6 presents the summary of damage and losses, by state/territory and sector, indicating in a separate column the effects on livelihood in terms of income losses (wages or otherwise) and assets lost in the micro enterprises and other commercial activities.<sup>11</sup>

<sup>11</sup> Assets lost in the agricultural sector (including livestock) and in fisheries appear in the respective sector.

Map 2

SCHEMATIC VIEW OF AFFECTED AREA IN INDIAN SUBCONTINENT



**Note:** The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

**Table 5**

**AFFECTED POPULATION IN INDIA PRIMARY AND SECONDARY AFFECTED HOUSEHOLDS, BY LIVELIHOOD**

	Total population	Affected (primary and secondary)	Total number of families affected	Fisher folk	Micro enterprises	Agriculture and livestock	Others
Total <sup>a</sup>	171 432 395	4 000 000	810 000	304 061	142 131	39 218	32 4590
Andhra Pradesh	76 210 997	645 000	130 000	48 000	29 586	689	51 725
Kerala	31 841 374	1 200 000	250 000	126 000	59 545	6 500	57 955
Tamil Nadu	62 405 679	2 000 000	400 000	120 000	50 000	30 702	199 298
Pondicherry	974 345	155 000	30 000	10 061	3 000	1 327	15 612

**Source:** Joint assessment mission.

<sup>a</sup> Total includes data from the Andaman and Nicobar Islands; it does not include 5 640 declared missing.

**Table 6**

**SUMMARY OF DAMAGE AND LOSSES**  
(US\$ million)

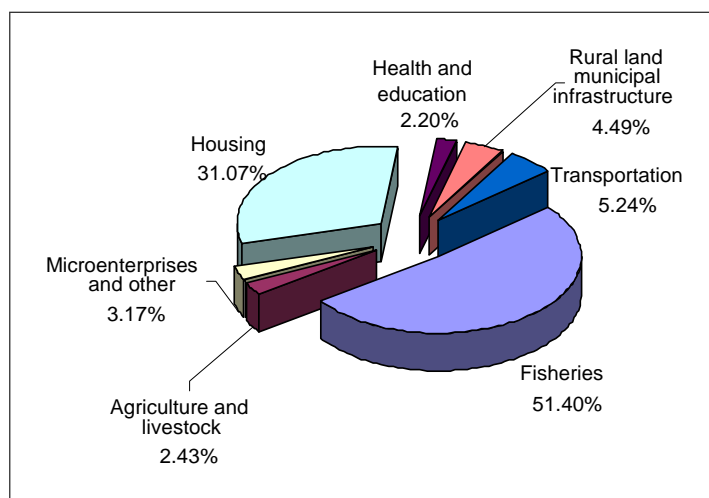
	Damage and losses			Effects on livelihoods
	Damage	Losses	Total	
Andhra Pradesh	29.7	15.0	44.7	21.2
Kerala	61.7	39.1	100.8	36.3
Tamil Nadu	437.8	377.2	815.0	358.3
Pondicherry	45.3	6.5	51.8	5.9
Total (by sectors)	574.5	448.3	1 022.8	421.7
Housing	193.1	35.4	228.5	
Health and education	10.7	12.9	23.6	
Agriculture and livestock	15.1	22.4	37.5	26.0
Fisheries	229.6	338.2	567.8	338.2
Livelihoods (micro enterprises and other)	20.0	37.5	57.5	57.5
Rural and municipal infrastructure	28.0	1.6	29.6	
Transportation	35.2	0.3	35.5	
Coastal protection	42.8		42.8	
Relief <sup>a</sup>		200.7	200.7	

**Source:** JAM estimates on the basis of information made available by the governments and direct observation.

<sup>a</sup> Relief provided by the local, state and national governments (not included in Total (by sectors)).

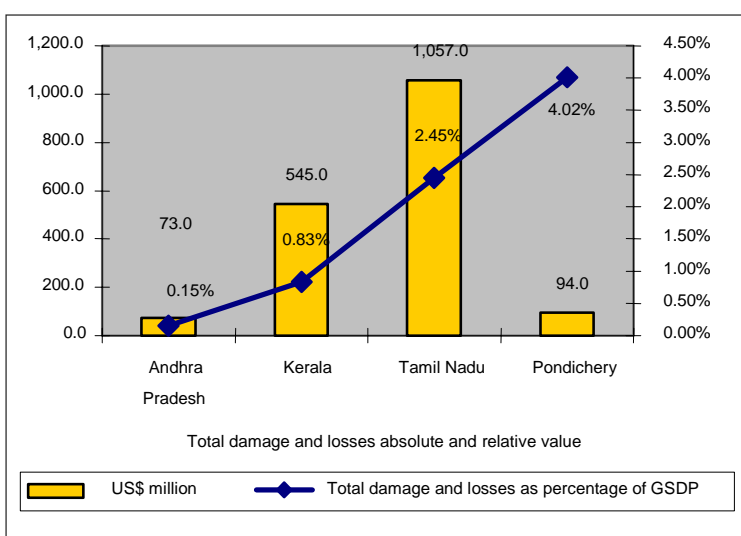
As illustrated in Graphics 4 and 5, the most affected sectors are those which were already highly vulnerable before the tsunami, since they were in the lower scale of income, some below the poverty level. The impact of the damage to fisheries also affects almost all other activities in the area, as income generated by labour, boat repair, ice makers and merchants, and mechanics will experience a downturn. This, in turn, will affect trade (fish traders as well as retailers whose sales will decline).

**Graphic 4**  
**AFFECTED STATES IN INDIA: DAMAGE AND LOSSES, BY SECTOR**



Source: ECLAC.

**Graphic 5**  
**ABSOLUTE AND RELATIVE VALUE OF DAMAGE AND LOSSES**



Source: ECLAC.

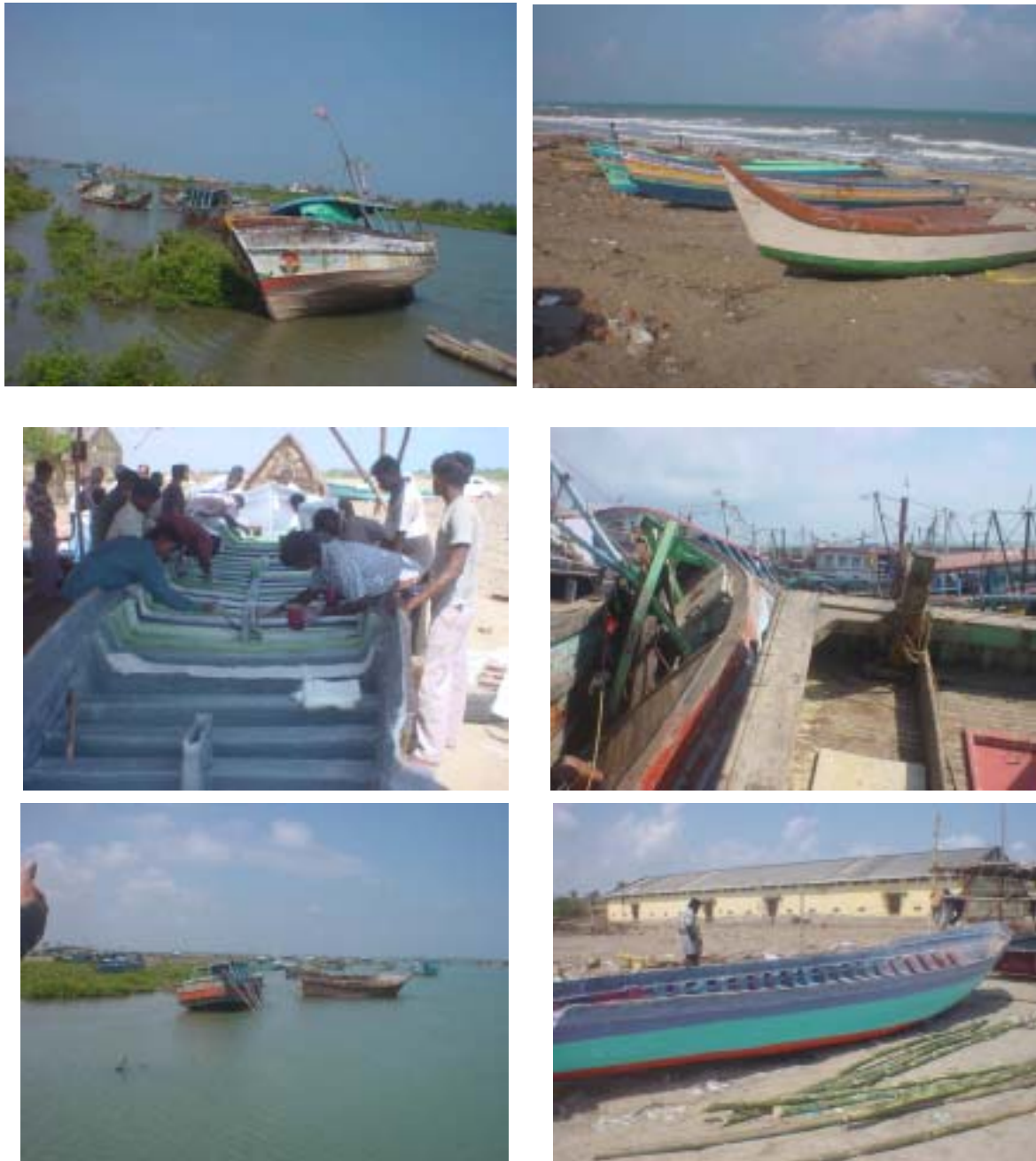
Another relevant characteristic of the disaster is that, in spite of the absolute value of damage and losses (the largest being in Tamil Nadu, whose whole coast was affected), their importance relative to the size, dynamics and diversification of each state/territory's economy will be quite different. In relative terms the Union Territories are the most affected (as can be seen for Pondicherry).

The fact that absolute and relative impacts vary indicate that the priorities for the reconstruction process should be linked to local capacity to undertake such a process. Also, this indicates that a uniform solution and programme for all affected districts, in terms of land zoning and planning and in terms of financial needs and capacity to absorb the reconstruction funding, is not possible.

**Figure 4**  
**SCENES AFTER THE DISASTER: DAMAGE AND RECOVERY IN THE MOST AFFECTED ACTIVITIES**



Figure 4 (Conclusion)



The needs for the recovery and reconstruction process, as identified by the different districts and the state governments, reflect different perceptions of existing risks and the vulnerabilities exposed by the tsunami. Some general policy issues are being discussed and revisited, including: physical location of activities; restrictions in land use (for example abiding by existing regulations that forbid constructions within 500 metres of the shore); and creating sea defences either by creating a vegetation buffer (restoring or expanding mangroves and channelling backwaters, planting coastal forests, etc.) or by building defence walls, groynes and sea walls. Financial needs vary in terms of amount and time frame for the reconstruction process according to the different countries' perceptions of what the vulnerability reduction measures and the necessary

improvements are (in terms of type and quality of housing, and type and quality of fishing vessels, for example). Table 7 shows the amounts and timelines (short and medium term needs) proposed by each state. It bears pointing out that the total amount of resources grossly matches the Indian Government's availability of resources, including potential donations, grants and credits from the national treasury, the private sector, NGOs, and the international and regional banks.

The profile that emerges is one where basic social and public services take priority in the short term, as well as providing the necessary resources for restoring agricultural production. In the fisheries sector, even though resources will be needed in the short term, most of the investment will be made in the medium term, since restoring the destroyed fleet will take a considerable amount of time. This gives the opportunity to analyze the restructuring and rationalization of the sector. The reconstruction of housing, in spite of its urgency, will take time as the necessary planning and zoning decisions have to be made. The same holds true for coastal protection and sea defences as well as hazard risk management, which includes the establishment of appropriate early warning with a multi-hazard perspective.

**Table 7**  
**INDIA: PRELIMINARY POST-TSUNAMI NEEDS IN AFFECTED MAINLAND STATES AND ONE TERRITORY**

	Reconstruction needs		
	Short term reconstruction	Medium term reconstruction	Total
Andhra Pradesh	26.0	46.6	72.6
Kerala	83.8	73.9	157.7
Tamil Nadu	248.6	619.7	868.3
Pondicherry	41.6	72.8	114.4
Total (by sectors)	400.0	813.0	1 213.0
Housing	160.0	329.0	489.0
Health and education	11.9	5.5	17.4
Agriculture and livestock	10.4	11.3	21.7
Fisheries	54.5	229.6	284.1
Livelihoods (micro enterprises and other)	70.6	108.1	178.7
Rural and municipal infrastructure	23.5	74.0	97.5
Transportation	41.5	27.7	69.2
Coastal protection	19.5	18.6	38.1
Hazard risk management	8.1	9.2	17.3

**Source:** JAM estimates on the basis of states' statements and memoranda.

### 3. A true global disaster

Damage and losses, and their effects on national economies, varied in each case as determined by the preliminary data compiled by the World Bank missions. The profiles of the impact, given the short time after the disaster and local conditions, show a complex global disaster that affected three continents most severely but was felt globally.<sup>12</sup>

<sup>12</sup> See World Bank, *World Bank Response to the Tsunami Disaster*, 2 February 2005.

In Sri Lanka the estimated loss of output in the most affected sectors (fishing and tourism) totals around 1.5-2% of GDP, but these sectors do not make up a significant portion of national GDP. Together the tourism (4% of GDP) and fishing (2.2% of GDP) industries make up about 6.2% of national GDP. Increased activity in the construction sector, which makes up a larger portion of GDP (7.2%), will mitigate part of the contraction in the fishing and tourism industries. Therefore, the tsunami may only result in slowing down economic growth by one percentage point in 2005 (from 6% to 5%) and less in subsequent years.

**Table 8**  
**SRI LANKA: PRELIMINARY ESTIMATES OF LOSSES AND FINANCING NEEDS**  
(US\$ millions)

Sector	Losses		Financing Needs		
	Asset Loss	Output Loss <sup>a</sup>	Short Term	Medium Term	Total Needs
Housing	306-341	-	50	387-437	437-487
Roads	60	-	25	175	200
Water and Sanitation	42	-	64	53	117
Railways	15	-	40	90	130
Education	26	-	13	32	45
Health	60	-	17	67	84
Agriculture <sup>b</sup>	3	-	2	2	4
Fisheries <sup>b</sup>	97	200	69	49	118
Tourism <sup>b</sup>	250	130	130	-	130
Power	10	-	27	40-50	67-77
Environment	10	-	6	12	18
Social Welfare <sup>c</sup>	-	-	30	-	30
Excluded Items plus Contingency <sup>d</sup>	90		30	120	150
Total (\$ Millions, rounded)	970-1 000	330	500	1 000-1 100	1 500-1 600
Percent of GDP	4.4-4.6	1.5			7-7.3

Source: JAM.

<sup>a</sup> Refers to 2005 and 2006.

<sup>b</sup> Includes estimates from *livelihoods damage assessment* of fishermen, small farmers, and small businesses in tourism totalling US\$140 million.

<sup>c</sup> Targeted assistance to vulnerable groups.

<sup>d</sup> Includes items mentioned at the end of paragraph 4 and are estimated at about 10% of the total.

The tsunami of December 2004 is the worst natural disaster that Maldives have experienced in recent history, resulting in major economic, social, and environmental impacts across the more than 1,119 islands that comprise the country. Of the 200 inhabited islands, 13 were totally destroyed, 56 suffered major damage, and 121 experienced moderate damage. Over one-third of the total population of 280,000 was directly affected. The disaster hit Maldives at a moment when it has been growing rapidly, reflecting strong performance in the tourism, fisheries, and construction sectors, and generally sound macroeconomic management.



## Financial Highlights

It is estimated that the macroeconomic impact of the tsunami in the Maldives will be substantial and proportionally greater than in the other affected countries, although magnitudes are difficult to estimate with certainty at the moment. The magnitude of this impact will become evident in the next 6 to 12 months, and it will depend on tourism sector recovery, the pace of reconstruction, the related availability of external financing, and macroeconomic and fiscal management in the face of unforeseen expenditures and revenue losses. The worse case scenario would be negative growth for the first time in over two decades, consumer price inflation to over 8 percent; a substantially larger current account deficit, a fall in reserves, and a significant widening of the fiscal deficit to about 10%. This would be a dramatic contrast with 2004 when, fuelled by tourism, GDP growth reached an estimated 9%, surpassing the impressive 8.4% achieved in 2003.

**Table 9**  
**MALDIVES: ESTIMATED DAMAGE AND FINANCIAL NEEDS**  
(US\$ millions)

Sector	Losses			Cost of reconstruction <sup>a</sup>			
	Direct losses	Indirect losses <sup>b</sup>	Total losses	Needs for next six months	Medium terms needs <sup>c</sup>	Total cost	Pubic financing needs <sup>d</sup>
Education	15.5		15.5	8.4	12.7	21.1	21.1
Health	5.6		5.6	4.9	7.3	12.2	12.2
Housing	64.8		64.8	22.2	51.8	74.0	74.0
Water and sanitation	13.1		13.1	18.4	27.2	45.6	45.6
Tourism	100.0	130.0	230.0	10.0	90.0	100.0	0
Fisheries	13.2	11.9	25.1	5.8	8.3	14.1	14.1
Agriculture	10.8	0.3	11.1	4.8	6.3	11.1	11.1
Transport	20.3		20.3	2.0	25.0	27.0	24.9
Power	4.6		4.6	1.9	2.8	4.6	4.6
Livelihoods		30.0	30.0	17.4		17.4	17.4
Environment				3.7	6.1	9.8	9.8
Disaster risk management				0.7	3.7	4.4	4.4
Other costs for new host islands <sup>e</sup>				5.0	10.0	15.0	15.0
Administration, etc. <sup>e</sup>	50.0		50.0	15.0	35.0	50.0	50.0
<b>Total</b>	<b>297.9</b>	<b>172.2</b>	<b>470.1</b>	<b>120.1</b>	<b>286.2</b>	<b>406.3</b>	<b>304.2</b>
Losses/costs as percent of GDP (2004 est.)			62			54	40
Estimated revenue loss <sup>e</sup>							60.0
Total financing gap including revenue loss							364.2
Total financing gap including revenue loss as percent of GDP							48

**Source:** These estimates were arrived at jointly by the Mission and the Government.

<sup>a</sup> Reconstruction costs in some sectors are higher than damages because (a) some partially damaged houses will need to be fully rebuilt because the original islands are not liveable anymore; and (b) new environmental standards apply to new facilities.

<sup>b</sup> Indirect loss estimates particularly in tourism and livelihoods are not robust.

<sup>c</sup> Medium term covers the period from 6 to 36 months.

<sup>d</sup> Public financing needs differ from reconstruction costs because certain losses may be covered by insurance and financial resources available to owners.

<sup>e</sup> Preliminary estimates.

In Africa the two most affected countries in terms of physical damage were Somalia and the Seychelles. However, other countries not covered in this report—including Kenya, Madagascar, Mauritius, and Tanzania—suffered loss of life or minor infrastructure damage. The hardest hit was the north-eastern coastline of Somalia.

The tsunami was a further assault on already vulnerable populations as chronic droughts and floods had already affected many parts of Somalia over the last few years. An estimated 80,000 people live in the worst affected coastal districts. Following the disaster, both the United Nations (UN) and nongovernmental organizations (NGOs) initiated interagency assessment missions to the affected areas and provided relief materials. However, it remains difficult to assess with precision the exact number of people affected. According to the United Nations, an estimated 150 people died in Somalia, with an additional 54,000 people directly affected by the tsunami; however, other estimates are higher. Significant infrastructure losses included housing, boats, wells, and water reservoirs. Unfortunately, the tsunami coincided with the height of the fishing season in Somalia, exacerbating the impact of the disaster. Further assessments are needed to determine the scope of the affected area and the extent of damage. It should be noted that the area's remoteness, the lack of reliable baseline data, and the limited presence of implementing partners and government counterparts prior to the disaster have hindered the assessment process and have created greater challenges in delivering assistance to the affected population. Delivering assistance to the needy is also a challenge because of poor communication and road infrastructure. Some of the affected areas are also inaccessible because of security concerns.

The Seychelles archipelago, which lies more than 7,000 kilometres from the epicentre of the undersea earthquake, suffered severe flooding and widespread damage to roads, fishing infrastructure, and tourism resources. Three people have been reported dead and at least four others were hospitalized. Two bridges on the road linking the airport to the capital were damaged and a main bridge was destroyed. The repair and rehabilitation of the damaged road network and bridges is estimated by the authorities at US\$ 6.4 million. The estimated loss in fishing infrastructure is US\$ 6.8 million. The preliminary cost of estimated damage to tourism infrastructure is US\$ 15 million, some of which is covered by insurance, but bookings are also down, contributing to an unknown further loss in GDP. The aggregate damage from the tsunami and heavy rains subsequent to the tsunami is currently estimated by the Government of Seychelles at US\$ 30 million, about 4% of Seychelles' GDP. The Government fears that the impact of the disaster on this small island economy with a population of approximately 80,000 will be significant. Within the overall government estimate, a United Nations Disaster Assessment and Coordination team puts the immediate needs as US\$ 8.9 million.

#### **4. Emergency and post-emergency response: Overwhelming commitments, conditional disbursement**

Given the number of visitors and tourists that died in the tsunami and the widespread coverage received by the international media, the tsunami was truly a global disaster. This mobilized unprecedented solidarity from civil society even faster than governments responded. The event's extent and development provoked massive humanitarian solidarity and concern for the apparently inappropriate early warning and rapid prevention. The amount of resources pledged, both for the emergency and for the ensuing reconstruction process, became a money bidding process of an unprecedented nature. This has raised fears that these pledges and offers might potentially divert resources from other development needs and appropriate risk management and disaster prevention and reduction measures.

Out of US\$ 931 million pledged to the consolidated United Nations Flash Appeal by official donors on or after 11 January, US\$ 500 million has been contributed. A further US\$ 221 million has been committed. Thus a total of US\$ 721 million have been converted into commitments or contributions that are 84% of the official pledges. The balance consists of general pledges for the Flash Appeal that have not yet been assigned or committed to any agency or NGO.

Private donors have contributed an additional US\$ 63 million for 7 UN agencies, and UN agencies have allocated US\$ 6 million from their own existing resources. The remainder are uncommitted official pledges. 55 governments have specifically pledged, committed or contributed US\$ 684 million to 16 UN agencies, and another US\$ 49 million to NGOs and other international organisations. 10 governments have channelled US\$ 28 million through the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) for onward distribution to implementing agencies.

Regarding overall funding in response to the tsunami for the short and medium term reconstruction process, the total amount pledged, committed or contributed to all recipients is US\$6,300 million (UN sources). Of this, 90 governments and inter-governmental organisations have pledged, committed or contributed US\$5,800 million. Private persons and institutions have pledged contributions of at least US\$ 572 million (see Table 10).

**Table 10**  
**FUNDS PLEDGED FOR TSUNAMI RECONSTRUCTION**  
(US\$ million)

Total	<b>6 399</b>
Bilateral	5 045
UN Agencies	139
European Commission	616
National Red Cross/Red Crescent	27
Other (private individuals and institutions)	572

**Source:** United Nations (OCHA).

This amount does not include private insurance claims and settlements, which although a small percentage in the overall figure, are significant for some sectors and countries (i.e. the tourism sector in Thailand). This figure does not include investment commitments that governments themselves are making from contingency funds, relief funds, or from their regular budget re-allocations.

The magnitude of the disaster and its impact on multiple countries and conflict-affected regions presents special challenges for financing reconstruction and for aid coordination. The international community, namely the United Nations and the World Bank, have indicated some criteria for the recovery and reconstruction process (see Box 1).

Official financial institutions and others have attempted to coordinate the international effort. Needs assessment missions have been staffed jointly with staff from the Asian Development Bank (ADB) and the UN, and have also included representatives from bilateral donors and other multilateral institutions. Aid coordination during the reconstruction phase most likely will take place at the national level and be led by the country; the Indonesia Consultative Group meeting took place before the end of January to discuss the pledging of resources for reconstruction. However, some donors may consider other arrangements to launch the reconstruction process, define responsibilities and accountabilities, guide aid allocation across countries, and to firm up financing and fiduciary arrangements.

This type of coordination is not the usual procedure after disasters. Precedents for it may be seen in crisis-solving conferences or, in the case of disasters, after hurricane Mitch in Central America. In this sense the tsunami, as Mitch was in the past, are milestone events. A similar ground-breaking occurrence after the tsunami has been the offer to provide debt relief for the affected countries (see Box 2).

**Box 1**

**WORLD BANK PROPOSED CRITERIA FOR TSUNAMI RECOVERY AND RECONSTRUCTION**

Particular issues include:

- Ensuring strong country ownership of reconstruction and commitment to implementation.
- Making the transition from emergency relief to reconstruction seamless and efficient. It is desirable to launch reconstruction as early as possible to restore livelihoods and markets and to avoid long-term dependency on relief aid.
- Government coordination of the efforts of many donors—60 countries were represented at the UN Flash Appeal in Geneva, each potentially with its own financing, fiduciary, and monitoring and evaluation procedures.
- Channelling funds efficiently and transparently to a multiplicity of small and dispersed activities in four countries—facilities worst affected by the disaster were private housing, small business (including fishing and agriculture), schools, and clinics.
- Providing for an equitable distribution of reconstruction activities.
- Ensuring that funds are put to their intended use.

**Box 2**

**DEBT RELIEF MORATORIUM OFFERS**

- **Paris Club Debt Relief.** On January 13, 2005, Paris Club creditors announced a debt moratorium for countries impacted by the tsunami disaster. The countries included are India, Indonesia, Malaysia, Maldives, Myanmar, Seychelles, Somalia, Sri Lanka, and Thailand.
- **Special Arrangements.** This debt moratorium is outside the scope of the normal debt restructuring mechanisms and, for this reason, many of the standards rules do not apply. Notably, there is no need to conclude an agreement with the IMF, nor is comparable treatment (or deferral) from other creditors expected.
- **Proposed Consolidation Period.** In the range of six months to two years. Likewise the repayment period is expected to be relatively short (five years), well below the standard rescheduling terms accorded by the Paris Club. (A temporary “payment holiday”, not a mechanism for addressing more fundamental debt problems.)
- **Debt Service Covered.** Principal and interest on any official development assistance loan and principal and interest on loans previously rescheduled by the Paris Club. Excluded is debt service falling due on guaranteed export credits that call on the guarantee by the export credit agency, which could send a negative signal to the financial markets.
- **Treatment of Interest Payments.** Subject of bilateral negotiation. Most expect to capitalize deferred interest payments as they come due but some creditors are prepared to forgive moratorium interest. However, in these cases the resulting loss to the creditor will be counted against the special aid commitments that have been announced in response to the tsunami disaster

Affected countries' willingness to forego debt moratoria and keep their increased indebtedness to a minimum is an indication of the importance of the globalization process and the concern of affected countries about the perception in financial markets, overall competitiveness and ability to attract foreign investment. Along with the IMF, World Bank staff is assisting affected countries in examining all financing options. Key issues include availability of additional funds, the degree of concessionality, and the impact of rescheduling on the longer-term profile of debt service payments.



### III. The 2004 Hurricane season in the Caribbean

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2004 was a “very busy” year in terms of disaster occurrence, with respect to the number of casualties, and the severity and rapid succession of the events. They included numerous cyclones and “super-typhoons” in the Pacific, floods in all regions, a heat wave in Europe, earthquakes in Asia and a very severe hurricane season in the Atlantic. According to Munich Re, “throughout the world, natural catastrophes claimed ... more than twice as many (lives) as in 2003. At the same time, the number of natural catastrophes (registered) was, at 650, no higher than the average of the last ten years. Economic losses totalled US\$ 145 thousand million, including insured losses of US\$ 44 thousand million, no less than US\$ 40 thousand million of which was generated by the destructive hurricanes in the Caribbean and the United States and the typhoons in Japan.”<sup>13</sup> Let’s not forget other affected areas, other trouble spots and other crisis and high risk situations.

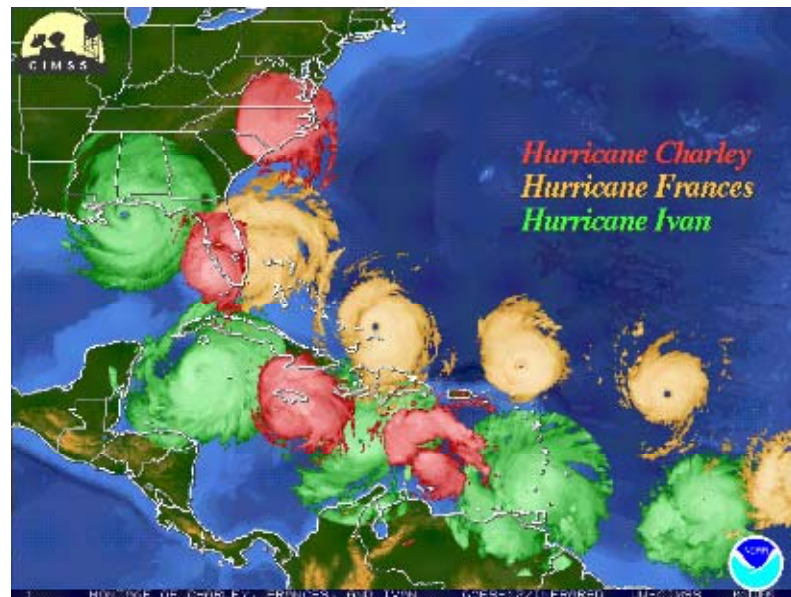
From a climatic perspective, Prof. Peter Höppe, head of Geo Risks Research at Munich Re suggests that “these events are further evidence that a correlation between global warming and the considerable rise in the number of extreme weather events is becoming increasingly plausible. (Thus) the insurance industry must adjust the scope and price of its insurance covers to the growing risk. This risk of change must be given even more weight in the models it uses to

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<sup>13</sup> Munich Re study: “*Topics Geo – Annual Review: Natural Catastrophes 2004*”, 24 February 2005.

analyse loss potentials from windstorms and severe weather events."<sup>14</sup> Such concerns are actually being recognised increasingly by governments and are a matter of study for the Fourth Assessment of the International Panel on Climate Change (IPCC), which is under preparation and will be completed by early 2007.

Figure 5  
THE 2004 HURRICANE SEASON IN THE CARIBBEAN



There is a growing literature that covers research on possible scenarios of climate change in the next 10 to 50 years, which would have severe consequences on human life and human activity.<sup>15</sup>

## 1. The different situations in the Caribbean

The Caribbean 2004 hurricane season exemplifies different experiences in terms of damage, losses and response that are relevant to the sustainability and capacity to mitigate and adapt to extreme events, even more so than the tsunami. Some of the salient differences among the season's impact in the different countries are:

- Appropriate warning and prevention as well as education (Cuba) vis-à-vis other countries.
- Aggravated damage, due to exposure and vulnerability (Haiti and Grenada), where levels of poverty in one case and insufficiently diversified economy in the second make recovery more complex.
- Losses expose weaknesses in the overall economy or sector affected (Dominican Republic and Jamaica), where financial implications of the recovery and reconstruction compound fragilities or weakness in that sector in the first country and in the second posed a risk to the country's credit rating.

<sup>14</sup> Munich Re, 24 February 2004 Press release.

<sup>15</sup> The author is one of numerous researchers involved in the fourth IPCC assessment. For a possible scenario of climate change see [http://www.ems.org/climate/pentagon\\_climate\\_change.html](http://www.ems.org/climate/pentagon_climate_change.html).



- Importance and coverage of damage and losses relative to the size of the economy (Grenada and Cayman Islands); but capacity to rebound is different on the basis of financial strengths, available insurance, and budgetary restrictions and need for resources.

- Florida and Cayman Islands had large absolute figures of damage and losses, particularly in the first case as the state was hit by four hurricanes within just a few weeks, but these figures have different weight in the national economy. Nevertheless, even if the weight in terms of percentage of GDP was negligible, the impact on the response mechanisms was high. In the first case the United States Federal Emergency Management Agency budget had to be replenished before the end of the fiscal year and the insurance industry was affected. With losses of US\$ 30 thousand million in the Caribbean region alone, 2004 was the most expensive hurricane season ever for the insurance industry.

In response to several countries in the region, ECLAC carried out, in association with other national, regional and international institutions, comprehensive assessments in six countries (Bahamas, Cayman Islands, Dominican Republic, Grenada and Jamaica).<sup>16</sup> The partial figure of damage and losses—in terms of assets lost, destroyed or harmed and of economic flows interrupted, increased or altered due to the damage—reaches an amount of more than US\$ 6,000 million dollars. If the reported damage in Cuba (US\$ 1,500 million) and in the state of Florida due to the four hurricanes is combined, the figure climbs to US\$ 37,600 million (see Table 11).

**Table 11**  
**ECONOMIC IMPACT OF 2004 HURRICANE SEASON**  
(US\$ million)

Island/State	Economic Impact	Natural Event
Total of ECLAC assessed damage and losses	6 059	Ivan, Frances and Jeanne
Bahamas	551	Hurricanes Frances and Jeanne
Cayman Islands	3 432	Hurricane Ivan
Dominican Republic	296	Tropical Storm Jeanne
Grenada	889	Hurricane Ivan
Haiti	296	Hurricane Jeanne
Jamaica	595	Hurricane Ivan
Florida	30 000	Jeanne, Charley and Frances
Cuba	1 500	Hurricanes Ivan and Charley
Total (including Cuba and Florida)	37 559	

Source: ECLAC.

<sup>16</sup> These studies may be downloaded at: [www.eclac.cl/mexico](http://www.eclac.cl/mexico), under recent documents. They are the following:

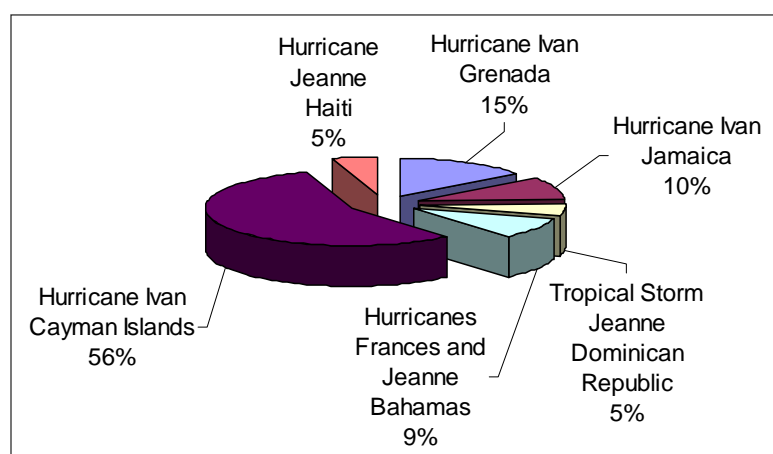
- Bahamas, “Hurricanes Frances and Jeanne in 2004: Their Impact in The Commonwealth of the Bahamas” (LC/MEX/L.642/Rev.2, LC/CAR/L.23/Rev.2), 8 December 2004.
- Cayman Islands, “The Impact of Hurricane Ivan in the Cayman Islands” (LC/MEX/L.645/Rev.1, LC/CAR/L.25/Rev.1) 8 December 2004.
- Dominican Republic, “Los efectos socioeconómicos del huracán Jeanne en la República Dominicana” (LC/MEX/L.638), 3 November 2004.
- Grenada : “Macro-Socio-Economic Assessment of the Damages Caused by Hurricane Ivan” (as part of a OECS led mission), September 7th, 2004.
- Haiti : « Le cyclone Jeanne en Haïti: dégâts et effets sur les Départements du Nord-Ouest et de l’Artibonite : approfondissement de la vulnérabilité » (LC/MEX/L.648, LC/CAR/L.27), March 2005.
- Jamaica: “Assessment of the socioeconomic and environmental impact of Hurricane Ivan on Jamaica” (LC/MEX/L.636, LC/CAR/L.22), 20 October 2004.

In summary, the cases analyzed by ECLAC this year show that 76% of the total impact was constituted by actual physical damage to assets (houses, businesses, roads and bridges, utilities, schools, hospitals and clinics, etc.), which imply losses in terms of flows of more that US\$ 1,454 million.

By sector, most of the damage affected the social sectors (47.5%) and productive activities (both goods and services, 35.2%, namely tourism). Damage and losses to infrastructure and utilities such as electricity, water and sanitation, and transport represent 15.6%, and the direct environmental impact, since most of natural resources are expected to recuperate, is 1.3%. This, nevertheless, does not imply that environmental action in terms of clean up, restoration and preservation of habitats and better environmental management is of lesser importance. In reality the amount of accountable damage pointedly signals that environmental assets and their services do not receive adequate valuation. The impact in terms of GDP is quite severe in most cases: 212% in Grenada and 138% in the Cayman Islands.

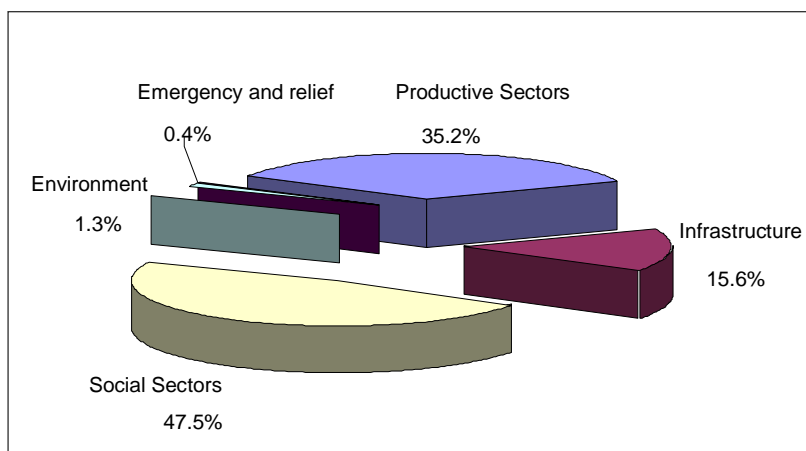
If the impact suffered by other territories and countries not appraised such as the Netherlands Antilles, parts of Mexico or the State of Florida, is added, damage would certainly exceed the total figure indicated of US\$ 37,600 million, once the impact in the overall economic performance of these economies is taken into account. As pointed out and is well known, in the more developed territories and countries insurance coverage and national response capabilities will compensate for the losses in the short to medium term but will, nevertheless, mark this season as one where the issue of sustainability of the present patterns of physical and spatial settlements will have to be reassessed in order to prepare these territories to move from prevention of unexpected events to adaptation to ever increasing damage if no appropriate measures are taken.

**Graphic 6**  
**HURRICANE SEASON 2004. DAMAGE DISTRIBUTION BY COUNTRY**



Source: ECLAC.

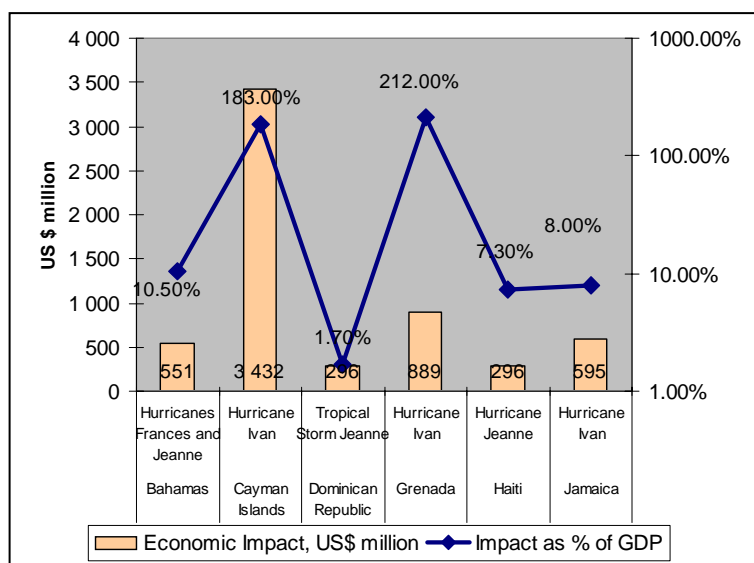
**Graphic 7**  
**DAMAGE PROFILE IN THE CARIBBEAN HURRICANE**  
**2004 SEASON**



Source: ECLAC.

However, from a social point of view the most severe socioeconomic and human toll, was concentrated in the least developed, smaller countries affected, whose capability to rebuild and return to the path of growth and development is limited given the lack of appropriate insurance coverage, institutional response and preventive policies. This is particularly the case of Haiti and Grenada, but other economies with fragile environment and indebted or weakly performing economies were burdened by the severity of the events. In Grenada the total impact was estimated to be almost US\$ 889 million, which is equivalent to more than twice (2.12 times) the current value of last year's GDP. Graphic 8 illustrates the relative importance of damage and losses (as compared to GDP) vs. the absolute value for the cases analyzed.

**Graphic 8**  
**RELATIVE AND ABSOLUTE ECONOMIC IMPACT OF DAMAGE**  
**AND LOSSES**



Source: ECLAC.

In the case of the Cayman Islands, the amount of damage and losses reached US\$ 3,432 million (or 3.4 billion), that exceeds by more than one third (1.38 times) the estimated GDP in 2003. The cases of Grenada and Cayman Islands illustrate the level of exposure to a major hurricane of very small territories, one with almost no insurance coverage or endogenous resources to cope and the other with a high level of insurance and, hence, with a capacity to rebuild albeit with a shortage of immediate resources and with effects on the islands' government budget and cash flow.

Of the overall consequences, the impact in the Bahamas (US\$ 551 million, roughly 10.5% of GDP), Jamaica (equivalent to US\$ 575 million and 8% of GDP), and the Dominican Republic (US\$ 270 million, equivalent to 1.7% of the 2003 country's GDP), nevertheless reinforce that out of this year's experience one key lesson learned is that the sustainability of economic and social development is closely interlinked with the environment. On top of the many constraints for development faced by some of the smallest and poorest countries, the cumulative impact of disasters makes the quest for development even more difficult. Strengthening the capacity to prevent and to respond to the emergencies caused by natural disasters is a main ingredient for development and poverty eradication in many poor countries.

An additional relevant conclusion is that even though most damage occurs in the private sector, it falls on Governments to take care of and assist those segments of the population with lower income, which are highly dependent on basic agricultural or fishing activities that are affected. Productive activities rank high in the amount of damage and losses and in some cases the ensuing losses (economic flows affected) will persist for a long period of time, in some instance years. Infrastructure vulnerability is enhanced by poor environmental management and environmental degradation, leading to high productive risks and huge human suffering.

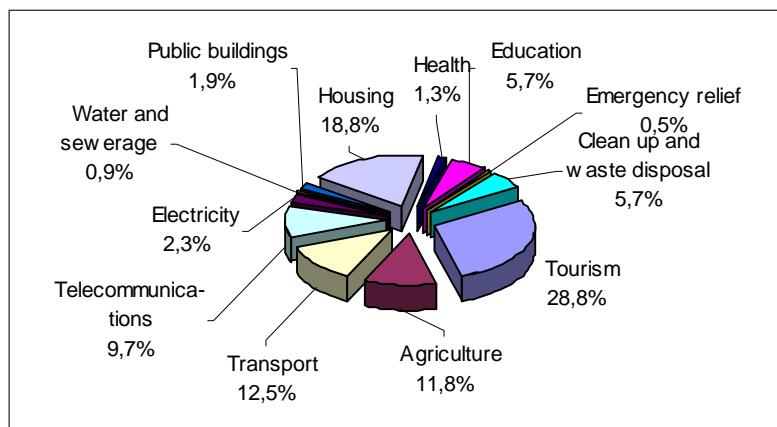
## **2. Impact profiles of the cases analyzed**

### **a) Bahamas**

The Bahamas experienced diminished growth rate, additional pressure on the budget, increased environmental vulnerability, and a varying impact among islands in the archipelago. Some islands were hit not by one but by two hurricanes, compounding the damage produced by the high winds of one plus the rains caused by the other. The seasonal dynamic of affected sectors will be altered by the impact on the productive activities.

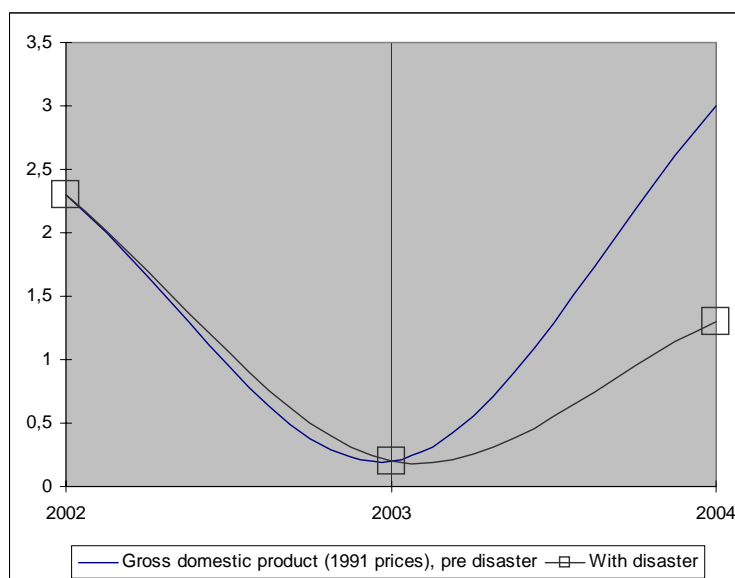
Although damage is not as severe as in other countries; the limited tax base (which conditions budgetary resources available) of a vastly duty free, offshore oriented economy limits resources available to the government for compensation and relief.

**Graphic 9**  
**SECTORAL AND DYNAMIC IMPACT IN THE BAHAMAS**



Source: ECLAC.

**Graphic 10**  
**EFFECT OF TWO HURRICANES IN THE BAHAMAS GROWTH RATE**



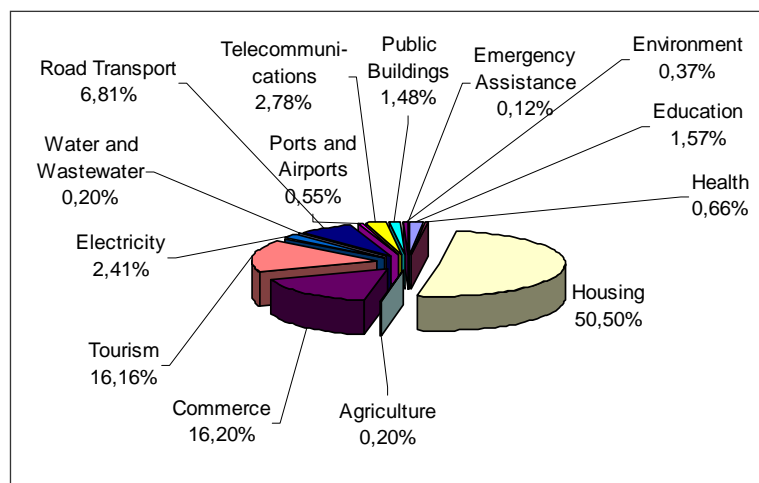
Source: ECLAC.

### b) Cayman Islands

The effect on the Cayman Islands' economy, in spite of the extraordinary weight of damage and losses, will not be so vast. Given its impact on fiscal revenue, output and tourism income drop in the fourth quarter, a negative growth of 1.2% is anticipated in 2004 after Ivan, as compared with previously projected growth of 3.1%.

Nevertheless, with extensive insurance coverage (although with significant level of private underinsurance), recovery is already underway. The disaster posed basically a cash flow problem for the local government as it had to use available funds during the emergency, thus, reducing resources in unspent budget lines.

**Graphic 11**  
**BREAKDOWN OF DAMAGE AND LOSSES IN THE CAYMAN ISLANDS**

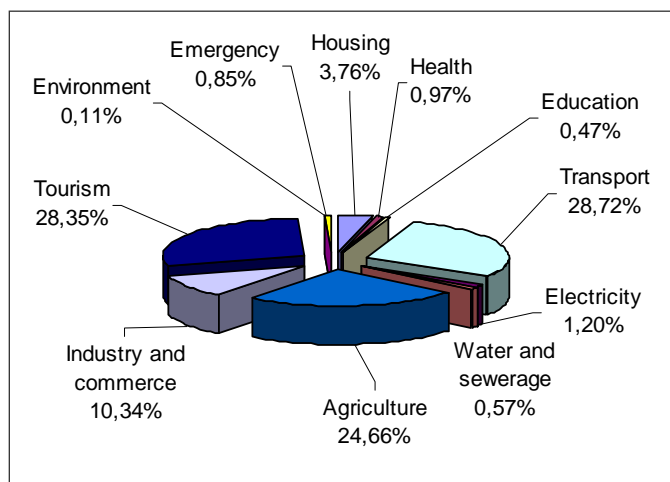


Source: ECLAC.

### c) Dominican Republic

The country has a long history of disasters associated with hurricanes (ECLAC has assessed the three major ones in the past), but the events in 2004 underlined unresolved vulnerabilities, some of which have been made worse both by the frequency of extreme events and the increased exposure to hazards associated with a pattern of development that does not provide an appropriate environmental management. Beyond the urgency to undertake an integrated systemic approach to watershed management (at all three stages: up streams with high slopes, mid-courses that have silted and need dredging, and estuaries that have been obstructed and also need opening and dredging), the coastal dynamic of beaches, mangroves and backwaters and lagoons has to be preserved and, in some cases, restored in the face of tourist developments that have interfered with such ecosystems.

**Graphic 12**  
**BREAKDOWN OF DAMAGE AND LOSSES IN THE DOMINICAN REPUBLIC**



Source: ECLAC.

After the third disaster in a 12 month period (floods in late 2003 in the Cibao and northern river basins, a rain causing tragic floods near Haiti in Jimani in the southern basin), actions recommended include:

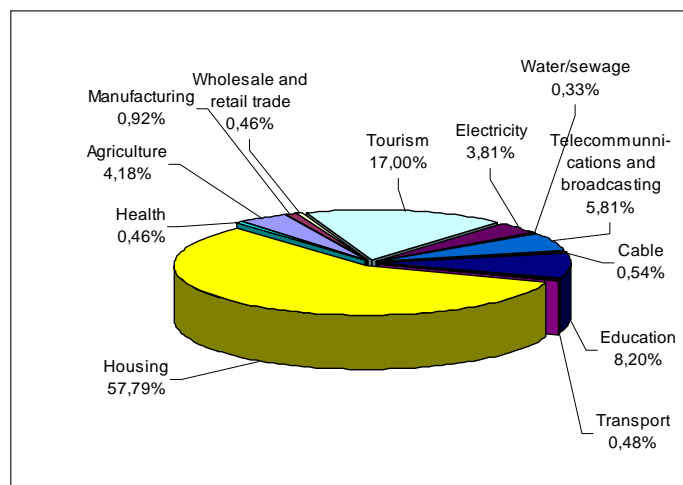
- Improved appropriate watershed management to slow water flow in the upper parts, retain water for agriculture and energy, and permit flow to sea downstream.
- Improved the country's disaster risk management by appropriate planning, zoning and physical infrastructure in the island's basins.
- Increased cooperation with Haiti in shared watersheds.

#### d) Grenada

As a result of the Hurricane, GDP growth is expected to fall in 2004 by 1.4%. The contraction in GDP growth will respond mainly to underperformance in most sectors and in particular to the devastation caused by the disaster in the agricultural sector and in the tourism industry.

Besides its size, Grenada was particularly vulnerable on account of its economy being highly dependent on its natural resources: tourism and agriculture are its main sources of foreign income. A more diversified economy, with a larger proportion of services (like other Caribbean islands) could reduce its vulnerability more than revising physical planning, land zoning or infrastructural investments.

**Graphic 13**  
**BREAKDOWN OF DAMAGES AND LOSSES IN GRENADA**



Source: ECLAC.

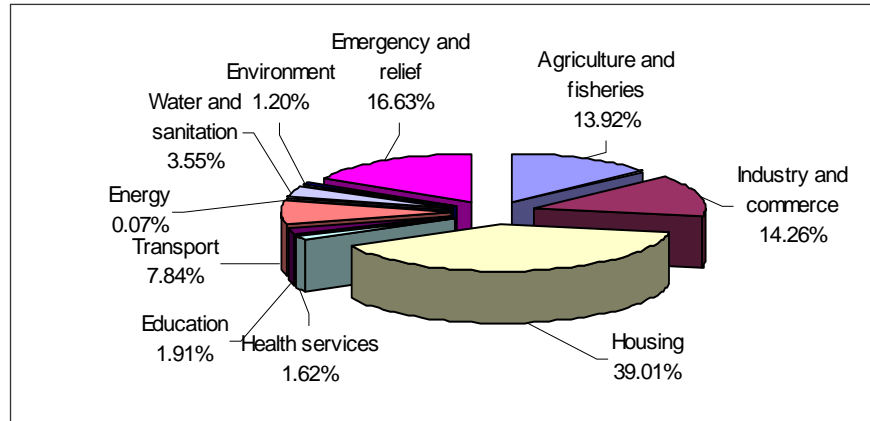
#### e) Haiti

Consequences for Haiti are particularly severe in human terms not only associated with the levels of poverty and inadequate social, economic and physical infrastructure, but as a result of long-standing environmental degradation.

In reality, this degradation is the main contributing factor to the disaster, which is the third in a 12 month period.

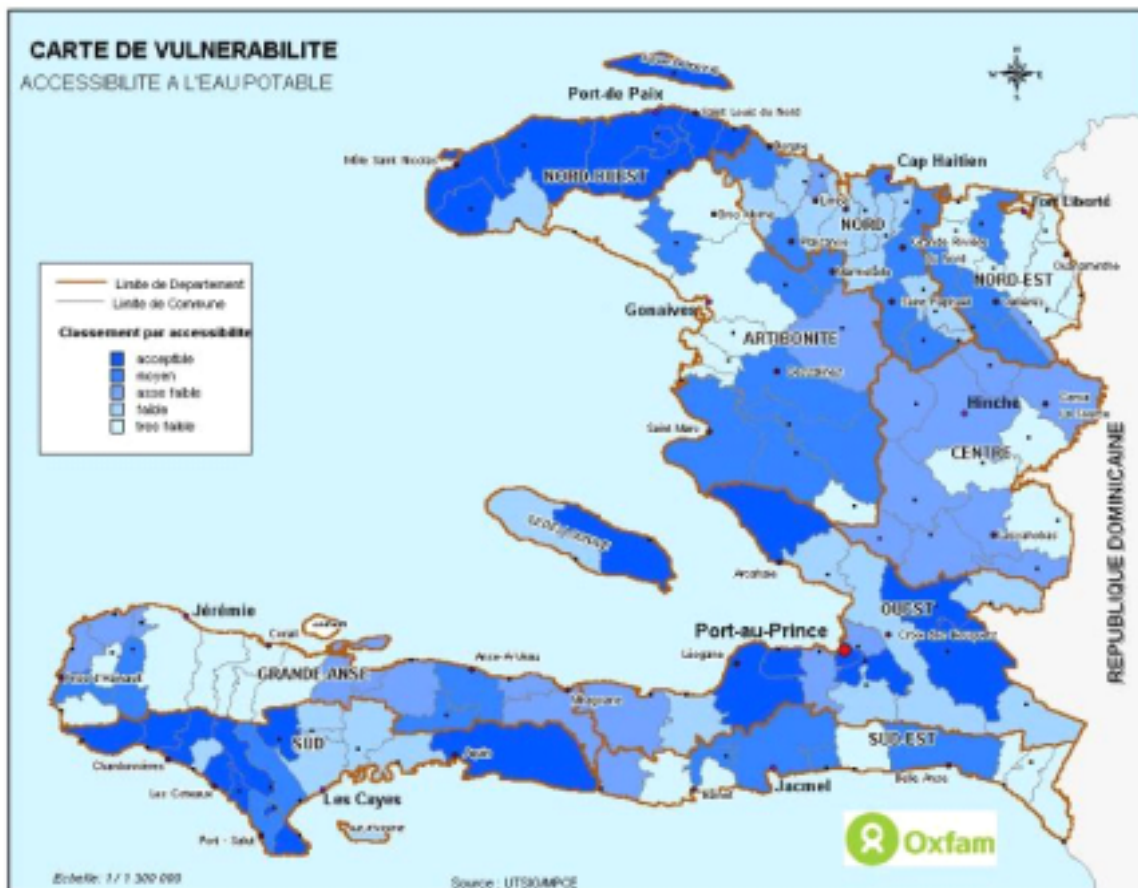
The disaster was added to conditions of extreme poverty. The worst social indicators and human development in Latin America and the Caribbean are found in Haiti, and in some indicators the affected region fares among the worst.

**Graphic 14**  
**BREAKDOWN OF DAMAGE AND LOSSES IN HAITI**



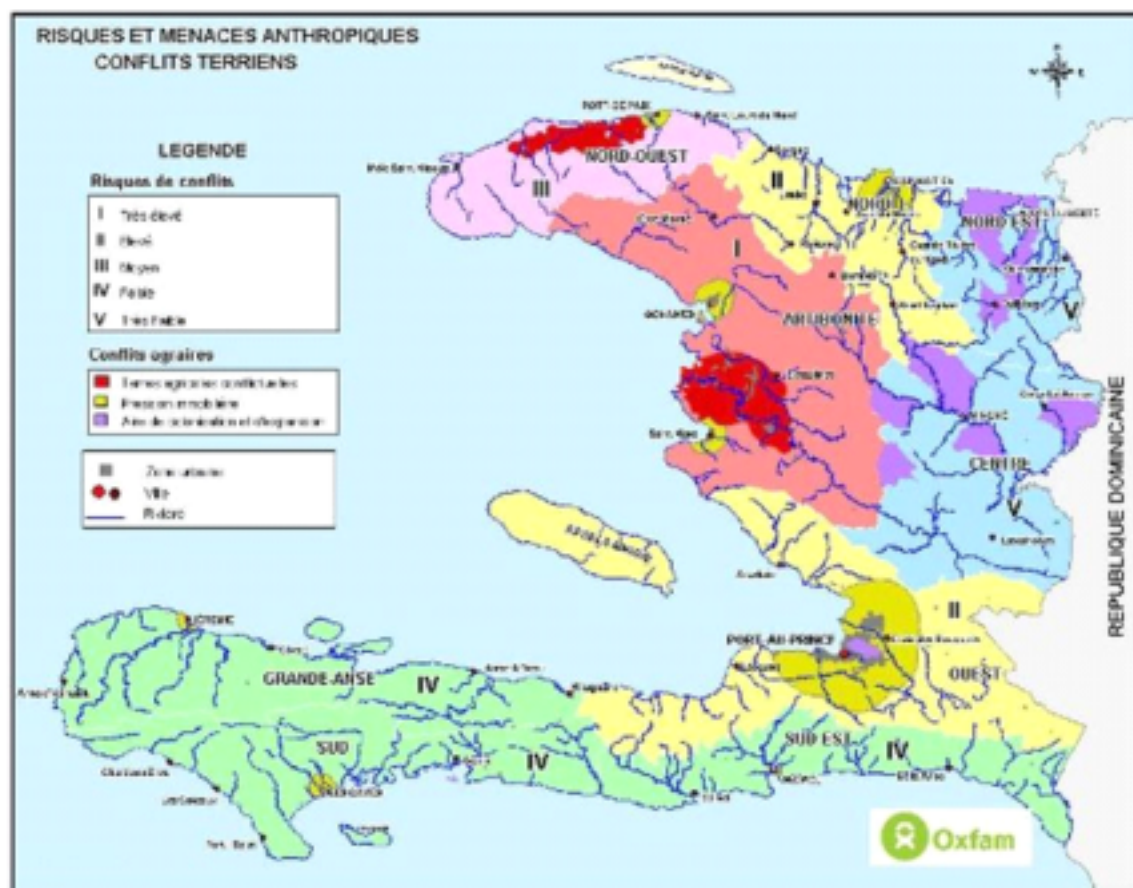
Source: ECLAC.

**Map 3**  
**VULNERABILITY AND EXPOSURE IN HAITI**



Map 3 (Conclusion)





**NOTE:** The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

In spite of preparation at the institutional level and well-trained technical staff, the country's vulnerability and the brittleness and fragility of its political system limit the response capacity. This is aggravated by international humanitarian assistance that, given local conditions, acts autonomously, further limiting local response.

Risk appropriation at the local and national level and international assistance that transforms itself into actual cooperation, and delegation of authority and responsibility to communities and the local and national level seem to be key needs in Haiti, even more than monetary transfers or grants. By the same token a reconstruction process that does not focus on reversing environmental degradation will only rebuild on existing vulnerabilities, leaving unattended the need to face recurrent hazards in an appropriate manner.

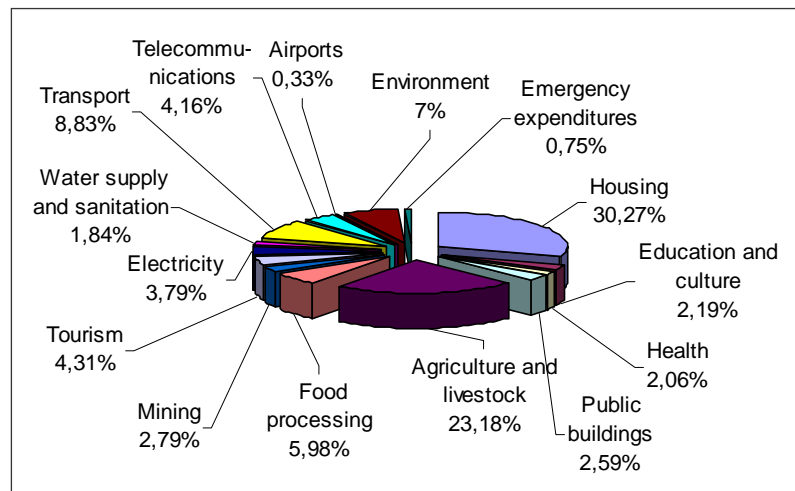
The amount of damage and losses underestimate the actual environmental cost, which has led historically to lack of investment and actual "disinvestment" (i.e. over consumption and destruction) in the country's environmental assets.

## f) Jamaica

Economic consequences in Jamaica may be summarized as follows:

- As a result of the natural disaster, the economy will witness a reduction in the rate of economic growth (from 2.6% before Ivan to 1.9% after).
- The government is concerned about not incurring a higher fiscal deficit
- There is an unwillingness to incur debt and affect the country's high credit rating that attracts foreign investment.

**Graphic 15**  
**BREAKDOWN OF DAMAGE AND LOSSES IN JAMAICA**



Source: ECLAC.

## **IV. Some conclusions/challenges**

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A general conclusion that emerges from recent events confirms what experience has shown over the years, which is that similar hazards in situations with different vulnerabilities result in different risks and different impact, thus risk reduction and disaster management policies depend more on appropriate vulnerability reduction in socioeconomic terms than in physical investment in infrastructure aimed at managing hazards.

The case of the 2004 Hurricane Season in the Caribbean and the December Indian Ocean tsunami also highlight the importance of strengthening institutional capabilities and appropriate action in a multi-sectoral, inter-institutional framework. The level of institutional organization to alert, react, respond and manage disasters leads to different levels and type of damage, as clearly exemplified by these events. More importantly, the level and effectiveness of the risk bearing infrastructure (physical and financial) lead to different levels and types of socioeconomic and environmental impact.

All the recent events, in spite of having generated a return to the reactive approach to disasters at the international level as evidenced by the huge response to their effects, one of the emerging conclusions is that the impact underlines the link of development (poverty, infrastructure, social cohesion and governance) to damage and losses. Thus risk management policy is to be seen as a state policy that does not change with each administration, and both institutional and legal norms must promote risk appropriation (ownership). It is the recognition of individual and collective responsibility —and the implications of not assuming such responsibility in terms of damage and losses— that will lead to risk management, reduction and transfer.

Lessons learnt from the recent experiences reaffirm what is well known and conceptualized but not necessarily instrumented appropriately, i.e. that intra-regional cooperation and exchange of experiences among countries will generate synergies. That is true both at the sub national, national and regional/international level where coordination, cooperation and decentralization will reduce individual costs and increase overall capacities and resilience. The decentralization aspect is crucial not only to reduce the responsibility of central governments and the pressure on their budgets and staff in the face of natural events; but as a means for the incorporation of local culture and local conditions to prevention, response and risk management mechanisms. There are no overarching, single responses, solutions or preventive/defensive measures to respond to multi-hazards. Local impact of those hazards and ever-changing vulnerabilities imply that local solutions —under general criteria and normative standards— are the viable way to protection and disaster reduction.

Another lesson is to de-emphasize the “hard” (structural, engineering, physical construction) response and favour the “soft” (community based, empowerment and ownership) measures that will promote risk management. There are neither single nor fast “solutions”: there is no “quick fix”.

In the face of recurrent or seasonal events (that have shorter return periods that are somewhat predictable) that may have disastrous consequences, appropriate actions and policies ought to be envisaged in a similar fashion as “anti-cyclical” instruments that will provide the means of response before the disaster’s occurrence. This implies the usual preventive measures (early warning, response, information to potential victims and exposed populations) as well as risk reduction and risk transfer instruments.

## **1. The Hyogo Declaration and Plan of Action**

Before the very intense year that 2004 turned out to be, not only in the Caribbean but with the dramatic, highly publicized tsunami as well, world governments were already immersed in assessing the advances made in disaster reduction in recent years, i.e. since the end of the International Decade for Disaster Reduction (1990-2000) and the occurrence of the emblematic Kobe earthquake that changed Japan’s perception of its own risk management in 1995. The Second World Conference on Disaster Reduction took place in January, 2005 under the auspices of the Government of Japan and the Hyogo Municipality (where Kobe is located), and was organized by the United Nations through OCHA and the Secretariat of the International Strategy for Disaster Reduction (ISDR). The conference focused on risk mitigation and management within the context of the international community’s concern about security and protection and the renewed concern over the lessons to be learnt from the 26 December tsunami.

Relevant issues for discussion included operational issues (such as how to coordinate humanitarian assistance and emergency response, and the role of official international agencies, NGOs and bilateral official assistance), the appropriate flow of information and its use in early warning and prevention, and ethical concerns about ownership and responsibility in the face of risk management, reduction and transfer.

After the international disaster reduction decade, there is greater knowledge about risk and countries have achieved important improvements in living with risk; on the other hand, the number of disastrous events —and their human and economic costs— have not seemed to abate. Actually, the costs have continued to increase exponentially. One of the concerns in the preparation of the second conference was to de-emphasize response and reinforce prevention, mitigation and adaptation; however, the tsunami placed response and assistance at the forefront again.

The conference, nevertheless, made a significant advance in reaffirming that disaster reduction is a matter of development (as ECLAC has indicated for over ten years) and reinforced, at

the level of financial institutions and economic policy proposals, that risk management must be part of the financial assessment and viability of both public and private activities. This leads to the conviction that disaster reduction as a matter of development makes clear the link between disaster reduction and the attainment of the Millennium Development Goals. On the one hand, disasters not prevented in developing countries further increase the difficulty of attaining the MDGs and increase the number of people living in poverty or who are further pauperized; on the other, resources are diverted to assistance and response away from development investment projects. This led to the promotion of a disaster reduction platform based on the exchange of local, national and international experiences in a multidisciplinary, inter-institutional framework; and the more extensive utilization and further development of analytical tools such as the ECLAC methodology, environmental risk assessment instruments, and crisis response and management frameworks.

**Box 3****HYOGO FRAMEWORK FOR ACTION 2005-2015**

Sets five priorities for action:

- Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
- Identify, assess and monitor disaster risk and enhance early warning.
- Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
- Reduce the underlying risk factors (associated with the level of development, special conditions such as insularity typical of small island development states (SIDS)).<sup>17</sup>
- Strengthen disaster preparedness for effective response at all levels

Thus the declaration issued at the Conference<sup>17</sup> builds upon relevant internationally agreed-upon development goals, namely the MDGs; recognizes the intrinsic relationship between disaster reduction, sustainable development and poverty eradication; emphasizes the importance of involving all stakeholders, including NGOs and the private sector; recognizes that a culture of disaster prevention and resilience associated with pre-disaster strategies is a sound investment, and affirms that states have the primary responsibility to protect people and property. This led to the adoption of a framework for action (see Box 3).

In essence, the need for financial instruments as well as clear-cut, achievable, and measurable goals was emphasized to promote disaster reduction, particularly with regard to prioritizing underlying risk factors such as health, where social consequences of their collapse may be particularly devastating.<sup>18</sup>

<sup>17</sup> *Hyogo Declaration*, 23 January 2005.

<sup>18</sup> ECLAC's participation in the Conference was in: Cluster 4: Reducing the underlying risk factors, specifically in: Session 4.2 - Vulnerability reduction of health facilities (Organizer: National Society for Earthquake Technology, Nepal (NSET); and Pan American Health Organization/World Health Organization (PAHO/WHO); and Session 4.3 - Financing disaster risk (Organizer: Kyoto University (KU), Department of Urban Management: Prof. Charles Scawthorn; International Institute for Advanced Systems Analysis (IIASA): Dr. Joanne L. Bayer; and the World Bank (WB): Mr. Christoph Pusch); and Cluster 1: Governance, Institutional And Policy Frameworks For Risk Reduction, in Session 1.5 - Disaster Reduction Indicators: safer critical facilities. Presentations made and conclusions of all clusters may be seen at the ISDR webpage.

## 2. Some final considerations

The outcome of the Kobe Conference, the Hyogo Declaration, will be positive if the international community and national governments pay heed and move ahead boldly to include risk management and adaptation to nature and natural events in a framework of sustainable development.

In regard to the outpouring of humanitarian assistance, a higher than usual part from civil society, two major questions stand: first, the effectiveness and validity of such assistance and the difficulty in coordinating efforts so that they strengthen communities and systems at risk and make them more resilient; and second, the validity and appropriateness increasing ownership leading to responsibility from those at risk or those who, through their actions, increase risk, sometimes at a profit. Thus, it becomes very important to raise the question of the relationship between ethics, development and disasters (addressed by Amartya Sen).<sup>19</sup>

Risk transfer becomes a crucial element in disaster reduction. Traditionally it has been made in what may be categorized as a spurious way, by not internalizing risk as part of the viability (economic, financial, social, environmental) and having private investment externalize risk to society at large, placing demands on government. Similarly, countries, particularly developing countries with high vulnerability and insufficient resources to sustain their development process, transfer risk to the international community. Thus the balance of resources from the international community and governments concentrates heavily in response and reconstruction investment, rather than on risk reduction, prevention, mitigation and adaptation. On the other hand, the “virtuous” alternatives to risk transfer imply recognizing risk and accepting responsibility in facing it, at both the individual and institutional levels.

Thus disaster reduction requires, first, appropriation and responsibility which come from appropriate regulatory and institutional frameworks and, second, economic and financial instruments that provide leverage to attain the risk reduction goals. Such instruments are relevant as part of macroeconomic policies of compensation and development. In a concrete sense, appropriate investment in risk management and transfer will generate pre-disaster leverage and reduce damage (in a manner similar to anti-cyclical policies such as price compensation funds for commodities). But that is only part of the risk management equation. The other is more at the micro level, focusing on having investors internalize risk (invest in its reduction on the basis of the profitability of not losing such investment in the face of disasters) instead of externalizing it to the rest of society. Also at the micro level, governments—as part of appropriate social policy—should generate resources and community based resilience. It seems fair to say that state-assisted responsibility and solidarity are needed instead of irresponsible charitable and paternalistic responses. The use of community-based institutions and instruments such as micro credit associations, self-help groups, community women groups has been successful in some instances, namely in some countries in Asia and is worth pursuing.

## Epilogue

Disaster’s negative impacts tend to be the result of underlying, unresolved socioeconomic, political and environmental conflicts.

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<sup>19</sup> See: Amartya Sen, IADB, January 2005.

## **Appendix**

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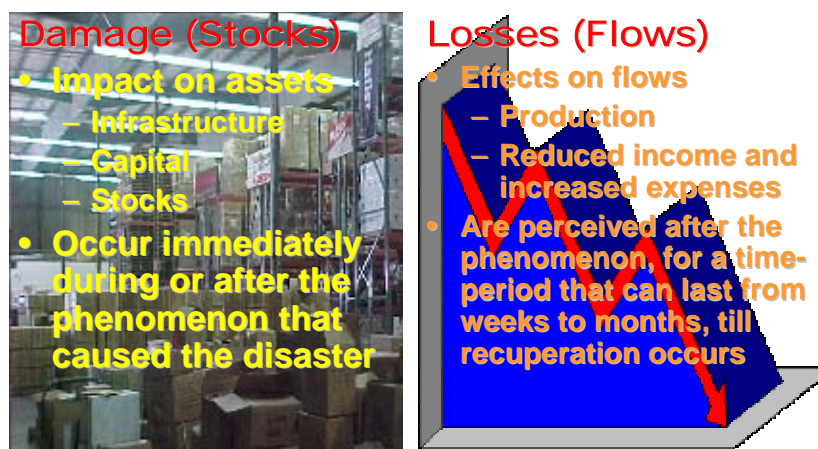


## A brief description of the socio-economic and Environmental Assessment Methodology

### What is the methodology?

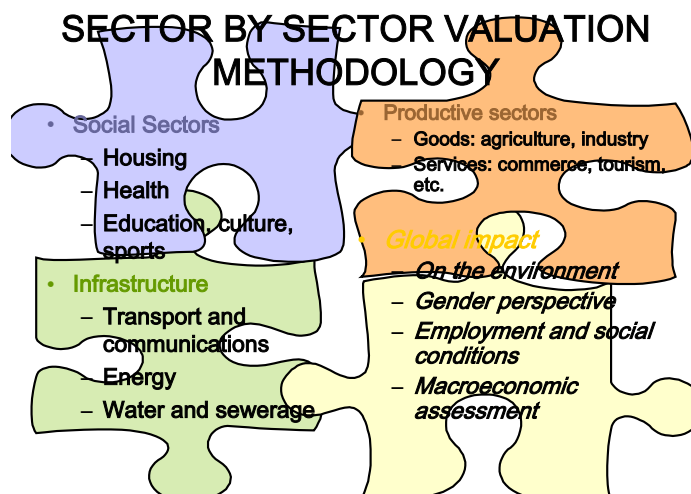
The socioeconomic and environmental impact evaluation methodology has been developed in Latin America by ECLAC<sup>20</sup> since the mid 1970s (the first requirement made by a government to have an assessment was the case of the 1972 earthquake in Managua, Nicaragua).

## Main Concepts



The main concepts used in a systemic sectoral approach are of a stock flow analysis. This entails first assessing the damage (partial or total) in assets, i.e. quantifying firstly the physical damage as miles or km. of road, miles or meters of bridges, number, type and size of buildings (i.e. houses, schools, hospitals, factories, warehouses, churches, museums, etc.); machinery, stocks of production, land for agricultural use, forest and natural reserves, beaches and ecological systems such as coral reefs; number of classrooms, hospital beds, etc. The valuation of these may be calculated in terms of present actuarial or book value (for insurance purposes, for example); at replacement value (current market value of construction of similar structures), real estate value, proxy prices in the case of environmental assets in terms of services rendered by asset damaged or lost. Valuation may also be attempted in terms of reconstruction that introduces hazard mitigation, vulnerability reduction or risk management measures.

<sup>20</sup> See [www.eclac/mexico](http://www.eclac/mexico), under “desastres”. *Handbook for the evaluation of the socioeconomic and environmental impact of disasters* (LC/MEX/G.5, July 2003) available at the following web pages: [www.eclac.cl/mexico](http://www.eclac.cl/mexico), (“desastres”), [www.worldbank.org/hazards/knowledge/other\\_res.htm](http://www.worldbank.org/hazards/knowledge/other_res.htm), and [www.proventionconsortium.org/toolkit.htm](http://www.proventionconsortium.org/toolkit.htm).

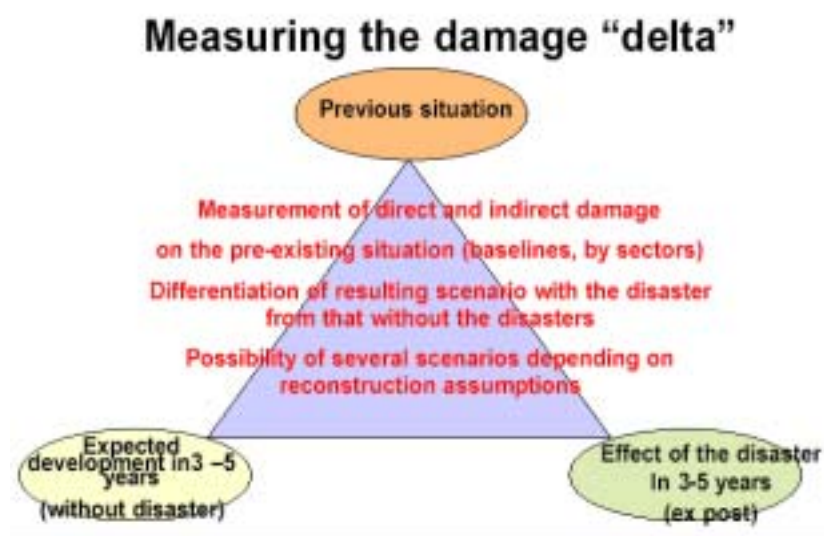


Once damage and its value are established, the economic consequences of that damage are assessed in terms of flows affected, sector by sector. These refer to the current value of production lost, reduced or deferred; additional production, distribution and marketing of production, trade in goods and services, increased government expenditures, and public service utilities (either provided privately or by the state); and reduced income both at the personal and entrepreneurial level as well as in terms of public finances. Reduced income to the state will be associated with reduced economic activities, special tax holidays given due to the disaster which can be of a general nature (reduction or elimination of import duties for example) or location specific to favour the disaster area. Other potential flow impacts could occur in the external sector, such a reduced exports or increased imports, and on the financial side, transfers received (be it private as remittances from nationals abroad or public as charitable contributions), new donations and grants as well as reconstruction credits. On the plus side also should be considered insurance and reinsurance payments from overseas. The sum of damage and losses, sector by sector, constitute the total impact of a disaster.

**Damage** (direct impact) refers to the impact on assets, stock, and property, valued at agreed replacement (as opposed to reconstruction) unit prices. The assessment should consider the level of damage, i.e., whether an asset can be rehabilitated/repared, or has completely destroyed.

**Losses** (indirect impact) refer to flows that will be affected, such as reduced income, increased expenditure, etc. over the time period until the assets are recovered. These will be quantified at present value of such flows.

These impacts, assessed sector by sector, as flows variations resulting from the disaster, are then used—in their value added component—to estimate the macroeconomic impact of the disaster. The purpose of such an exercise is to establish the gap—or delta—that the economy as a whole and its components will experience. In fact three alternate situations are analyzed: the pre-disaster situation and trend (baseline situation), the non-disaster expected performance, and the post-disaster impact. This impact, in its entirety, without any potential reconstruction or response, constitutes the base scenario. To consider the reconstruction needs (as distinct and different from damage and losses) several possible scenarios may be considered on the basis of the system's absorptive capacity, that is, the resources available for reconstruction (from insurance and reinsurance, contingency or emergency funds, or credit available). Alternatively the base scenario serves to establish the financial gap to be filled, considering the reconstruction strategy (and its cost) that is put forward by the relevant stakeholders.



### What is the use or purpose of the evaluation?

The general purpose of the evaluations is to provide a preliminary assessment of the damage and losses after a disaster in order to identify immediate recovery and longer-term reconstruction needs, and to determine the economic and financial implications of the event. The assessment's conceptual basis is a stock/flow analysis that evaluates effects (i) on physical assets that will have to be repaired, restored, replaced or discounted in the future and (ii) on flows that that will not be produced until certain assets are repaired or rebuilt.

The end product will be a consolidated summary of damage and losses that provide the extent and breadth of a disaster's impact, in quantitative, sector by sector, geographically specific terms that are stratified by affected groups, stemming from information compiled immediately after the event. It should not be considered a definitive assessment, but rather a preliminary understanding, compiled in a timely manner, to inform urgent recovery efforts. This quantification offers two further results: a determination of the relative size of impacts on relevant economic variables (by use of macroeconomic analysis and scenario modelling under different assumptions for the reconstruction potential and needs); and an analysis of the resource gap that these reconstruction scenarios pose to the government and to the affected population.

## **Use of Assessment Report**

The evaluation's most important function is to provide decision-makers and stakeholders with a quantitative basis to request recovery funding assistance, and to design a reconstruction strategy. The quantification, given its sector by sector nature, allows for concrete, specific proposals for action in sector or geographic terms. It is a tool for determining priorities (importance vs. urgency) and sequencing (timeline for reconstruction process), i.e. to restore livelihood through income and employment while physical reconstruction of housing, production, and infrastructure proceed.

## **How to proceed: when and how the methodology is applied**

Past experience indicates several needs. First, a team must be established to collect, organize, and analyze the necessary sector by sector information, from profiling existing baseline to superimposing damage and losses with a unified and comparable approach. The team should be multidisciplinary and inter-institutional, with clearly designated focal points to compile and present the data in a comparable manner, so that they can be summarized and factored into a macroeconomic scenario exercise. Each focal point should have common terms of reference. The global analysts (e.g. macroeconomists, environmental economists, gender experts) will proceed to use the emerging data of damage and losses to: contrast the disaster scenarios to the non-disaster trend; make environmentally related damage and losses visible; and differentiate men and women's impact and roles in the post-disaster process.

Second, a deadline must be established to submit the final report deadlines for submission of sector data (quantification in standardized format with agreed common criteria) and accompanying descriptive text must be set depending on the final deadline. The description will include not only narratives of the event's impact on the sector but also the criteria and assumptions made to establish damage and loss figures.

Third, a deadline must be set for completion of a global analysis, and this deadline must be discussed and made compatible with a strategic reconstruction proposal. Caveats as to accuracy of available data, methodological considerations and assumptions made must be specifically addressed. The timing for the assessment should be such that, without losing its timeliness, it does not interfere with the ongoing emergency, particularly the search and rescue, although thinking of the future in terms of the needs for the reconstruction process is an immediate task to be pursued since some actions are required to be undertaken promptly, especially those related to providing housing solutions, health and education services, and recovery strategy. Additionally, discussion of the future serves as a therapeutic measure to overcome trauma. The main concern is that it does not interfere with immediate life-saving activities and emergency relief operations.

Each sector team should consult and exchange information with each other to avoid duplication, share data of common interest or of interest in more than one sector, and identify information gaps or lack of information. The sector specialist will not only gather information on baselines and the disaster's impact on them (i.e. damage and losses), but on reconstruction needs in the form of sectoral strategic responses. These can be used as input to develop an overall reconstruction strategy and possibly project proposals.

The strategic proposal will include a framework for action, based on pre-existing policies or development strategies, focusing on adaptation of the latter to the needs for the reconstruction, prioritize and sequence the process, define resource gaps to be filled from government, private and external sources, and profile execution processes in which affected populations and other stakeholders can play key roles in reconstruction.



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