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The 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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Contents

Boxes

Diagrams

Figures

Graphic

Maps

Tables

Summary

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

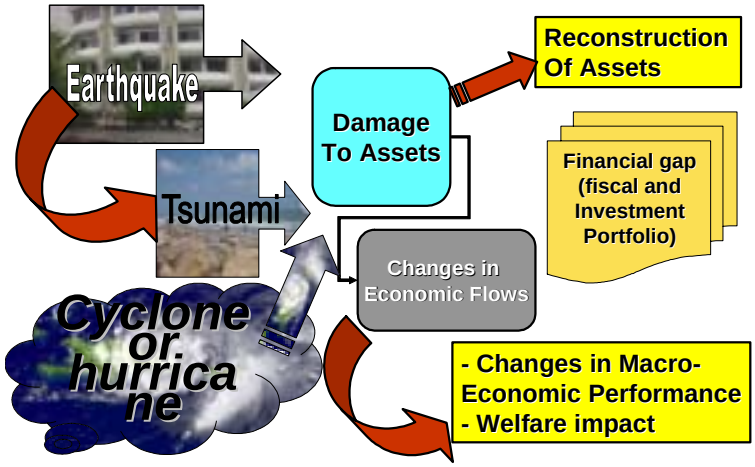
The following reflections are based on the author's first-hand experience in evaluating some recent disasters in which he participated in assessing damage and losses caused to countries of different sizes and levels of development.[1]

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.[2] These include the macroeconomic and fiscal gaps, the environmental consequences, a gender perspective and livelihoods and welfare (see Diagram 1).

[1] 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.

[2] 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[3] 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.

[3] One thousand million is equivalent to one billion in US notation.

I. Differentiated impact

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)[4] 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

[4] 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 sub ducting 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[5] 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

Tsunami (December)	12 countries affected	304 201
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 Univesity, 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.

[5] 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)

Earthqueke (October)	**Japan**	**28 000 000**
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 Univesity, Brussels.

II. The 26 December Tsunami

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),[6] 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:[7]

[6] 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.

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

[a] Figures provided by Government of India, Ministry of Home Affairs, 1/18/05.

[b] BAKORNAS (31/01/05).

[c] 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.

[d] Figures provided by UNOCHA, 1/14/05.

[e] 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.[8] 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 lead 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

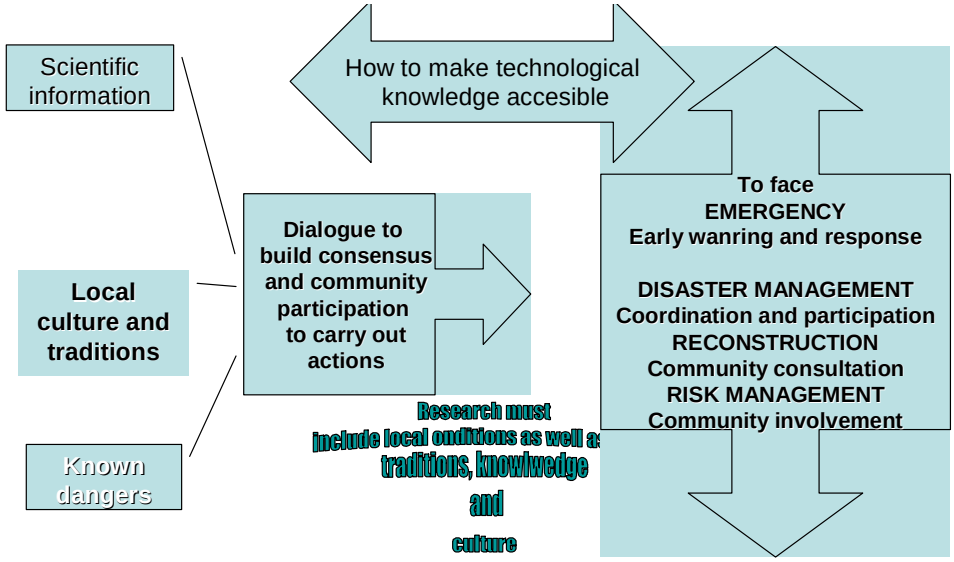
[8] As indicated in the Munich Re study *"Topics Geo – Annual Review: Natural Catastrophes 2004",* 24 February 2004. This study concludes that the experience gained from the tsunami points out some relevant conclusions. The consequences that ensue for the field of science, politics, and the insurance 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

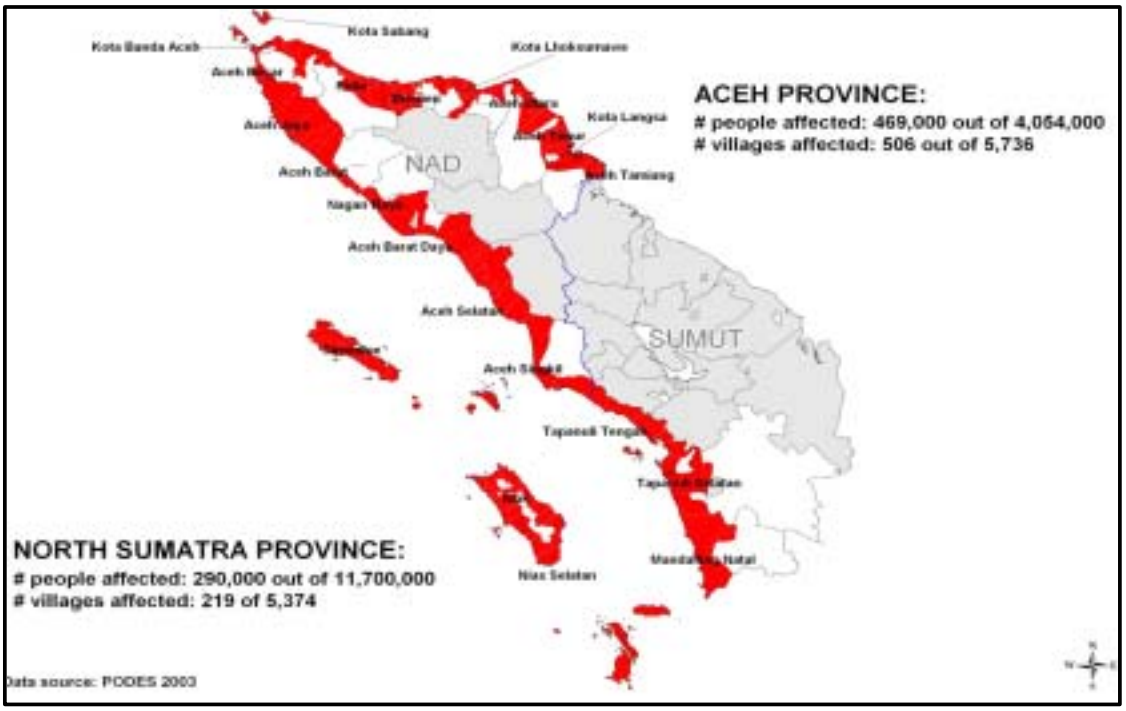
in economic activities and their profitability, as well as the appropriate preparation for multi-hazards and emergencies, including providing information on emergency procedures to those potentially affected.

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,[9] 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 it 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 de 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 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

[9] See the Indonesian report, along the other countries' ones in the World Bank's webpage (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

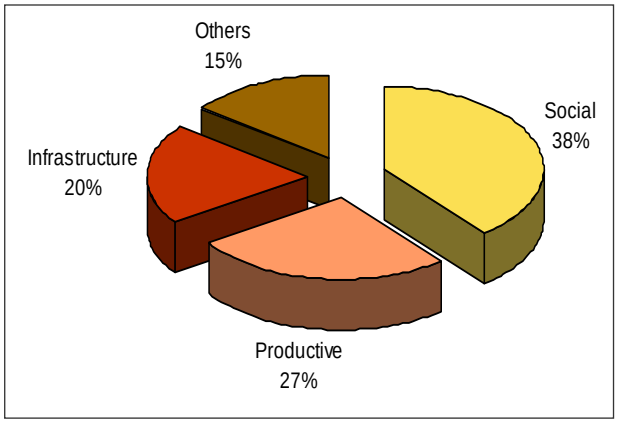
(US$ million)

	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
Total	2 920.0	1 531.2	4 451.6

Source: ECLAC.

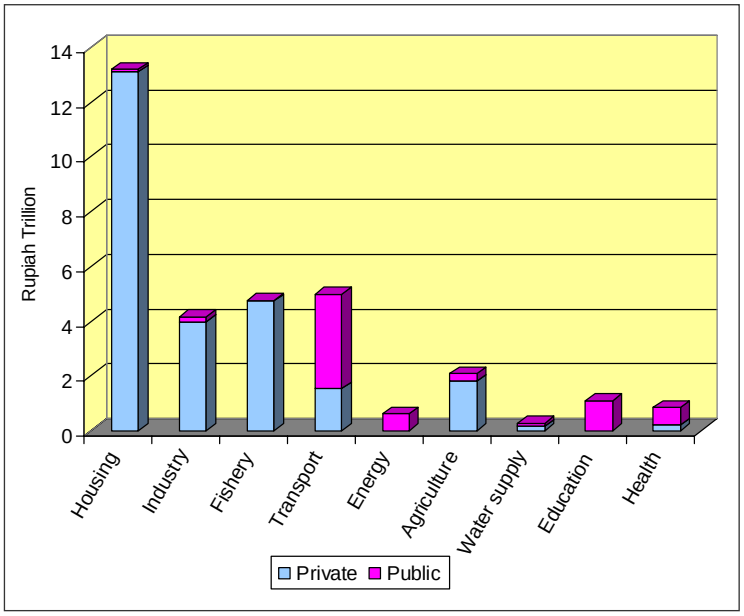
Graphic 1

SECTORAL BREAKDOWN OF IMPACT



Source: ECLAC.

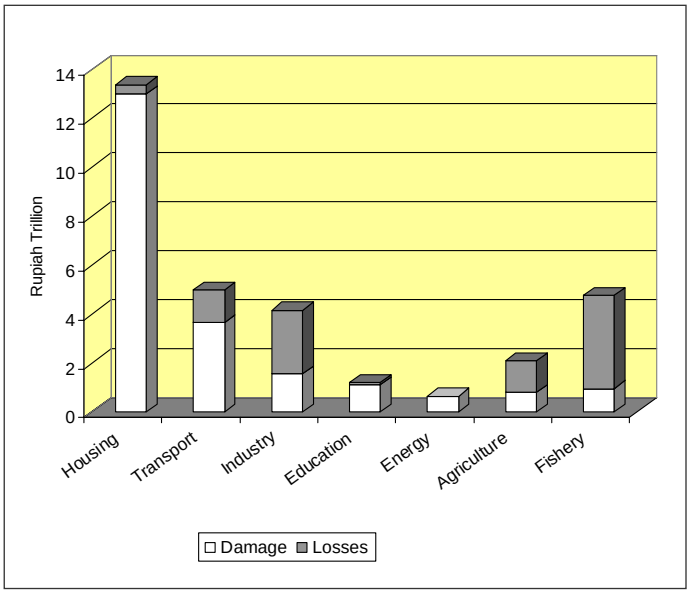
Graphic 2
IMPACT ON PRIVATE AND PUBLIC SECTORS



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,[10] 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.

[10] 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

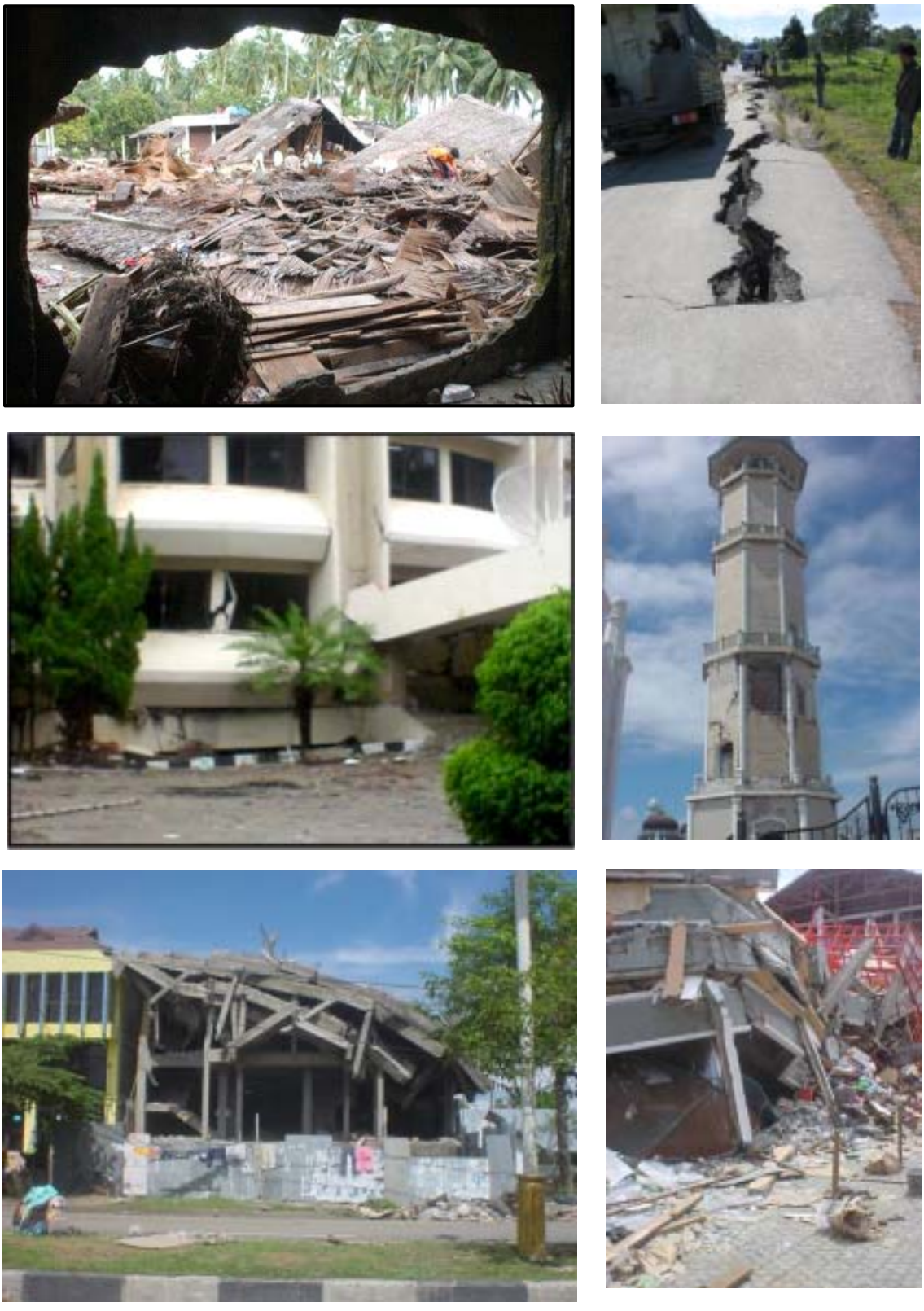


Figure 3
COMPOUND EFFECT OF TSUNAMI AND EARTHQUAKE

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.[11]

[11] Assets lost in the agricultural sector (including livestock) and in fisheries appear in the respective sector.