WHAT PUTS LATIN AMERICA AND THE CARIBBEAN AT RISK?

Not all violent manifestations of nature—earthquakes, volcanic eruptions, hurricanes, floods—necessarily become disasters. When a disaster does occur, it is not always the exclusive result of the natural hazard itself. What human beings do, or what they fail to do, is a key factor.

Consider the following scenario. A strong earthquake—magnitude 7.8 on the Richter scale—occurs in an unpopulated area. This violent event does not cause the loss of lives nor of infrastructure, and the country does not have to mobilize resources to respond to the situation. As a result, it is not a disaster. But an earthquake of lesser magnitude, for example 5.1 on the Richter scale, can create a disaster of major proportions if it occurs in a densely populated area, or if it causes the collapse of critical facilities such as hospitals or schools, which were not built according to code.

Consequently, the degree of risk to which a country or a population group is exposed when confronted with the effects of a violent natural phenomena depends mainly on two factors: the hazard itself and the vulnerability of the exposed group.

That people have always coexisted with natural hazards is an unchanging fact. What has changed, particularly in the last century, is the impact disasters have when they hit populated areas. In areas where there is no human population, these events for the most part do not become disasters. However, the very same natural hazard—a volcanic eruption or a tropical hurricane—can bring about very different effects depending on the vulnerability of the community.

The vulnerability of a building, a population, or a country is measured by how susceptible to harm or loss it is in the face of a hazard. Thus, the risk factor is calculated by measuring the probable occurrence of a natural hazard of certain intensity against the vulnerability of the exposed elements. For example, a building is at risk during an earthquake when a) the earthquake (hazard) is strong enough to damage or destroy the building, and b) seismic-resistant construction techniques are not used (vulnerability) in the design and construction of the building.

Risk is not an abstract concept; it is concrete and measurable. Many countries and communities have designed maps to illustrate their degree of risk. These maps not only mark the areas with the highest probability of occurrence of an event of certain magnitude, but also point out vulnerable infrastructure in those areas.

A natural disaster is an overwhelming ecological disturbance that exceeds the capacity of the affected community to adjust, and consequently requires external assistance.

Source: PAHO/WHO, 1980.

Photo: Gaggero, PAHO/WHO

Photo facing page:

In the Caribbean, the hurricane season regulates the lives of millions, overshadowing other risks such as earthquakes and volcanic eruptions. Hurricane Gilbert tossed this airplane into the trees at the Kingston Manley Airport in Jamaica.

Table 3.1

Selected natural disasters in Latin America and the Caribbean, 1970-1993

Photo: Week, PAHO/WHO

Year	Country	Type of disaster	No. of deaths reported	Estimated no. of affected people
1970	Peru	Earthquake	67,000	3,139,000
1972	Nicaragua	Earthquake	10,000	400,000
1974	Honduras	Hurricane (Fifi)	7,000	15,000
1976	Guatemala	Earthquake	23,000	1,200,000
1979	Dominica	Hurricane (David)	38	81,000
1979	Dominican Republic	Hurricane (Frederick)	1,400	1,200,000
1980	Haiti	Hurricane (Allen)	220	330,000
1982	Mexico	Volcanic Eruption	1,770	60,000
1985	Chile	Earthquake	180	1,000,000
1985	Mexico	Earthquake	10,000	60,000
1985	Colombia	Volcanic Eruption	23,000	200,000
1986	El Salvador	Earthquake	1,100	500,000
1987	Ecuador	Earthquake	300	150,000
1987	Dominican Republic	Hurricane (Emily)	3	50,000
1988	Brazil	Flood	355	108,000
1988	Jamaica	Hurricane (Gilbert)	45	500,000
1988	Mexico	Hurricane (Gilbert)	225	200,000
1988	Nicaragua	Hurricane (Joan)	116	185,000
1989	Antigua, Guadeloupe, Montserrat, Puerto Rico, St. Kitts and Nevis, U.S.A., U.S. Virgin Islands	Hurricane (Hugo)	56	220,000
1990	Peru	Earthquake	21	130,000
1991	Costa Rica	Earthquake	51	19,700
1992	Nicaragua	Tsunami	116	13,500
1993	Honduras	Tropical Storm (Gert)	103	11,000

Source: PAHO/WHO; OFDA/USAID; DHA/Geneva; *Atlas Nacional de Riesgos de México.*

NATURAL HAZARDS IN LATIN AMERICA AND THE CARIBBEAN

Natural hazards of all types exist in Latin America and the Caribbean. The most common are classified by their origin: geological, such as earthquakes, tsunamis, volcanoes, and landslides, or hydrometeorological, such as hurricanes, tropical storms, floods, landslides, and drought. Selected natural disasters in Latin America and the Caribbean are listed in Table 3.1.

GEOLOGICAL HAZARDS

Earthquakes

During the last 100 years, earthquakes of great magnitude and intensity have rocked many countries in the Americas Earthquake magnitude, first defined by Charles Richter, is a measure of the strength of an earthquake as calculated from records of the event made on a calibrated seismograph. The Richter scale is used to describe an earthquake's magnitude In contrast, earthquake intensity is a measure of the effects of an earthquake on structures and the earth's surface at a specific site. Among the many existing scales, the Modified Mercalli Intensity Scale of 12 degrees, symbolized as MM, is frequently used.

Most earthquakes in the Region have been caused by the interaction of active tectonic plates (see Figure 3 1). The Cocos plate, for example, subducts or dives beneath the lighter American plate. On 19 September 1985, the Cocos plate snapped at a depth of 20 km, and seismic waves devastated Mexico City more than 350 km away This sort of activity, the subduction and collision between the continental and the Cocos, Nazca, and Caribbean plates, is responsible for the extensive seismicity along the Pacific coast of Central and South America and in the Caribbean Basin. The earthquake that hit northern Peru on 31 May 1970 killed an estimated 67,000 people. Entire villages, such as Yungay and Ranrahirca, were buried in the avalanches and mudslides that were triggered by the tremor. An estimated half million people were left homeless

In Central America, the Cocos and overriding Caribbean plates are broken into distinct segments which are characterized on the earth's surface by structural depressions full of volcanic and alluvial sediments. The richness of this soil has attracted dense human settlements to spring up, precisely in those places most prone to seismic activity

In 1972 most of Managua, the capital of Nicaragua, was destroyed by a 6.2-magnitude earthquake, leaving 10.000 dead. In 1976, 23,000 people perished in an earthquake in Guatemala; nearly 90% of the buildings in the central part of the country's high mountains were destroyed or seriously damaged. The collapse of unstable slopes, where thousands of people of limited resources lived, caused most of the deaths in Guatemala City. In March 1985 an earthquake took place in central Chile which measured 7 8 on the Richter scale with its epicenter on the coast near Alzarrobo This event affected an area where 50% of Chile's urban population is concentrated: 180 lives were lost, 2,575 people were injured and nearly 84.000 homes were totally destroyed. In El Salvador in 1986, a 20-square-block area in downtown San Salvador was completely destroyed, claiming more than 1,000 lives.

Photo facing page. Cemetery at Milluni tin mine, Bolivia.