Analytical Report on

Natural Disasters in the World
&
International Disaster Reduction Activities

Asian Disaster Reduction Center

March 2004

Foreword

Natural disasters have been increasing every year due to various factors such as urbanization, population growth, destruction of nature and climate change. Further, the Asian region accounts for nearly 90% of people affected in the world.

Natural disasters are one of the biggest obstacles to sustainable development in Asia. Hence, the Asian Disaster Reduction Center (ADRC) has been taking an active role in disaster reduction activities. ADRC and the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA) Kobe have been jointly promoting the Total Disaster Risk Management (TDRM) approach in Asia.

With the aim of promoting global and regional socio-economic development in the face of natural disasters and designing effective disaster reduction mechanisms, we have edited this publication to analyze trends in the occurrence of natural disasters and international disaster reduction activities. We hope this publication will be utilized not only by policy makers, researchers and academics but also by grass-roots level activists. We sincerely hope that this analytical report furthers our efforts towards reduction of the impact of natural disasters in the world.

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Satoru Nishikawa
Executive Director
Asian Disaster Reduction Center

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Chapter 1 Global Challenges in Disaster Reduction

1-1 Recent Major Natural Disasters

Table 1-1 shows major natural disasters that have caused serious damage since December 2002.

Table 1-1 Major Natural Disasters Since December 2002 (as of February 2004)

Date	Conuntry	Type of disaster	Fatalities (number of persons missing)	Number of people afeccted (approx.)	Amount of damage (approx. US$ million)
Dec 2002-early Feb 2003	India	Cold wave	900 +		
As above	Bangladesh	Cold wave	748	40,000 +	
Jan 21, 2003	Mexico	Earthquake	29	177,530	
Jan.	Peru	Cold wave	339	1,839,888	
Jan. 4-5	Mozambique	Flood	3 (1)	100,000	
Jan	Fiji	Tornado	15 (2)	300,000	3
Feb 24	China	Earthquake	268	650,000	
Mar. 12	India	Hailstorm	30	100,000	16
Mar 31-Apr 2	Indonesia	Landslide	59 (34)	231,656 +	3.96
Apr. 30-Late Apr.	Near Somalia	Flood	160 +	60,000	
Late Apr.	Argentina	Flood	23 (600)	140,000	
May 1	Turkey	Earthquake	177	270,000	
May 9	Madagascar	Flood	68 (19)	110,000 +	
May 17-18	Sri Lanka	Flood	235	1,200,000 +	140
May 20	India	Heat wave	1,210	1,200,000	
May 21	Algeria	Earthquake	2,266	150,000 +	4,100
June 13-	India	Flood	8 +	236,000	
Late June-	China	Flood	814	150,000,000	7,890
Late June-	Bangladesh	Flood	73	1,200,000	
July 21	China	Earthquake	16	1,250,000	
July-Aug.	Nepal	Flood and landslide	205 (34)	9,000 +	
Late July-Sept.	Pakistan	Flood	230	1,260,000 +	
Aug 16	China	Earthquake	3	1,150,000	1.68
Sept	Bosnia-Herzegovina	Drought		62,575 +	140
Sept. 12	Republic of Korea	Typhoon	117 (13)	12,000	4,100
Oct. 25	China	Earthquake	10	137,000	
Nov 3	Indonesia	Flood	245	1,300	
Dec. 15-22	Philippines	Landslide and flood	207 (1)	344,077	840
Dec. 20-22	Haiti	Flood	28 +	150,000	
Dec. 23	China	Gas well explosion	234	64,000	
Dec 26	Iran	Earthquake	30,000	75,000	
Feb 24, 2004	Morocco	Earthquake	564	30,000	

Note: The disasters listed caused more than 100 fatalities/missing persons, more than 100,000 people affected, or direct damage, such as destruction of homes, totaling US$100 million or more. Compiled by the Asian Disaster Reduction Center (ADRC) based on information from the UN Office for the Coordination of Humanitarian Affairs (UN-OCHA) and the Ministry of Foreign Affairs of Japan

(1) Earthquake in China's Xinjiang Uygur Autonomous Region

At approximately 10:00 a.m. on February 24, 2003, an earthquake of moment magnitude 6.4 (as measured by the US Geological Survey [USGS]) struck near the Kashi City/Bachu County region of the Kashgar area in China's Xinjiang Uygur Autonomous Region. On February 26 the authorities reported that the earthquake had killed 268 people, severely injured 2,058, slightly injured 2,000, totally collapsed 70,000 houses and affected 650,000 people.

(2) Flood in Sri Lanka

On May 17–18, 2003, heavy monsoon rainfall caused landslides and flood across an extensive area of southwestern Sri Lanka. On May 22, authorities reported massive human and property damage, including at least 235 fatalities and a total of 140,000 affected households. The flood also destroyed houses (either fully or partially), damaged crops, and caused interruptions to the infrastructure network. This was the worst disaster to strike Sri Lanka since the country became independent in 1948.

(3) Earthquake in Algeria

On May 21, 2003 at 7:43 a.m. (3:43 a.m. Japan time), an earthquake with moment magnitude 6.8 (as measured by the USGS) struck Boumerdes, just east of the Algerian capital of Algiers. The earthquake killed 2,266 people, wounded more than 10,000, and inflicted massive damage on houses and other buildings.

(4) Flood in Pakistan

Starting in late July, heavy rainfall brought about massive flood across the entire Sindh Province of southern Pakistan (along the downstream portion of the Indus River). The disaster caused massive human and property damage, killing at least 230 people and affecting more than 1.26 million. The flood also destroyed houses (either fully or partially), damaged crops and livestock, and interrupted telephone services.

(5) Typhoon in Republic of Korea

Typhoon Maemi (no. 14) struck southern Republic of Korea on September 11-13, 2003, leaving about 12,000 people homeless, 117 dead, and 13 missing, and causing massive damage estimated at more than $4.1 billion.

(6) Landslides and Flood in the Philippines

Persistent heavy rains that began falling on December 15 caused landslides and flash

floods across the Central (Leyte Island) and Southern (Mindanao Island) Philippines. The rain caused massive damage, claiming more than 207 lives and affecting about 340,000 people

(7) Earthquake in Iran

On December 26, 2003, at 1:56 a.m. (7:26 a.m. Japan time), an earthquake with moment magnitude 6.6 (as measured by the USGS) struck the city of Bam in Kerman Province in southeastern Iran The disaster caused massive human and property damage, killing more than 30,000 people and injuring as many as 20,000. The earthquake also destroyed houses (either fully or partially), damaged crops and livestock, and interrupted telephone services. The earthquake also destroyed the ruins of the Bam citadel as well as other historical remains in the area.

(8) Earthquake in Morocco

On February 24, 2004 at 2:27 a.m. (11:27 a.m. Japan time), an earthquake with moment magnitude 6.4 (as measured by the USGS) struck the area of Al Hoceima City, located about 300 km east-northeast of the Moroccan capital of Rabat. The earthquake killed 564 people and injured approximately 300

1-2 Natural Disasters Since the 20th Century

Natural disasters occur throughout the world, causing significant loss of lives and property While urbanization is accelerating in developing regions, delay in the development of infrastructure is triggering increased vulnerability.

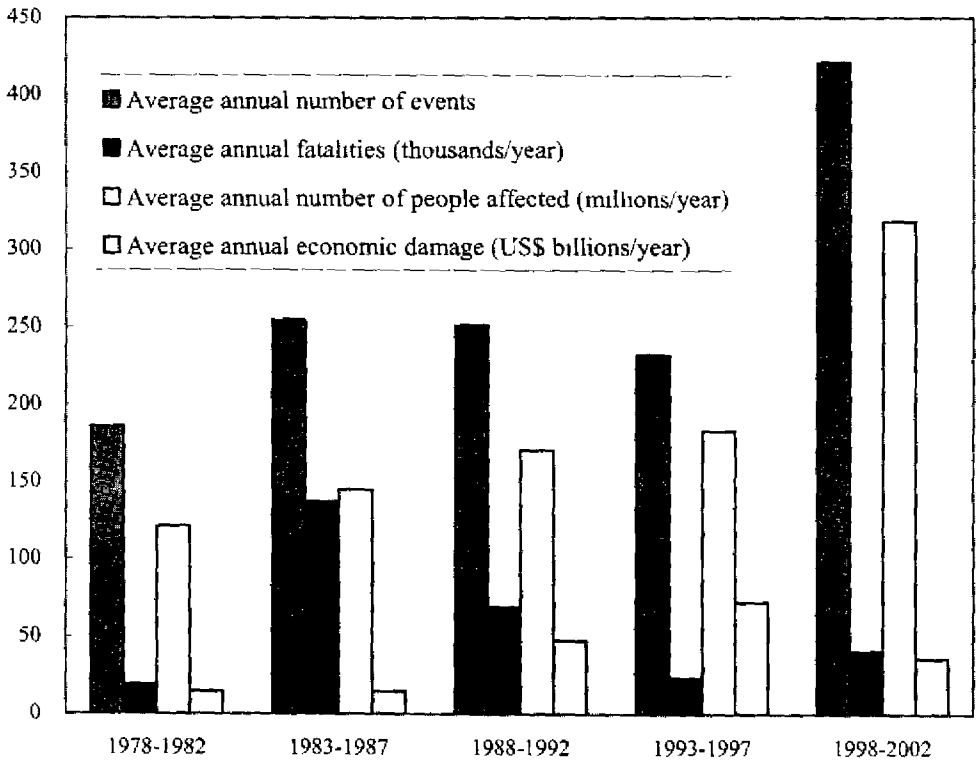
According to the statistics on natural disasters compiled by the Center for Research on the Epidemiology of Disasters (CRED, http://www.cred.be/emdat/intro.htm) at the Université Catholique de Louvain in Belgium, natural disasters afflict 200 million people throughout the world every year, killing approximately 60,000 people and causing US$37 billion in damage (annual average for 1978-2002).

In recent years, significant damage has been caused by such events as flood in China in 1998, the earthquake in Turkey and storms in France in 1999, and flood in Europe in 2002.
As the number of natural disasters increases each year, the number of people affected increases accordingly. However, the number of fatalities is actually falling (Figure 1-1).

Table 1-2 shows the major natural disasters from the beginning of the 20th century to the present. Large-scale disasters caused by earthquakes, storms, and flood have frequently occurred in Asia

Figure 1-1 Global Trends in the Frequency of Natural Disasters and Their Impact

Totals for 1978–2002	
No. of events:	6,726
Fatalities:	1,451,916
No. of people affected:	4,694,365,123
Economic Damage	$929,022,116,000



Note: Compiled by ADRC based on information from the Center for Research on the Epidemiology of Disasters (CRED), of the Université Catholique de Louvain in Belgium

Table 1-2 Major Natural Disasters Since the Beginning of the 20th Century

Year	Type	Country (region)	Fatalities & missing persons (approx.)
1900	Hurricane	USA (Texas)	6,000
1902	Volcanic eruption	Martinique (West Indies, Mt. Pelée)	29,000
1902	Volcanic eruption	Guatemala (Mt Santa Maria)	6,000
1906	Typhoon/tidal wave	Hong Kong	50,000
1906	Earthquake	Taiwan	6,000
1906	Earthquake/fire	USA (San Francisco)	1,500
1908	Earthquake	Italy (Sicily)	75,000
1911	Volcanic eruption	Philippines (Mt. Taal)	1,300
1915	Earthquake	Italy (central region)	30,000
1916	Landslide	Italy, Austria	10,000
1919	Volcanic eruption	Indonesia (Mt. Kelut)	5,200
1920	Earthquake/landslide	China (Gansu Province)	200,000
1923	Earthquake/fire	Japan (Kanto region)	143,000
1928	Hurricane/flood	USA (Florida)	2,000
1930	Volcanic eruption	Indonesia (Mt. Merapi)	1,400
1932	Earthquake	China (Gansu Province)	70,000
1933	Tidal wave	Japan (Sanriku region)	3,000
1935	Earthquake	India (Baluchestan)	60,000
1939	Earthquake/tidal wave	Chile	30,000
1944	Earthquake	Japan (Tonankai region)	1,200
1945	Earthquake	Japan (Aichi prefecture)	2,300
1945	Typhoon	Japan (western region)	3,700
1946	Earthquake/tidal wave	Japan (Nankai region)	1,400
1947	Typhoon	Japan (Tohoku region and further north)	1,900
1948	Earthquake	Japan (Fukui prefecture)	3,900
1948	Earthquake	Turkmenistan, former Soviet Union	100,000
1949	Flood	China	57,000
1949	Earthquake/landslide	Tajikistan,former Soviet Union	20,000
1951	Volcanic eruption	Papua New Guinea (Mt. Lamington)	2,900
1953	Flood	Japan (Kyushu island)	1,000
1953	Flood	Japan (main island)	1,100
1953	Flood	North Sea coast	1,800
1954	Typhoon	Japan	1,700
1954	Flood	China	40,000

Year	Type	Country (region)	Fatalities & missing persons (approx.)
1958	Typhoon	Japan (western region)	1,200
1959	Typhoon	Japan (main island)	5,100
1960	Earthquake	Morocco (Mt. Agadir)	12,000
1962	Landslide	Peru (Mt Huascaran)	4,000
1962	Earthquake	Iran (northwestern region)	12,000
1963	Cyclone	Bangladesh	22,000
1963	Volcanic eruption	Indonesia (Mt. Agung, Bali)	1,200
1963	Landslide	Italy	2,000
1965	Cyclone	Bangladesh	57,000
1968	Earthquake	Iran (northeastern region)	12,000
1970	Earthquake/landslide	Peru (northern region)	70,000
1970	Cyclone	Bangladesh	500,000
1971	Cyclone	India (Orissa)	10,000
1976	Earthquake	China (Tianjin- Tangshan)	250,000
1976	Earthquake	Guatemala	24,000
1977	Cyclone	India (Andhra Pradesh)	20,000
1978	Earthquake	Iran (northeastern region)	25,000
1982	Volcanic eruption	Mexico (Mt. El Chichon)	17,000
1985	Cyclone	Bangladesh	10,000
1985	Earthquake	Mexico (Mexico City)	10,000
1985	Volcanic eruption	Colombia (Mt Nevado del Ruiz)	22,000
1986	Toxic gas	Cameroon (west region, Lake Nyos)	1,700
1986	Earthquake	El Salvador (San Salvador City)	1,000
1987	Earthquake	Ecuador (northwestern region)	Several thousand
1987	Flood	Bangladesh	1,000
1988	Earthquake	India, Nepal	1,000
1988	Earthquake	China (Yunnan Province)	1,000
1988	Flood	Bangladesh	2,000
1988	Earthquake	Armenia, former Soviet Union	25,000
1989	Flood/landslide	China(Sichuan Province and other regions)	2,000
1989	Flood	India	1,000
1990	Earthquake	Iran	41,000
1990	Earthquake	Philippines	2,000
1991	Cyclone	Bangladesh	140,000
1991	Flood	China (Jiangsu Province and other regions)	More than 2,300
1991	Typhoon	Philippines	6,000

Year	Type	Country (region)	Fatalities & missing persons (approx.)
1992	Flood	Pakistan	1,300
1992	Earthquake/tidal wave	Indonesia	2,100
1993	Flood	India	1,200
1993	Flood	Nepal	1,800
1993	Earthquake	India	9,800
1994	Typhoon/ flood	China (six southern provinces)	1,000
1994	Heavy rainfall/ flood	India	2,000
1994	Tropical rainstorm	Haiti	1,100
1995	Earthquake	Japan	6,300
1995	Flood	China	1,200
1995	Earthquake	Russia	1,800
1996	Flood/typhoon	China (seven southern provinces, and five northern and northwestern provinces)	2,800
1996	Tropical rainstorm/ flood	Vietnam	1,000
1997	Earthquake	Iran	1,600
1997	Flood	India	1,400
1997	Flood	Somalia	2,000
1997	Typhoon	Vietnam	3,700
1998	Earthquake	Afghanistan	2,300
1998	Flood	China	3,700
1998	Earthquake	Afghanistan	4,700
1998	Flood/landslide	India	3,000
1998	Cyclone	India	2,900
1998	Flood	Bangladesh	1,000
1998	Tidal wave	Papua New Guinea	2,600
1998	Hurricane	Nicaragua	3,300
1998	Hurricane	Honduras	13,700
1999	Earthquake	Colombia	1,200
1999	Earthquake	Turkey	15,500
1999	Earthquake	Taiwan	2,300
1999	Cyclone	India	9,500
2000	Flood	Venezuela	30,000
2001	Earthquake	India	13,805
2001	Earthquake	El Salvador	1,159
2003	Earthquake	Algeria	2,266
2003	Earthquake	Iran	More than 30,000

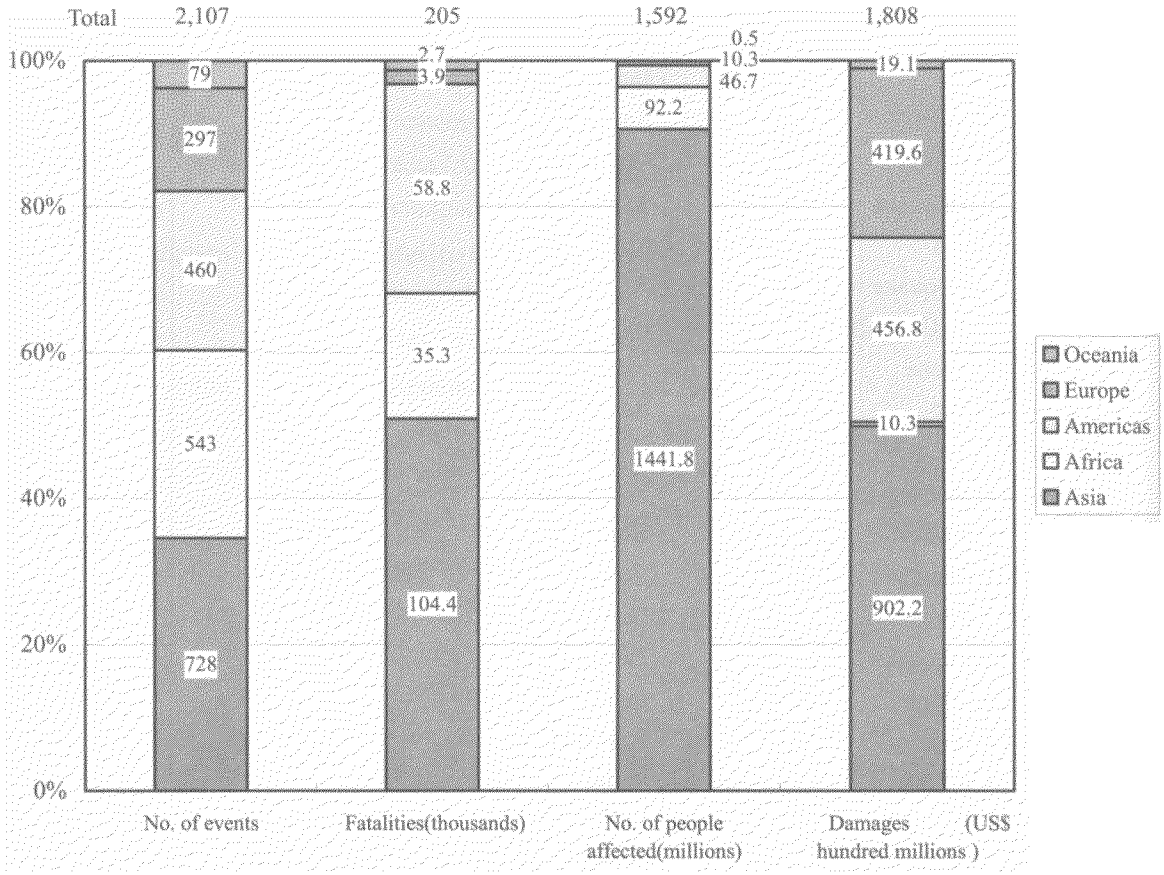
Note: Names of countries and regions are based on information current at March 2002. Events listed are those reported to have caused 1,000 or more fatalities/missing persons Compiled by ADRC based on the Chronological Scientific Tables (*Rika Nenpyo*), information from the UN-OCHA and the Cabinet Office of Japan

In spite of persistent efforts by governments in Asia to prevent disasters and reduce their impact, every year these countries are stricken by disasters that bring about more than 1,000 fatalities or missing persons.

Over the past five years, Asia has accounted for 40% of the world's natural disasters, 90% of the people affected and 50% of all fatalities and damage. Although Europe reported fewer fatalities and people affected, the impact is higher.

Damage in the African region is extremely low as compared with the number of fatalities and people affected. These trends reflect the economic background of the regions in which disasters occur (Figure 1-2).

Figure 1-2 Natural Disasters of the World During 1998–2000 by Region

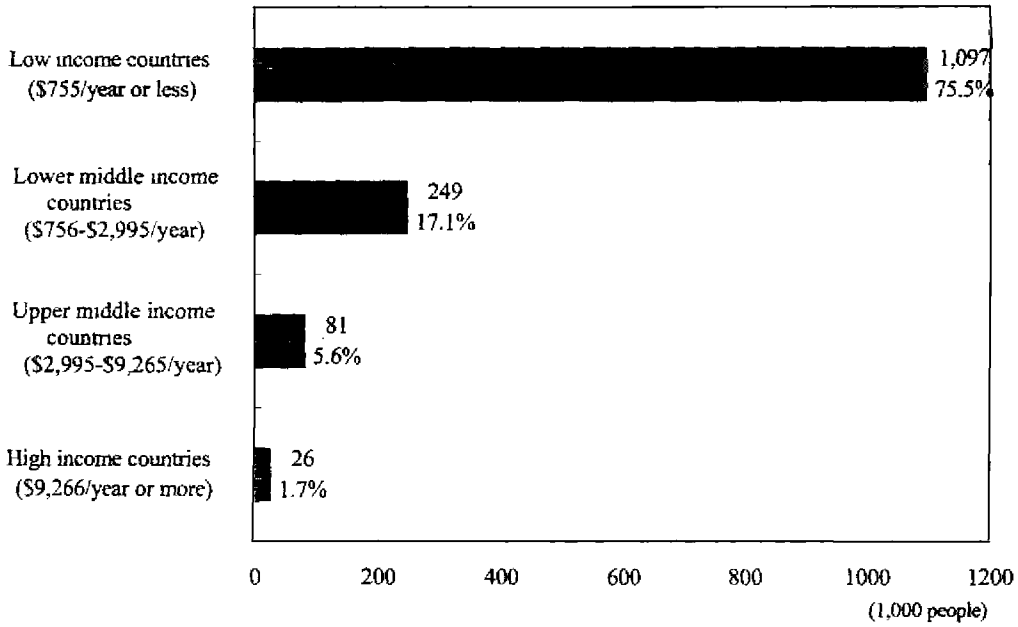


1-3 Worldwide Disaster Reduction Challenges

Nearly 1.45 million people have perished in natural disasters worldwide over the past 25 years (an average of 60,000 people per year), and 80% of those deaths occurred in

Figure 1-3 Fatalities Related to Natural Disasters (by average per capita income of country)

[World totals 1978-2002]



Note. Compiled by ADRC based on information from CRED, the Université Catholique de Louvain in Belgium and the World Bank.

low-income countries (Figure 1-3).

Furthermore, developing countries can be hard hit by a single disaster, which may cause serious economic damage exceeding that nation's annual GDP.

For example, the 1988 earthquake in Armenia caused economic damage totaling about 180% of its GDP, while the forest fires that ravaged Mongolia in 1996 caused damage equivalent to about half of Mongolia's GDP. Understanding that the Great Hanshin-Awaji Earthquake (Kobe Earthquake) resulted in economic damage totaling about 2% of Japan's GDP makes the magnitude of the damage suffered in those other countries more palpable (Tables 1-4, 1-5)

Economic damage caused by natural disasters is a major impediment to the sustainable development of developing countries.

To ensure sustainable development in these countries, it is essential that efforts be made to reduce their social vulnerability to natural disasters and their impact.

Table 1-4 Damage From Natural Disasters In Comparison With GDP

Country	Year	Type of disaster	Amount of damage (US$ billion)	GDP for the year of the event (US$ billion)	Damage as a percentage of GDP
Armenia	1988	Earthquake	20.50	11 65	176%
Mongolia	1996	Forest fires	1.71	3.68	47%
Yemen	1982	Flood	0.98	8.92	11%
Nepal	1987	Flood	0.73	12.79	6%
Laos	1993	Typhoon	0.30	5.95	5%

Note: Compiled by ADRC based on information from CRED, the Universite Catholique de Louvain in Belgium, and the World Bank.

Table 1-5 Damage From Natural Disasters In Comparison With GDP (Japan)

Event	Year	Amount of damage	GDP for the year of the event	National budget	Damage as a percentage of GDP
Great Kanto Earthquake (Tokyo Earthquake)	1923	¥5.5 billion	¥13 3 billion	¥1 5 billion	About 40%
Great Hanshin-Awaji Earthquake (Kobe Earthquake)	1995	¥9 6 trillion	¥504 trillion	¥51 trillion	2%

Note: The GDP figure for 1923 is the national income given in information produced by the Statistics Bureau of the Prime Minister's Office of Japan.

COLUMN Disasters Impede Economic Development in Developing Countries: Armenia

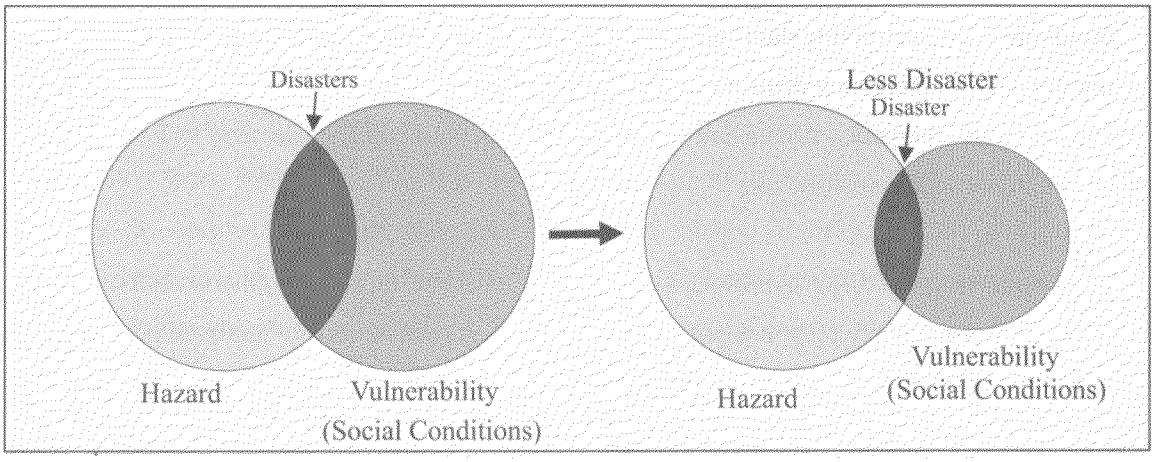
In December 1988, a catastrophic inland earthquake of magnitude 7.2 struck Armenia, killing 25,000 people out of its population of 3 45 million, injuring 20,000, and leaving 515,000 homeless. Economic damage reached a total of 1 8 times the national GDP.

Armenia's economy had been battered by the Nagorno-Karabakh conflict being fought along its border with Azerbaijan shortly before the earthquake (the estimated death toll was 18,000, as of February 1988) as well as by economic blockades by neighboring countries in the aftermath

Restoration plans were wiped out by the collapse of the Soviet Union (1991), which reduced the country's GDP by 60% for the period 1991–1993 following its independence. A survey conducted in July 1993 showed that the minimum monthly wage at that time was 4,200 rubles, which would only have covered about one-tenth of the food expenses for a family to obtain the minimum balanced nutrition. In addition, the cost of firewood for heating, which was necessary to survive the harsh winter months, was 12–18 times the minimum monthly wage.

Note: Information from the Ministry of Foreign Affairs of Japan, 1994 World Disasters Report: International Federation of Red Cross and Red Crescent Societies (IFRC), 2003 World Yearbook, Kyodo News

Figure 1-6 Relationship between "Hazard" and " Vulnerability" in Natural Disasters



1-4 Need for Disaster Risk Management

The damage caused by disasters is a factor of both the external force imposed by a natural phenomenon, such as an earthquake (hazard) and the community's weakness to disasters (vulnerability), as shown in the following formula:

Disaster = Hazard × Vulnerability

As natural phenomena, hazards cannot be controlled by human intervention. Social vulnerability to hazards such as earthquakes, however, can be reduced by such measures as earthquake-resistant houses that minimize the damage inflicted.

Poverty in many developing countries has prevented significant investment in damage mitigation measures aimed at reducing social vulnerability, causing some areas to repeat emergency relief activities over and over again after disasters strike.

As a result, large sums of money are needed for recovery and reconstruction, further fueling the poverty problem.

To break this vicious circle, societies need to reduce their vulnerability before disasters strike and make efforts toward disaster reduction that emphasize "mitigation" to reduce damage.