WHERE MIGHT THE INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION CONCENTRATE ITS ACTIVITIES?

A COMPARATIVE ANALYSIS OF DISASTER DATA SETS

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PREFACE

The final decade of this millennium has been designated by the United Nations, the United States, and other national and local governments around the globe as the Decade for Natural Disaster Reduction (DNDR). Although the precise form and content of this undertaking have not yet been determined, the Decade clearly offers opportunities to make significant advances in hazard preparedness, response, and mitigation throughout the world. Almost as surely, there are pitfalls that can sidetrack such an effort – undertakings, that, with some forethought, might be avoided.

To help identify such opportunities and risks, the Natural Hazards Research and Applications Information Center has initiated this series of papers as a forum for presenting and discussing Decade issues. As the Decade itself matures, these papers will change correspondingly. We anticipate that initially authors will present speculations on where the Decade should or should not go; that later they will discuss specific, emerging issues and programs; and that finally they will evaluate the successes and shortcomings of the Decade.

This is the Center's second Decade paper. The first, *Report of the Colorado Workshop on Hazard Mitigation in the 1990s: Toward the U.S. Decade for Natural Disaster Reduction* (1989, 45 pp.), costs $3.50 ($4.50 beyond North America) and is available from the *Publications Clerk, Natural Hazards Research and Applications Information Center, Institute of Behavioral Science #6, Campus Box 482, University of Colorado, Boulder, Colorado 80309-0482*

The Hazards Center invites anyone wishing to share ideas on the Decade with the hazards community to contact the Center's director or editorial staff about possible publication in this series.

TABLE OF CONTENTS

INTRODUCTION

The International Decade for Natural Disaster Reduction (IDNDR) is scheduled to begin in 1990 (National Research Council, 1987; Mitchell, 1988). It is a U.S.-inspired and UN-sponsored program that has two goals: 1) to put into practice existing, but unused, knowledge about the reduction of sudden-onset disasters such as floods, cyclones, and earthquakes; and 2) to develop the scientific and technical basis for new disaster reduction measures. At present the IDNDR possesses a general strategy that emphasizes the transfer of experience and technology among participating countries, but many of the organizational details remain to be worked out. Individual countries are expected to set up their own national programs under the broad umbrella of the IDNDR, and thus a parallel United States Decade for Natural Disaster Reduction is being developed, together with similar programs in individual states (National Research Council, 1989).

Although a general awareness of the human impacts of disasters is implicit in the IDNDR, the program is not primarily organized to respond to the *needs* of disaster victims. Instead, it is intended to exploit unmet *opportunities* for the application of measures that have the potential to reduce loss. The fact that the IDNDR is opportunity-driven rather than needs-driven has implications for distributive justice as well as program effectiveness. Groups that can take advantage of new technology and information inputs stand to benefit more than people who cannot. Given the close association of vulnerability to disaster with economic and sociopolitical disadvantage, under the present IDNDR strategy many of the people who are most at risk may remain in jeopardy after the program has ended. A needs-driven program might concentrate disaster reduction efforts on those countries and groups that bear the heaviest burdens of disaster. A better balanced IDNDR program should take account of both needs and opportunities for disaster reduction.

Whether a "needs emphasis" or an "opportunities emphasis" is employed, it is necessary to identify countries and communities where disaster reduction efforts can best be concentrated and to establish priorities among them. Records of disaster losses provide one basis for doing this.

NATURAL DISASTER LOSS DATA

Disaster losses are of many types. They include deaths, physical injuries, mental trauma, destruction of material property and natural resources, disruption of livelihoods and economies, social dislocation and a wide variety of other impacts. Deaths are probably the most consistently recorded type of loss, and information about deaths often constitutes the only data on losses that are available. Death tolls are also the primary indicators of losses in most global assessments. Broadly speaking, global data on disaster losses can provide information about 1) the absolute scale of losses; 2) trends in losses; and 3) relative differences in losses among various countries.

Information about disaster losses is published in a wide variety of sources, and no single source is comprehensive. The range of sources includes 1) systematic compilations by government agencies and nongovernment organizations; 2) summary tables listed in encyclopedias, yearbooks, and specialized disaster sourcebooks; 3) reports in major newspapers such as the *New York Times* and *The Times* of London; and 4) a wide array of publications prepared by research scientists, professional managers, and other groups. For example, global data about many types of natural disasters have been compiled by the Office of U.S. Foreign Disaster Assistance (OFDA) (1988); the Swedish Red Cross (Hagman, 1984); the Office of the United Nations Disaster Relief Co-ordinator (UNDRO) (1988); the United Nations Environment Programme (UNEP) (1987); the United Nations Educational, Social and Cultural Organization (UNESCO) (1970); Munchener Ruckversicherungs-Gesellschaft (1982); the Natural Hazards Research and Applications Information Center (NHRAIC) (Sheehan and Hewitt, 1969; Dworkin, 1974; Thompson, 1982); Shah (1983); the World Resources Institute and the International Institute for Environment and Development (1987).

Other groups have confined their attention to global information about one or two types of natural disasters (e.g., weather disasters; floods and earthquakes), not the full range of events (World Meteorological Organization, 1986; World Meteorological Organization/United Nations Environment Programme/International Council of Scientific Unions, 1984; UNESCO, 1976; Rudier and Roche, 1984; U.S. National Environmental Satellite, Data, and Information Service, 1984; Gere, 1982; U.S. National Oceanic and Atmospheric Administration, 1981).

An increasing number of regional organizations have also begun to collect and publish disaster loss data. The Organization for Economic Cooperation and Development (OECD) (1985) provides useful information about Europe, North America, and Japan. The Typhoon Committee of the Economic and Social Commission for Asia and the Pacific (ESCAP) and its predecessor organizations have supplied detailed information on disasters in east Asia and south Asia since 1947 (e.g., Typhoon Committee, 1988). A limited amount of specialized information on Latin American disasters is also becoming available.

Many individual countries publish national disaster loss information. In the United States the Federal Emergency Management Agency (FEMA) assumes this responsibility for disasters and emergencies that involve extensive commitments of aid by the federal government. Information about disasters in less-developed countries that receive American assistance is available in the Office of U.S. Foreign Disaster Assistance (OFDA) "Country Profiles" series (e.g., Office of U.S. Foreign Disaster Assistance, 1982).

ADVANTAGES AND LIMITATIONS OF DISASTER LOSS DATA

Clearly, there exists a large amount of information about disaster losses that might provide a useful basis for structuring disaster reduction programs. Data about losses reflect the extent to which societies are successfully managing natural hazards and indicate the level of savings that might be achieved by effective disaster reduction programs. For example, in poor countries where the economic costs of disasters may exceed 3% or 4% of the gross national product (GNP), reduction of losses may mean that substantial additional resources become available for the improvement of human welfare.

Loss data also provide quantitative yardsticks that facilitate ranking of disaster reduction efforts, and they establish "baselines" for evaluating project effectiveness. Finally, public support for improved disaster management initiatives is often closely associated with the magnitude and visibility of losses. Management programs that are directly linked to the reduction of known losses may help to mobilize an effective public constituency in favor of disaster reduction.

Though potentially valuable, disaster loss data also have significant limitations (Tubbesing, 1979). Multiple sources must be reconciled and the authoritativeness of available information varies. It is often difficult to compare data that were gathered in different ways by different organizations for different purposes. Sometimes ostensibly separate data sets are not entirely independent. Access to existing information is also problematic. Much of the collected data is not published or is published erratically and in obscure sources. Longitudinal data must be adjusted to take account of changes in formats and reporting systems and the revision of early loss estimates in the light of later information. (Changes in disaster loss statistics for one recent event, Hawaii's hurricane Iwa in 1982, have been charted in some detail (Committee on Natural Disasters, 1983)). As a result of these and other limitations, information about disaster losses is usually incomplete and often conflicting. This judgment applies both to less-developed countries (LDCs) that bear the heaviest disaster burdens and to more-developed countries (MDCs) that maintain the most comprehensive data sets.

Some of the data inconsistencies are readily apparent in reports of recent disasters. For several weeks after the Armenian earthquake of December 1988, the official death toll stood at 50,000. It was later revised downward to 25,000. Similarly, there is considerable doubt that only 9,500 people died in Mexico City's 1985 earthquake; many observers who were present suggest that the correct number was far greater. Several authoritative sources continue to list the number of people killed in the 1976 Tangshan earthquake as 665,000, although the government of the Peoples Republic of China has long accepted 242,000 as the final tally. Some observers believe that the Bangladesh cyclone of 1970 may have killed upward of half a million people, not the 250,000 noted in official reports.

PREVIOUS GLOBAL DISASTER LOSS ASSESSMENTS

Despite the potential importance of disaster loss information there have been few attempts to make use of these data for public policy purposes. Three studies are summarized here. The two best known were carried out by the Swedish Red Cross and the Natural Hazards Research and Applications Information Center (NHRAIC). The Swedish Red Cross focused on the period from 1960 to 1981 and relied mainly on information provided by OFDA and by the League of Red Cross and Red Crescent Societies (Hagman, 1984). Studies by NHRAIC and Shah examined data for the years 1947 to 1980 that were derived from newspaper reports of losses (Sheehan and Hewitt, 1969; Dworkin, 1974; Thompson, 1982; Burton, Kates, and White, 1978; Shah, 1983). Tomblin (1982) has also conducted an independent analysis of disaster losses during the period 1970-81 that draws on data from OFDA, UNDRO, reinsurance companies, and scientific organizations.

Although they analyze different sets of data over different periods of time, the three studies noted above reach similar conclusions about many aspects of disasters. Tropical cyclones, earthquakes, floods, and droughts are identified as the most deadly natural events. All other phenomena account for perhaps 10% of the global death toll from natural disasters. The global death rate from natural disasters rose sharply during the 1970s compared with the previous decade and may be continuing to increase during the 1980s. There is consensus that while the toll of deaths due to natural disasters is growing on a global basis, it is falling in many of the more-developed countries. Around three-quarters of all natural-disaster-related deaths occur in Asia. Finally, it is widely believed that the economic and material burden of disasters is increasing everywhere, though it is disproportionately heavy in poorly developed countries.

Despite consensus on these points, the three studies are not in accord about other aspects of natural disasters, most notably disaster death rates and trends in the number of disasters (Table 1). Tomblin reports death rates that are approximately three times larger than the those noted by NHRAIC and Shah. Similarly, total numbers of disasters, absolute death tolls, and average annual death rates reported by the Swedish Red Cross are up to two times larger than those reported by NHRAIC and Shah. NHRAIC studies estimate that the number of very large disasters increased between 1947 and 1972 and then began to decline, whereas the total number of natural disasters declined up to 1975 and then began to increase. In contrast, Swedish Red Cross figures suggest that the total number of disasters of all kinds has risen throughout the 1960s and 1970s. Finally, different types of countries are identified as being particularly susceptible to natural disasters. The NHRAIC studies suggest that although some very poor countries like Bangladesh and Haiti are disaster prone, disaster death rates are generally higher in middle-income countries that are experiencing rapid economic development, war, or other societal upheavals (e.g., Guatemala, Nicaragua, Peru, Iran, South Korea, New Guinea). Swedish Red Cross analysts point to a close association between poverty and disaster susceptibility. Although they suggest that disasters are more likely to afflict the very poorest countries, the data in Table 1 do not provide unambiguous support for that contention. Only three of the countries that possess high disaster death rates as measured by Red Cross data are included in the World Bank's list of low-income economies. The other four are middle- and upper-middle-income economies.

Obviously there are significant differences among existing assessments of global losses due to natural disasters. Divergent interpretations noted in the three sources analyzed above are also mirrored in many other places. No attempt has yet been made to explain or reconcile these differences or to take them into account in plans for the IDNDR. Yet, part of the justification for the IDNDR is concern about growing losses. For example, the National Research Council report that laid out a broad strategy for the Decade begins by accepting a figure of 2.8 million deaths due to natural disasters in the past 20 years (National Research Council, 1987). This is almost half as large again as the highest death rate calculated in the studies noted above. Which figure is more accurate? Are all of the current estimates too low? Are losses trending in the same direction? Is a more definitive assessment of disaster loss data possible? What might it show? The next section of this paper attempts to provide some of the answers to these questions.

Table 1
Contrasts Among Global Assessments of Natural Disaster Losses

	NHRAIC and Shah	Swedish Red Cross	Tomblin
Principal data source	newspapers	disaster relief reports	reinsurance information and science agencies
Period of analysis	1947-1980 34 years	1960-1981 22 years	1970-1981 12 years
Number of disasters recorded	1,062	1,190	357
Total deaths reported	1,222,298	1,454,980	1,131,963
Mean annual global death rates	35,950	66,135	94,330
Mean number of deaths per disaster	1,151	1,223	3,171
Countries with mean annual disaster death rates of more than 1,000 per million population (declining order)	Bangladesh Guatemala Nicaragua Iran Peru New Guinea Haiti South Korea	Nicaragua Bangladesh Peru Somalia Ethiopia Honduras Iran	N.A.

Table includes drought as well as sudden-onset meteorological, hydrological, and geological events.

GLOBAL DISASTER LOSSES REASSESSED

During the past 18 months a comprehensive global reassessment of disaster loss information and the communication of disaster loss information to public and professional audiences has been under way at Rutgers University. It includes several different components: 1) replication and extension of the NHRAIC studies on newspaper reports of disasters; 2) a similar longitudinal analysis of updated OFDA disaster data; 3) an analysis of major disaster lists published in the professional, scientific, and technical literature about natural disasters; 4) a review of major disaster lists published in encyclopedias, yearbooks, and other nonspecialist outlets; and 5) a comparative survey of disaster losses in selected countries using information from a cross-section of global, regional, and national data sets. This paper focuses on the last of these activities and highlights information about disaster-related deaths.[1] The results of the other analyses will be discussed in a subsequent general report on the project.

The three global loss assessments discussed above come to somewhat different conclusions in part because they rely on different types of data. Newspapers, relief agencies, insurance firms, and scientific monitoring bodies record different components of disasters. However, all three studies are also subject to an important constraint, the differential effects of geographic scale.

The collection and compilation of disaster loss data are affected by considerations of geographic scale because victims, local organizations, national agencies, regional or international bodies, and global institutions tend to define disasters differently. For example, individual victims define disasters in highly idiosyncratic terms that are personally relevant. As a result, a census of individual disasters would produce the largest and most varied set of data. In similar fashion, local agencies define disasters in more modest terms than national organizations. Global data sets are the most general of all.

Some of these differences can be illustrated for the United States. Each year in the United States the President issues a number of formal disaster declarations. These are associated with events that overwhelm the coping capabilities of affected communities and state governments. In a typical year there may be between 20 and 30 such Presidential disaster declarations. Yet, at the community level many relatively modest losses may be recorded as disasters. The American Red Cross counts as many as 40,000 disasters in some years, most of them residence fires that kill or injure one or two people or destroy a family's possessions.

Drawing on these and other observations, it can be hypothesized that data sets which are compiled by local organizations are more likely to include small-scale losses than are data sets compiled by national or international organizations. Since the aggregate impact of small losses may be substantial, the availability of fine-grained loss estimates might change the scale and distribution of public policy responses. The following section describes the results of an analysis of several types of disaster data sets in one subglobal region.

DISASTER LOSSES ON THE ASIAN RIM

As part of the Rutgers study, disaster loss data about countries on the eastern and southern rim of Asia were selected for analysis. These countries are exposed to very high levels of natural risks. For example, the Pacific Ocean is encircled by the so-called Ring of Fire, a band of high mountains that includes most of the earth's active volcanoes and overlaps with the earth's most seismically active region. The latter extends westward through the Himalayas. These primary hazards often trigger dangerous secondary events, including most of the earth's tsunamis, and many of its landslides, lahars, and other mass movements. A majority of tropical

1. It is important to remember that death tolls may convey a misleading benign impression of disaster losses because they are only one of the possible indicators of loss. In comparison to deaths caused by diseases, disaster deaths are relatively few in number, but the range of other impacts is very large. For example, a number of sources estimate that up to one-fifth of the earth's current population is "affected" by disasters in a direct sense (Wijkman and Timberlake, 1984).

cyclones are spawned in the Pacific Basin and the Bay of Bengal. Together with droughts, these storms threaten communities throughout much of the region, and they help to exacerbate vast damaging floods in the river valleys of China, Vietnam, Bangladesh, India, and neighboring countries.

Human exposure to risk is also very great in countries of the Asian rim. The world's most heavily populated areas are located here, and they are continuing to grow, albeit more slowly than in many African and Latin American countries. Considerable societal turmoil has affected the region in recent decades putting established institutions under strain, including those that provide buffers against disasters (Havlick, 1986). Industrialization, migration to urban areas, sociopolitical and economic restructuring are characteristic processes. Poverty is also widespread in Asian rim countries, and people are vulnerable to loss because they lack many of the resources necessary to provide effective protection against natural disasters. In view of these factors, it is no surprise that the two most deadly disasters since World War II have both occurred in this region. At least a quarter of a million people died in the Bangladesh cyclone of 1970, and a further quarter million were killed by the 1976 earthquake in the Chinese city of Tangshan.

Quite apart from their high levels of natural risk, human exposure, and vulnerability, the countries of the Asian rim offer other advantages for analysis of disaster losses. Countries like Japan and China possess detailed documentary records of natural disasters that go back centuries, sometimes millennia. Due to the work of ESCAP's Typhoon Committee, since 1947 the entire region has possessed steadily improving records of most types of natural disasters. A number of regional and national disaster research and information centers have also been established, especially in Japan. Those at Kyoto University, the Japanese "science city" of Tsukuba, and the UN Centre for Regional Development in Nagoya are leaders in their fields. Another noteworthy source of information is the Asian Disaster Preparedness Center outside Bangkok. Finally, there have been several major public policy initiatives for the reduction of natural disasters in this region. Japan's apparently successful attempt to curb large-scale loss of life in disasters – undertaken in the wake of the catastrophic Ise Bay typhoon (1959) – is one example. China's more recent introduction of improved seismic construction practices and its pioneering efforts to spread flood waters across vast rural holding areas represent other important initiatives. This hazard-prone region, with its high levels of social and policy dynamism, provides a valuable context for the analysis of disaster loss data.

ANALYSIS

For at least the past century the Japan Meteorological Agency (JMA) and its predecessors have compiled finely detailed records of natural disaster losses that are believed to be among the world's most accurate. Disasters are manifold and serious in Japan. Indeed, they are central features of Japanese history and culture as well as contemporary threats. Disasters crop up in ancient tales of invasions thwarted by typhoons, in apocryphal stories of temples destroyed by earthquakes, in folklore and art about tsunamis and volcanoes, and in factual accounts of societal catastrophe that range from fires which destroyed most of Tokyo after the Kanto earthquake of 1923, through the firestorms that consumed many cities during World War II bombings, to the nuclear destruction of Hiroshima and Nagasaki.

With this background it is not surprising that Japanese leaders and citizens are preoccupied with the subject of disasters. For example, Japan is ready to deploy quick-response disaster teams around the world at a moment's notice, and it is the only country that has passed legislation that is designed to prepare people for a specific predicted natural disaster that has not yet occurred. Japanese society places great emphasis on careful record keeping, and its hierarchical structure facilitates the compilation of disaster loss data by a centralized bureaucracy. Japanese scholars, hazard professionals, and public policy makers make extensive use of these data for a variety of purposes. Thus, Japanese disaster data are among the most dependable in the world, and they provide a useful yardstick for a comparative assessment of other data sets (Japan Meteorological Agency, various dates). In this analysis Japanese (national) data are compared with information drawn from disaster data sets at regional and global levels of analysis.

Deaths are underestimated in global and regional data sets

Disaster deaths recorded by the JMA were compared with similar records maintained by ESCAP and OFDA. All three organizations now compile records of a wide range of types of disasters, but, for

the purposes of this analysis, only deaths from meteorological and hydrological hazards during the 33-year period 1954–1986 were considered. Tabulations of annual death tolls recorded by these three sources are shown in Table 2.

Even a cursory inspection of this table shows one clear and consistent relationship. For an overwhelming majority of the period of record (28 of 33 years), disaster death tolls recorded by the JMA are larger than those recorded by ESCAP, which are in turn larger than those recorded by OFDA. (In the other five years (1957, 1961, 1962, 1982, 1983) there are small and partial deviations from this relationship.) Differences among JMA, ESCAP, and OFDA data are probably due to more detailed reporting of losses by the national organization (JMA) than by the regional and global organizations (ESCAP and OFDA). In quantitative terms, the differences are quite considerable. Over the 33-year period of record, 105% more deaths were recorded by JMA than by OFDA, 58% more deaths were recorded by ESCAP than by OFDA. For the most recent decades of this period, the differentials are even larger.

If, like Japan, losses reported by national agencies in other countries are systematically larger than losses reported in regional and global data sets, it will be necessary to substantially increase accepted estimates of global disaster losses. According to OFDA data, the mean annual global death rate from natural disasters is 66,135 (Table 1). Adjusted for more accurate national records, this figure would become at least 135,577 deaths per year (Table 3). This is almost half as large again as the global death toll from natural disasters that is estimated in the National Research Council's planning report for the International Decade for Natural Disaster Reduction (National Research Council, 1987).

Most disasters involve small death tolls

A second finding that emerges from the analysis of Japanese and Asian rim data is that a significant proportion of all disaster deaths occur in events that kill relatively small numbers of people. According to information from JMA, the mean loss of life per disaster is 33, compared with 219 using OFDA data (Table 4). National data sets tend to include many smaller-scale disasters that are ignored in regional and global data sets. If one assumes that 48 of the disasters recorded by JMA killed 10,530 people (OFDA data), then the remaining 611 disasters may have been responsible for 11,098 deaths. In other words, approximately 7% of Japanese disasters are responsible for about half the country's disaster death toll. For 93% of the disasters, the mean number of deaths per event is around 18.

Without analyzing additional national and subnational data from other countries, it is not yet possible to confirm that small death tolls per disaster are the norm in most parts of the world. On a priori grounds one would expect that MDCs might exhibit that pattern more than LDCs, because the general level of disaster deaths has fallen in North America, Western Europe, and other affluent regions throughout this century. Limited anecdotal evidence for flood-, tornado-, and lightning-related deaths in the United States also supports this conclusion, but the picture is less clear in LDCs.

However, even the present limited finding has potentially major significance for disaster reduction policies in more-developed countries. It suggests that far more attention than at present should be devoted to planning for the reduction of subcatastrophic disasters. Instead of preparing for "the big one," it may be desirable to concentrate on raising thresholds of protection against a large number of "little ones." Such events may be responsible for as many deaths in aggregate—and more damage—than the relatively few great events that dominate media headlines and disaster record books.

Temporal trends in disaster losses on the Asian rim

Trends in disaster deaths among different countries on the Asian rim were assessed using ESCAP data (Table 5). No overall pattern emerges. Some more-developed countries are experiencing declining death tolls (e.g., Japan, Hong Kong). Elsewhere death tolls appear to have peaked during the 1970s and are now in decline (e.g., India, Korea). However, in at least one country, the Philippines, death tolls appear to be increasing rapidly. No detailed information about disaster deaths are available for the single most populous country in the region (China), and data about other countries that are exposed to high levels of physical risk are too incomplete to permit analysis (e.g., Bangladesh, Indonesia).

Trends in economic losses are much more obvious (Table 6) (ESCAP Secretariat, 1983). Losses during the 1970s were significantly higher than during the 1960s in all countries for which data are available. For some countries there was a twelvefold increase in losses (e.g., the Philippines). Detailed information for the 1980s has not yet been compiled.

Table 2
Deaths in Japan from Meteorological and Hydrological Hazards
According to Three Sources (1954-1986)

	JMA	ESCAP	OFDA
1954	2,988	2,063	1,567
1955	445	301	-
1956	436	383	-
1957	1,220	1,224	513
1958	1,734	-	1,360
1959	5,583	5,616	4,580
Subtotal	12,406	9,587	8,020
1960	381	137	138
1961	653	882	172
1962	337	784	-
1963	780	217	-
1964	411	277	-
1965	395	339	289
1966	680	578	44
1967	625	585	343
1968	271	195	22
1969	274	162	100
Subtotal	4,807	4,156	1,108
1970	224	105	-
1971	372	348	135
1972	784	593	130
1973	280	72	-
1974	283	178	158
1975	233	191	68
1976	261	234	104
1977	176	54	21
1978	83	51	14
1979	202	188	94
Subtotal	2,898	2,014	724
1980	130	95	7
1981	117	-	47
1982	547	526	450
1983	317	69	121
1984	101	24	-
1985	172	90	36
1986	133	51	17
Subtotal	1,517	855	678
TOTAL	21,628	16,612	10,530

JMA: Japan Meteorological Agency
ESCAP: Economic and Social Committee for Asia and the Pacific
OFDA: U.S. Office of Foreign Disaster Assistance

Table 3
The Range of Estimates of Average Annual Global Death Tolls
From Natural Disasters

Source	Estimate	Index
NHRAIC/Shah	35,949	100
Swedish Red Cross (OFDA)	66,135	184
Tomblin	94,330	262
Regional agency data (projected)	103,832	289
National agency data (projected)	135,577	377

Table 4
Deaths per Disaster in Japan (1954-1986)

	Source	
	JMA	OFDA
Number of disasters	659	48
Number of deaths	21,628	10,530
Deaths per disaster	33	219

Table 5
Trends in Mean Annual Death Tolls Due to Meteorological and Hydrological Hazards for Selected Asian Rim Countries
(ESCAP data)

	GNP per capita (1982 $US)	1950s	1960s	1970s	1980s
Japan	10,080	1,598	416	201	122
Hong Kong	5,340	-	57	45	12
India	260	541	404	3,030	1,819
Rep. of Korea	1,910	-	285	295	262
Philippines	820	168	239	564	982

Table 6
Trends in Mean Annual Economic Losses Due to Meteorological and Hydrological Hazards for Selected Asian Rim Countries
(ESCAP Data)

	GNP per capita (1982 U.S.$)	Millions of U.S. Dollars (1975) 1960s	1970s	% Change
Japan	10,080	1,247.0	1,575.0	+26
New Zealand	7,920	3.6	8.1	+125
Hong Kong	5,340	0.9	2.8	+211
Rep. of Korea	1,910	39.0	66.0	+69
Thailand	790	25.0	41.0	+64
India	260	303.0	880.0	+157
Philippines	820	9 6	132.0	+1275

SUMMARY AND CONCLUSIONS

This paper describes one part of a larger research project on the assessment of worldwide disaster losses. The purpose of the project is to use information about losses to identify targets and to develop guidelines that are appropriate for the International Decade for Natural Disaster Reduction. The present paper focuses on a comparative case study of global, regional, and national disaster loss data for countries of the Asian rim. Information about disaster deaths has been emphasized and only brief comments have been made about economic losses.

The following findings are noteworthy:

1) Existing global data sets and regional data sets seriously underestimate natural disaster death tolls.

2) Based on detailed figures for Japan and other Asian countries, estimates of the mean annual global death toll from natural disasters might be increased fourfold over the most conservative existing totals. A worldwide total of at least 3 75 million dead during the past two decades is likely. If, as seems possible, disaster deaths in poor countries are less well documented than in Japan, this estimate is too low.

3) Small-scale disaster death tolls are often not reported in existing global and regional tabulations, even though in aggregate they may account for more than half of all disaster deaths. Much more attention should be paid to the special requirements of preventing, avoiding, and reducing smaller-scale disasters with few deaths as well as catastrophic disasters with many deaths.

4) Compilation of disaster loss data has improved over the past three decades both in terms of the range and volume of events that are reported and the standardization of reporting categories. It is now possible to find useful regional data sets that are more detailed than existing global tallies, and individual countries are attempting to bring their own collection efforts into line with regional data collection systems.

5) It is difficult to discern any uniform global pattern in trends of disaster deaths at the national scale. In many countries they appear to be declining, often quite dramatically in the wake of determined and effective public responses, but this trend may be deceptive or temporary. At least among countries of the Asian rim there is insufficient evidence to confirm a direct link between national economic status and disaster death tolls. However, because adequate measures of exposure, vulnerability, and response to disasters are not yet available for the case study countries, the possibility of indirect linkage has not been tested and is not precluded.

6) In sample countries throughout the Pacific rim, economic losses from disasters climbed dramatically between the 1960s and the 1970s. This supports a widely held belief that the economic burden of disasters is increasing everywhere. Further analysis will attempt to confirm whether this trend has been maintained into the 1980s

It is too early to highlight many implications for the International Decade for Natural Disaster Reduction because the entire study of disaster losses is still incomplete. However, some interim conclusions raise intriguing questions. For example, trends in deaths are ambiguous but upward trends in economic losses are unmistakable. Also, although deaths may be seriously underestimated on a global scale, small death tolls appear to be typical of most disasters. Does this mean that particular attention should be paid to ways of reducing economic/property losses in preference to further investment in improved personal safety? Or does it suggest that there might be valuable payoffs from a broad-based strategy that involves raising levels of protection against potential disasters in many places by quite small increments? In view of burgeoning concern about insidious global hazards like soil erosion, desertification, and atmospheric warming, a combination of both prescriptions may be compatible with a worldwide strategy to stem widespread undesirable environmental changes of various kinds.

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