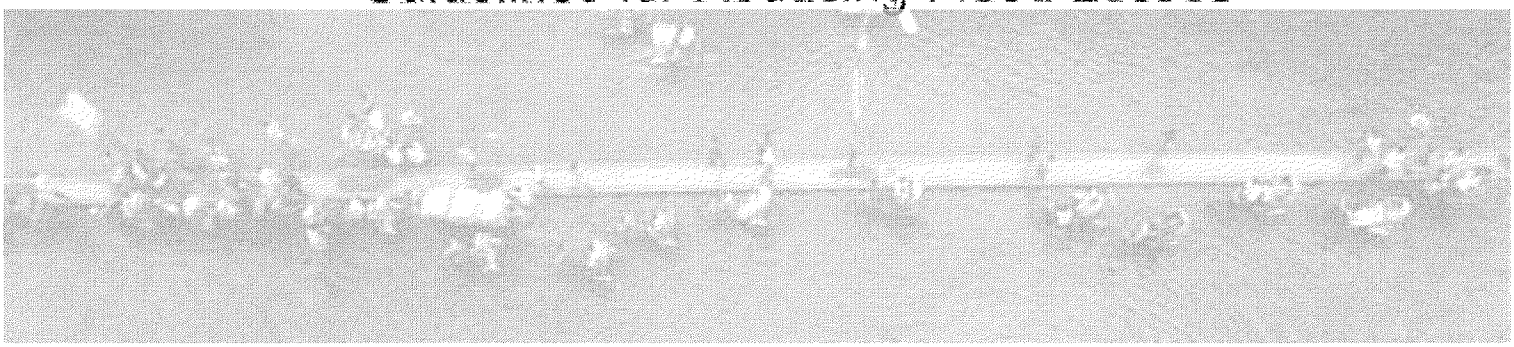
Guidelines for Reducing Flood Losses



United Nations

A contribution to the International Strategy for Disaster Reduction

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Foreword

Throughout the history of mankind, floods have brought untold wealth and prosperity to civilizations, and yet at the same time, they have caused tremendous losses and resulted in untold suffering for millions of people. Even today, floods lead all natural disasters in the number of people affected and in resultant economic losses, with these numbers rising at alarming rates

In response to the devastation arising from water-related natural disaster, particularly flooding, a series of three workshops and symposia were held, sponsored by the United States National Oceanic and Atmospheric Administration (NOAA) and the United Nations Department of Economic and Social Affairs. One objective of these events was to create comprehensive guidelines that could be used by governments, international organizations, non-governmental organizations and civil society to help avert losses from flooding.

The first session was the Flood Forecasting and Disaster Response Workshop. It was held in Tegucigalpa, Honduras, from 6-8 April 1999, following the devastation in the region stemming from Hurricane Mitch. This workshop was followed by an international Symposium on Flood Forecasting for the Americas, held in Brasilia, from 15-19 November 1999, and it was hosted by the National Institute of Meteorology of Brazil. A rough draft of these guidelines was prepared following this meeting. From 27-31 August 2001, an International Symposium on Water-related Disaster Reduction and Response was held in Bangkok, Thailand, wherein the draft guidelines were reviewed and new materials were gathered. Materials and ideas from these three meetings have been incorporated into this publication. It is hoped that these guidelines can be further improved and that additional experiences and concepts can be shared globally in an updated version.

This publication is based on the findings of those three sessions and is a contribution to the overall efforts that are required to help society cope with the forces of nature. Focused efforts are required to reduce the risk of flooding on society. Flood forecasting and warning systems, data collection systems, flood plain management practices and land-use planning, as well as economic and social measures can be adopted within an integrated framework to lead to sustainable solutions. Concerted efforts are required to achieve these solutions, and such efforts are necessary to stem the rising losses from water-related disasters. It is truly hoped that these guidelines will assist in the planning and implementation of actions leading to more healthy and resilient societies.

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Executive Summary

Floods have the greatest damage potential of all natural disasters worldwide and affect the greatest number of people On a global basis, there is evidence that the number of people affected and economic damages resulting from flooding are on the rise at an alarming rate. Society must move from the current paradigm of post-disaster response. Plans and efforts must be undertaken to break the current event-disaster cycle. More than ever, there is the need for decision makers to adopt holistic approaches for flood disaster management.

Extreme flooding events are not relegated to the least developed nations, but can also devastate and ravage the most economically advanced and industrialized nations. In the last decade there has been catastrophic flooding in Bangladesh, China, India, Germany, Mozambique, Poland, the United States and elsewhere. When floods occur in less developed nations, they can effectively wipe out decades of investments in infrastructure, seriously cripple economic prosperity, and result in thousands of deaths and epidemics. The majority of the deaths associated with such disasters can be found within the most vulnerable members of society, namely women and children. The greatest tragedy is that most of these deaths, associated post traumatic stresses, and social and economic hardships can be either avoided or dramatically reduced through pre-, during, and post-disaster investments in preparedness activities and associated infrastructure, flood plain policy development, effective watershed land use planning, flood forecasting and warning systems, and response mechanisms.

It is recognized that comprehensive assessments of risks from natural hazards such as flooding, mud/land slides, and extreme wind and rain are necessary for society to better understand the risks which they face daily. Assessment of risk and the involvement of the community in the decision making, planning and implementation process can help lead to sustainable solutions. Solutions must reflect the human dimension and must also consider the impacts of changing land use on flooding, erosion, and landslides. Integrated water management practices must be embraced. Societies have much to learn from new approaches such as better forecasting techniques and applying experience gained from flood events and mitigation efforts employed elsewhere. Implementation will only be sustainable if solutions are suitable for the community at risk over the long term. As storms will continue to occur, risk assessment and planning followed by actions are needed to help reduce the overall risk to society, the economy and the environment.

These guidelines are oriented to the needs of the decision-maker and provide a description of the range of mitigation options that need to be considered when making efforts to reduce losses from flooding. The guidelines are designed to provide an introduction to the general area and to introduce the reader to various measures to mitigate the impacts associated with floods. A bibliography is provided that cites detailed material available for the planning and implementation stages. These guidelines are not meant to address floods resulting from storm surge, ice or debris jams, or the failure of human-made structures

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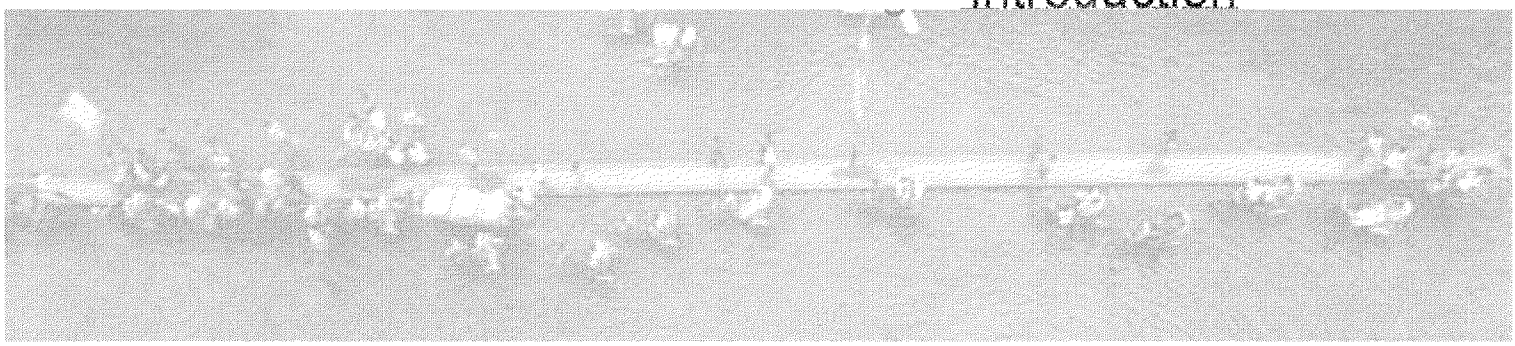
Introduction



There is an increasing trend worldwide in the number of disasters and their total economic impacts. This is very evident in the analysis by Munich Re, a major reinsurance company, of what it terms Great Natural Catastrophes[1] (see Figures 1 and 2). Flooding causes over one-third of the total estimated costs and is responsible for two-thirds of people affected by natural disasters Over 90% of people affected by natural disasters worldwide live in Asia, as the countries in Asia with large populations are particularly prone to recurrent flooding.

The number of disasters attributed to flooding is on the rise (see Figure 3), while the number of people killed[2] due to flooding remains steady (see Figure 4). However, the overall number of deaths due to all natural disasters is decreasing, and this has been attributed to investing in early warning and preparedness programmes. There is an alarming increasing trend in the number of people affected by natural disasters with an average of 147 million affected per year (1981-1990) rising to 211 million per year (1991-2000), with flooding alone accounting for over two-thirds of those affected. This might well be a result of the increasing growth of urban populations, some portions of which may be in flood-prone areas

Figure 5 shows the number of people that have been affected by natural disasters from 1975 to 2000 by income and disaster type. More than 95% of all deaths as a result of natural disasters are in the least developed nations, and these same nations have the greatest number of people affected by natural disasters. Typically, disasters impact the elderly, women and children the most.

This is a trend that will continue unless concerted actions are taken to mitigate the impacts from natural hazards.

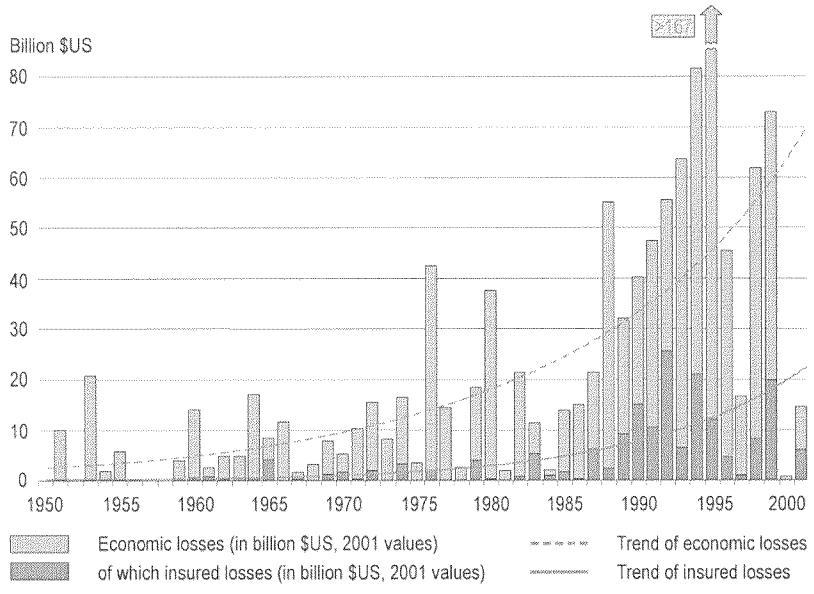
Flooding is the single most destructive type of natural disaster that strikes humans and their livelihoods around the world. In the last decade, there has been catastrophic flooding experienced in China, India, Bangladesh, Germany, Poland, Mozambique, the USA, and elsewhere. Flooding is not restricted to the least developed nations, but also occurs in devastating fashion in the most developed and industrialized countries of the world. However, it is the citizens of the least developed nations that suffer the highest toll from the occurrence of flooding. If we look at Hurricane Mitch as one specific example, it caused massive destruction and loss of life in Central America, affecting the peoples of Honduras, Nicaragua, El Salvador, and Guatemala. Honduras was hardest hit with economic losses estimated as being approximately US$ 3.64 billion (UNDP/ECLAC, 1998) or about 69% of their annual gross domestic product (GDP) in 1998 (IMF, 2002). In comparison, Hurricane Andrew resulted in estimated damages of US$ 30 billion (see http://www.aoml.noaa.gov/hrd/Landsea/Usdmg). These damages represented less than 0.5% of the GDP of the USA (IMF, 2002). When natural disasters such as flooding occur in developing nations, they can effectively wipe out decades of investments in infrastructure and the personal wealth of many of its people, not to mention the countless loss of lives, physical injuries, sickness and psychological trauma that result from the disasters.

[1] Munich Re in their 2001 annual review of natural catastrophes defines these as follows "Natural catastrophes are classed as great if the ability of the region to help itself is distinctly overtaxed making interregional or international assistance necessary. This is usually the case when thousands of people are killed, hundreds of thousands are made homeless or when a country suffers substantial economic losses, depending on the economic circumstances generally prevailing in that country."

[2] It should be noted that deaths from storm surge caused by cyclones are not included in these figures on floods but are classified as resulting from wind storms For example, in Bangladesh over 300,000 people were killed in tropical cyclones in 1970 and over 138,000 people in 1991

Figure 1

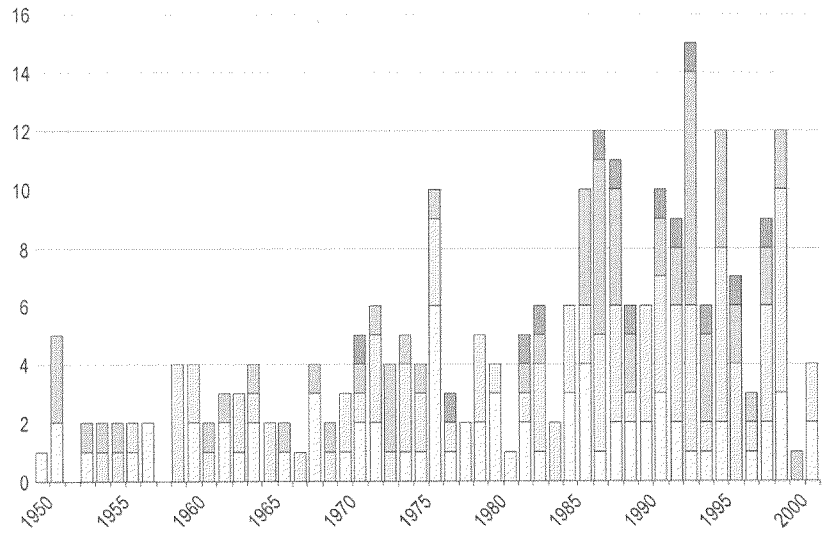
World economic losses from 1950-2002 for great natural catastrophes*



Source: Munich Re, 2002
*Note: Far exeeding 100 deaths and/or $US 100 million in claims

Figure 2

Number of great natural catastrophes from 1950-2001



Source: Munich Re, 2002