Wolfgang Kron, Erich Plate, Sabine Vollmer

Natural Disasters and Disaster Reduction

Contributions of the German scientific community
to the International Decade for Natural Disaster Reduction
(IDNDR)

Summarized report

German IDNDR Committee
Deutsche IDNDR-Reihe Nr. 1

Imprint:

Deutsches IDNDR-Komitee für
Katastrophenvorbeugung e.V.
Vorstand
(German IDNDR Committee - Board)
Postfach 1460
D-53004 Bonn

Tel.: (0228) 541 302
Fax.: (0228) 541 303

German IDNDR-Series No. 1
Natural Disasters and Disaster Reduction

Printed in Potsdam, 1996

Authors:
Dipl.-Ing. Wolfgang Kron
GeoForschungsZentrum Potsdam (GFZ)
Telegrafenberg A17
D-14473 Potsdam
Prof. Dr.-Ing. Dr.-Ing. E.h. Erich Plate
Dipl.-Geogr. Sabine Vollmer
Institute for Hydrology and Water Resources
Planning, University of Karlsruhe
Kaiserstraße 12
D-76128 Karlsruhe

Translation:
Katrin Weiße, Wolfgang Kron (GFZ)

Editing:
Judith DeVarnne (U.S. Geological Survey)

Layout:
Otto Grabe (GFZ)

Print
Wolfgang Rost (GFZ)

Introduction

Raising the awareness for disaster reduction at the level of decision making and policy, public information, and transfer of technology were declared major issues of the International Decade for Natural Disaster Reduction (IDNDR) by the United Nation's International Scientific and Technical Committee for the Decade. As a step toward these goals the German IDNDR Committee and, in particular, its Board, decided to launch a series of IDNDR publications called 'Deutsche IDNDR-Reihe' (German IDNDR series) which is addressed to individuals and institutions that are concerned with natural disasters. Natural and social scientists, engineers and relief workers, politicians and the public - they all shall be reached by the series. Everyone shall be called upon to regard a disaster not only as the result of a triggering natural event (such as an earthquake, a flood, a drought, etc.), but also as the consequence of the existing social conditions and the ability of an affected society to react to and cope with a catastrophic event.

The series will consist of annual reports and of occasional papers comprising the whole range of natural disaster related topics from scientific reports to case studies of disasters, expert papers on institutional efforts for prevention, mitigation and relief, etc. Although the upcoming issues, as a rule, will be in German, the first publication is in English. Issue number 1 contains the translation of the first chapter of a book published in 1993, which summarizes in quite some detail information on knowledge and gaps in knowledge about natural disasters. The book was compiled by the Scientific Advisory Board of the German IDNDR Committee involving the leading German scientists of all disaster-related fields.

One of the features that will characterize each individual issue of the series is the aspect of *interdisciplinarity*. Disasters need to be regarded not only from the point of view of a single field of expertise but in a very broad context that includes natural and social sciences as well as engineering. There will be a core group of recipients of the series, but the full list of addressees may differ from issue to issue, depending on the topic treated.

The series also serves to document some of the German IDNDR Committee's work and assist its efforts to bring the important message of the necessity of disaster prevention and reduction into the minds of as many people as possible. Prevention pays off! This may not always become apparent immediately, but, in the long run, the benefits from prevention measures will always outweigh their costs by far. We hope that the series will contribute to reaching the goals of the IDNDR by conveying information and exchanging expertise worldwide.

Hans-Jurgen Wischnewski
Chairman, German IDNDR Committee e.V.

Preface

A purpose for the International Decade for Natural Disaster Reduction is to inform people in the disaster prone countries of the earth about protective measures to be taken against such natural forces as earthquakes, volcanoes, storms, floods and storm surges, and to help make these measures accessible. A natural hazard becomes a natural disaster if it has serious consequences for mankind or the environment. Appropriate measures of preparedness and relief may not be able to prevent disasters, but they can significantly reduce their consequences. Although many such measures are well established, additional information that can only be gained by research is still required.

How can earthquakes be predicted ? How may modern methods of data acquisition via satellites and remote sensing help provide early warnings of threats from volcanic eruptions, tropical cyclones or storm surges ? How will climate changes affect the occurrence and intensity of natural events ? How can inappropriate reactions of individuals and groups in the case of a catastrophe be avoided ? How can help from other - unaffected - countries be appropriately coordinated ?

Such questions challenge scientists not only to reexamine their own fields from the point of view of disaster reduction, but also to work together with those from other disciplines. The entire chain of events must be investigated with interdisciplinary methods; these include the triggering natural event, the consequences on buildings and people, and disaster relief and post-disaster measures for relief of long-term negative consequences for the society. As mankind is the focus of disaster research, natural and engineering sciences must be combined with social sciences, especially by social geography, psychology, disaster sociology, and ecology, in order to illuminate this chain. Hence three essential points can be made:

1. Natural disasters have to be regarded as a chain of a triggering event possibly followed by several secondary events.
2. Man must be included in this chain both as a cause of disasters and as the victim of them, his actions and reactions often determine the extent of a disaster.
3. Disaster research must provide a basis for sustainable development in a way that will not be affected by future changes in societies and in nature.

Initiated by the Scientific Advisory Board of the German IDNDR Committee, a state-of-the-art report for the various fields of natural disaster related sciences was prepared in 1992 with the help of the Deutsche Forschungsgemeinschaft (DFG - German Research and Science Foundation). Altogether 44 scientists contributed to this report, which was edited by Erich Plate, Lars Clausen, Ulrich de Haar, Hans-Bernhard Kleeberg, Günter Klein, Georg Mattheß, Rainer Roth, and Hans-Ulrich Schmincke. It was published in German as a book titled **'Naturkatastrophen und Katastrophenvorbeugung - Bericht zur IDNDR' (Natural Disasters and Disaster Reduction - Report for the IDNDR)** by VCH-Verlagsge-

sellschaft Weinheim, Germany, 1993 (ISBN: 3-527-27028-0). The following text is the translation of the first chapter, which summarizes the six subsequent chapters. The complete table of contents (in English) and the authors of the book are listed in the annex.

Acknowledgments

The authors are indebted to Hans Spada (psychology), Wolf Dombrowsky (sociology of disaster), Gottfried Grünthal, Jack Bouwkamp and Peter Bormann (earthquakes), Hans-Ulrich Schmincke (volcanoes), Edmund Krauter (landslides), Peter Wilson (floods), Hans-Georg Bohle (droughts), and Gerd Tetzlaff (storms) for their help in translating technical terms properly. They also provided critical comments and their scientific expertise if the original text needed to be revised. Mary Lavin-Zimmer was always available with advice when language problems occurred. Special thanks go to Judith DeVarnne and Peter Smith of the United States Geological Survey, Water Resources Division, Sacramento, who were responsible for the final polishing of the text; they did an excellent job. Finally, Katrin Weiße, Li Hong, and Otto Grabe had to incorporate repeatedly corrections; their patience as well as their quick and fine work was highly appreciated. The translation was made possible by the financial contribution of the German IDNDR Committee. GeoForschungsZentrum Potsdam supported the layout and print and Munich Reinsurance Company, represented by Gerhard Berz, provided the 'World Map of Natural Disasters'. The permission of VCH-Verlagsgesellschaft for the translation is acknowledged.

Table of contents

Figure 1: *World Map of Natural Hazards*