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Cover: *Floods (Haque/Bangladesh) and earthquakes (IDNDR) are a few of the natural disasters that strike communities and countries worldwide with devastating consequences. The International Decade for Natural Disaster Reduction has made great strides in mitigating the impacts of these disasters.*

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NOTE

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FOREWORD

The International Decade for Natural Disaster Reduction (IDNDR) is about to come to a close, but it really represents a beginning that has brought together very different groups that have, up to now, played parallel but separate roles in mitigating and preventing natural disasters. During the decade, the role of science and technology clearly assumed their place as important components for the next phase in our ability to assess risk and vulnerability; provide preparedness and prevention including early warning; and in enhancing awareness and educating the public. Over 99 per cent of all natural disasters are a result of hazards occurring in the earth's fluid and solid environment. The programmes of UNESCO and WMO address the relevant science for these environment sectors that include the earth's geosphere, atmosphere, and hydrosphere (rivers and oceans). Both UNESCO and WMO have provided strong support as part of the framework partners under the IDNDR in planning and implementation of science and technology programmes for natural disaster reduction as a part of needed capacities for sustainable development. As a part of this partnership, UNESCO and WMO jointly convened a Sub-Forum on the Science and Technology Support to Natural Disaster Reduction as a part of the overall IDNDR Programme Forum. The Sub-Forum presentations and resulting discussions, as reflected in an agreed statement by the participants, are provided in this special report as a contribution of the two agencies in the closing of the Decade. On behalf of the Member States of UNESCO and Members of WMO, we would like to express our appreciation to the many participants in the Sub-Forum and especially to the panelists and scientists that contributed long hours to the excellent presentations. We particularly would like to thank the three panel chairs, Dr John Rodda, Dr Richard Hallgren, and Dr Soren Malling for their efforts in guiding the preparation and approval of the Sub-Forum statement. Finally, we wish to thank and acknowledge the excellent work of Dr Wolfgang Eder and Dr John Zillman in convening the Sub-Forum.

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INTRODUCTION

Growing evidence continues to show that the world is increasingly being threatened by natural disasters that have long-term negative social, economic and environmental consequences on vulnerable societies worldwide. Most of these natural disasters can be attributed to meteorological, hydrological, oceanographic, or geophysical phenomena or events that are strongly influenced in terms of development, intensity and impact from these same phenomena. Global intergovernmental cooperation in the understanding these natural hazards, as well as the application of the relevant sciences, including early warning, in the effort to reduce impacts of these natural disasters rests largely within the programmes of UNESCO and WMO.

Both of these UN Specialized Agencies have been major framework partners of the IDNDR and have provided significant scientific and technological support for use in natural disaster reduction. The Science sector of UNESCO, including its Intergovernmental Oceanographic Commission (IOC), has provided a global framework for most all of the research and application of the geophysical aspects including vulcanology, seismology, and other terrestrial and earth-related sciences. In addition, the IOC serves as a major International focus for ocean research and applications, including the management of the Tsunami Warning System for the Pacific Ocean. The WMO has long served as the UN organization responsible for atmospheric science and its applications primarily in terms of weather and climate. The World Weather Watch, including its Tropical Cyclone Warning and Public Weather Services programmes, provide the majority of information and data used by all countries of the world in providing early warning capability. Similarly, the data from these activities also serve as a basis for the understanding of climate, both in terms of global changes and in the seasonal and inter-annual fluctuations, that often are manifested in phenomena such as *El Niño* and *La Niña*. UNESCO and WMO jointly share the responsibility for Hydrological Sciences within the UN framework. UNESCO continues to pursue the understanding of the basic science aspects through activities, such as the International Hydrological Programme (IHP), and WMO has responsibilities related to applications and operations through its Hydrology and Water Resources Programme.

Both UNESCO and WMO, in addition to their normal programmes, have implemented special IDNDR scientific activities and projects throughout the IDNDR decade. It is both the normal programmes and these special projects that motivated both agencies to jointly convene a special Sub-Forum on Science and Technology in Support of Natural Disaster Reduction as part of an overall Programme Forum closing event of the IDNDR.

The Sub-Forum on Science and Technology in Support of Natural Disaster Reduction (Geneva, July 6–9, 1999) was jointly organized by WMO and UNESCO. It formed a major component of the 1999 IDNDR Programme Forum "Partnerships for a Safer World in the 21st Century", a keynote event of the concluding phase of the International Decade for Natural Disaster Reduction.

The Sub-Forum's objectives were to review the current state of science and technology in support of natural disaster reduction, to identify needs for additional research and capacity building efforts, and to consider ways to further enhance science and technology support for global natural disaster reduction efforts during the 21st century

Under the guidance of co-convenors Dr J.W. Zillman and Dr F.W. Eder, participants in the Sub-Forum addressed a broad range of meteorological, hydrological and geophysical hazards, focusing on the contributions of science and technology, to mitigation of their impacts, and on promising scientific and technological developments which may further contribute to this objective in future years. Presentations by invited experts were followed by panel discussions focusing on three key aspects of disaster prevention and reduction: Vulnerability and Preparedness; Warning Capacities; and Preparedness and Education. The meeting

concluded with the endorsement by participants of a formal Sub-Forum Statement, which reflects the results and conclusions from their deliberations.

The specific presentations related to phenomena of meteorological, hydrological or geophysical origin or directly contributing to the development, movement, and intensity of the disaster-causing hazards The lectures included the following topics: tropical cyclones, extratropical storms; severe convective storms and tornadoes; drought; extreme temperatures; dust and sand storms; forest and bush fires; floods; avalanches; landslides; seismic risk and earthquakes; tsunami and coastal storm surges; and volcanoes.

The presentations emphasized the need for expanding scientific knowledge and technological capacity to improve warning capability, preparedness and to mitigate the impacts of natural hazards in vulnerable regions around the globe. This theme was central to the panel discussions where participants reviewed the specific contributions that science and technology can make in the broader disaster reduction process, through:

- The assessment of vulnerability and enhancement of community awareness of the nature of the risk;
- The operation of integrated warning systems; and
- Preparedness and education programs.

The Statement summarizes the major conclusions from the Sub-Forum, emphasizing that science and technology have already contributed to reducing injury and loss of life, as well as economic damage losses from natural hazards and greater reductions are possible in the future. The Statement points out that an outstanding achievement of the IDNDR has been to increase cooperation between the natural and social science communities, resulting in enhanced application of science and technology to reducing the societal impacts from natural disasters. The statement also expresses concern regarding the substantial gap that still exists between the disaster reduction capabilities of developed and developing countries, drawing attention to the need to continue efforts to develop scientific and technological capacities, early warning systems and public awareness and education in all regions exposed to natural hazards.

The lectures and panel discussions of the Sub-Forum provided significant elements used within the overall IDNDR Programme Forum and resulted in key information presented and discussed at the substantive Economic and Social Council (ECOSOC) session of 1999 regarding successor arrangements for the International Decade for Natural Disaster Reduction.