

Executive Summary

The impacts of natural hazards continue to increase around the world; the frequency of recorded disasters affecting communities significantly rose from about 100 per decade in the period 1900-1940, to 650 per decade in the 1960s and 2000 per decade in the 1980s, and reached almost 2800 per decade in the 1990s. Hundreds of thousands of people are killed and millions injured, affected or displaced each year because of disasters, and the amount of property damage has been doubling about every seven years over the past 40 years. Although earthquakes and tsunamis can have horrific impacts, most disaster losses stem from climate-related hazards such as hurricanes, cyclones, other major storms, floods, landslides, wildfires, heat waves and droughts. Current evidence demonstrates that changes in the global climate will continue to increase the frequency and severity of climate-related hazards.

Globalization, population growth, widespread poverty, particularly in hazardous areas, and a changing climate will cause the risk associated with natural hazards to be even greater in the future, with more people and communities at risk. In urban regions, the complex infrastructure systems that make life and economic activity possible, the concentration and centralization of economic and political functions, social segregation and complex spatial and functional interrelationships, all contribute to the vulnerability of populations to disruptions caused by hazards.

The ICSU Priority Area Assessment on Environment and its Relation to Sustainable Development (2003) and the ICSU Foresight Analysis (2004) both proposed 'Natural and human-induced hazards' as an important emerging issue. The executive summary of the ICSU Priority Area Assessment on Capacity Building in Science (2005a) stated that a great challenge is 'a development problem...the widening gap between advancing science and technology and society's ability to capture and use them.'

It is the assessment of the ICSU Planning Group that, despite all the existing or already planned activities on natural hazards, an integrated research programme on disaster risk reduction, sustained for a decade or more and integrated across the hazards, disciplines and geographical regions, is an imperative. The value-added nature of such a programme would rest with the close coupling of the natural, socio-economic, health and engineering sciences.

The Planning Group recommends that the Research Programme be named **Integrated Research on Disaster Risk – addressing the challenge of natural and human-induced environmental hazards** (acronym: IRDR).

The Science Plan of the proposed IRDR Programme would focus on hazards related to geophysical, oceanographic and hydrometeorological trigger events; earthquakes; volcanoes; flooding; storms (hurricanes, typhoons, etc.); heat waves; droughts and fires; tsunamis; coastal erosion; landslides; aspects of climate change; space weather and impact by near-Earth objects. The effects of human activities on creating or enhancing hazards, including land-use practices, would be included. The IRDR Programme would deal with epidemics and other health-related situations only where they were consequences of one or more of the aforementioned events. Technical and industrial hazards and warfare and associated activities would not be included *per se*. The focus on risk reduction and the understanding of risk patterns and risk-management decisions and their promotion would require consideration of scales from the local through to the international level.

The increases in costs of disasters are taking place in both developed and developing countries, which suggest that reducing the risks from hazards is not simply a matter of economic growth and development. There is a great shortfall in current research on how science is used to shape social and political decision-making in the context of hazards and disasters. These issues also highlight the need for more systematic and reliable information on such events. An aim of the Programme would be to both generate new information and data and to leave a legacy of coordinated and integrated

global data and information sets across hazards and disciplines, with unprecedented degrees of access.

IRDR would leave the legacy of an enhanced capacity around the world to address hazards and make informed decisions on actions to reduce their impacts, such that in ten years, when comparable events occur, there would be a reduction in loss of life, fewer people adversely impacted, and wiser investments and choices made by governments, the private sector and civil society.

The IRDR Programme would have three research objectives, the first of which deals with the characterization of hazards, vulnerability and risk. The identification and assessment of risks from natural hazards on global, regional and local scales, and the development of the capability to forecast hazardous events and their consequences would be, of necessity, interdisciplinary. Understanding of the natural processes and human activities that contribute to vulnerability and community resilience will be integrated to reduce risk. This objective would address the gaps in knowledge, methodologies and types of information that are preventing the effective application of science to averting disasters and reducing risk.

The second research objective involves understanding decision-making in complex and changing risk contexts. Understanding effective decision-making in the context of risk management – what is it and how it can be improved – calls for an emphasis on how human decisions and the pragmatic factors that constrain or facilitate such decisions can contribute to hazards becoming disasters and/or may mitigate their effects.

The third research objective, on reducing risk and curbing losses through knowledge-based actions, would require integration of outputs from the first two and could only be achieved through implementing and monitoring informed risk reduction decisions and through reductions in vulnerability or exposure. Processes of human adjustment or adaptation can be used to reduce vulnerability and increase resilience.

Three cross-cutting themes would support these objectives: capacity building, including mapping capacity for disaster reduction and building self-sustaining capacity at various levels for different hazards; the development of case studies and demonstration projects; and assessment, data management and monitoring of hazards, risks and disasters.

The Planning Group has identified the major programmes and projects that already exist in the field of natural hazards and disasters and, through an extensive consultation process, the Programme would further explore these and other activities and enter into agreements as to how they might become components of the whole as partners in research.

During the first three years, the Programme would establish a team of co-sponsors and make arrangements with existing programmes so as to undertake research with shared outcomes and responsibilities. A Scientific Committee, mandated by the co-sponsors and with support from an International Project Office, would have the responsibility for building the formal linkages with partners in research. The collaborating organizations, working through a Consultative Forum, would become significant actors in the Programme.

In addition, new projects would be initiated to put in place, in a priority sense, the elements needed to fully meet the objectives over a ten-year timescale. It is recommended that the Scientific Committee, when established, create two working groups to help scope out the programme and lay the firm basis for further programme development. These would be working groups for forensic investigations of recent disaster events, and for a long-term hazards research network.