

SCIENCE-DRIVEN APPROACH TO DISASTER RISK REDUCTION

Periodic scientific assessments of disaster risks should provide the world with a clear view of the current state of knowledge, potential socio-economic impacts of natural hazards, and the ways to reduce (if not prevent) significant human and economic losses.

Activities of several major intergovernmental and international organizations in the area of disaster risk reduction (DRR) are briefly reviewed here, and the importance of scientific assessments of disaster risks is highlighted.

United Nations (UN) activities. Since at least 1989, when the UN General Assembly launched the International Decade for Natural Disaster Reduction (IDNDR, 1990-1999), which was succeeded by the UN International Strategy for Disaster Reduction (UNISDR), governments started to realize the importance of DRR. Sálvano Briceño, who led the UNISDR office for ten years, remembers: “Following the ten-year review of the 1994 Yokohama Strategy (adopted at the first World Conference on Natural Disaster Reduction in Yokohama, 23–27 May 1994), and in conclusion of two years of negotiations, governments adopted the *Hyogo Framework for Action (HFA, 2005-2015): Building the Resilience of Nations and Communities to Disasters* at the second World Conference on Disaster Reduction (WCDR) in Kobe, Hyogo, 18-22 January 2005. This agreement represents a historic engagement of governments and the international community to respond forcefully to the increasing vulnerability to natural events or phenomena around the world. In doing so, governments agreed on a series of specific policies and measures to be taken to substantially reduce disaster losses by 2015 (in terms of loss of life and social, economic and environmental assets of communities and countries)”¹.

Despite the great concern of society and governments of many countries, the number of disasters due to natural events and associated losses keeps growing. “Economic losses amount to hundreds of billions of dollars annually and are projected to double by 2030. Driven by investment decisions that do not take disaster risks into account, disaster losses are out of control, threatening the lives and livelihoods of billions of people and making sustainable growth and development an uncertain aspiration in many countries, now and in the future”². Natural hazards become imminent threats to civilization because of the rapid increase of physical and social vulnerability to hazards at local, regional and global levels. The economic impact of disasters exceeds the cost of mitigation and preparedness by orders of magnitude. DRR, including disaster mitigation and preparedness, needs long-term planning. To undertake the planning, a *science-driven approach* is required to assess disaster risks at all levels. This should provide the world with a clear scientific view of the current state of knowledge in disaster risks, potential socio-economic impacts of natural hazards, and the ways to reduce (if not prevent) significant human and economic losses.

In March 2015, national governments will assemble for the 3rd World Conference on Disaster Reduction (WCDR2015) in Sendai, Japan, to review the HFA and to provide guidance for the next decades ahead. The International Council for Science (ICSU) has been invited to partner with

¹ Briceño, S. (2014) The International Strategy for Disaster Reduction and the Hyogo Framework for Action (2005-2015): essential tools for meeting the challenges of extreme events. In: *Extreme Natural Hazards, Disaster Risks and Societal Implications*, eds. A. Ismail-Zadeh, J. Urrutia Fucugauchi, A. Kijko, K. Takeuchi, and I. Zaliapin, pp. 333-347. Cambridge: Cambridge University Press.

² Report by the U.N. Secretary General on Implementation of the International Strategy for Disaster Reduction (<http://www.unisdr.org/files/resolutions/SGReportEnglish2013.pdf>)

UNISDR in the process of preparation to the WCDR2015, as science plays a crucial role in DRR now and should do it in the future. Existing scientific knowledge and technology for disaster risk assessment and mitigation could provide impetus to more effective preventive measures.

International Council for Science (ICSU) activities. ICSU and its Scientific Unions and National Members supported the UN-IDNDR program and contributed significantly to understanding the causes of natural hazards and disasters. Recognizing the importance of integrated research on disaster risk for DRR (a holistic view on disaster risk as a convolution of natural hazard, vulnerability and exposure components), ICSU, together with the International Social Sciences Council (ISSC) and UNISDR, created in 2008 the Scientific Program on Integrated Research on Disaster Risk (IRDR)³ to address the challenge of natural and human-induced environmental hazards as a ten-year major research program. Presently IRDR runs several international disaster risk projects (i) to uncover the root causes of disasters; (ii) to analyze how people make decisions in the face of risks; (iii) to study issues related to the collection, storage, and dissemination of disaster loss data; and (iv) to assess the integrated research on disaster risk.

International Union of Geodesy and Geophysics (IUGG) activities. In 2000, IUGG set up the Union Commission to promote research on geophysical risks and its reduction. The Budapest Manifesto on Risk Science and Sustainability 2002⁴ has been guiding the IUGG community in research on disaster risk and DRR. IUGG endorsed enthusiastically the creation of the IRDR program and launched in 2009 the project “Extreme Natural Hazards and Societal Implications” (ENHANS)⁵ with a support from ICSU Scientific Unions, IRDR, and several international and intergovernmental bodies. One of the principal goals of the ENHANS project was to disseminate scientific knowledge and data on natural hazards and disaster risks for the advancement of research and education in general and especially in developing countries; and to establish links and networks with the organizations involved in research on all aspects of disaster risks. The ENHANS Declaration called for a reduction of disaster risks based on comprehensive holistic inter- and trans-disciplinary approaches to disaster risk research and on periodic risk assessments.

International Society for Photogrammetry and Remote Sensing (ISPRS) Activities: Knowledge transfer from geospatial science to professionals and decision-makers in Disaster and Risk Management is a major challenge in view of the global upward trend in major disasters which is likely to continue due to the impacts of climate change and population growth in areas exposed to natural hazards.

The Joint Board of Geospatial Information Societies (JB GIS), and the United Nations Office of Outer Space Affairs (OOSA), which is carrying out the United Nations Platform for Space-based information for Disaster Management and Emergency Response (UN-SPIDER), have embarked on a major initiative to demonstrate the potential of geospatial technologies for Disaster and Risk Management to deciders in governmental and administrative bodies, to disaster management professionals and to other stakeholders.

³ <http://www.irdrinternational.org/>

⁴ http://www.iugg-georisk.org/Documents/Commission%20reports/Budapest_Manifesto_2002.pdf

⁵ <http://www.enhans.org>

In the follow-on of the booklet “Geoinformation for Disaster and Risk Management - Examples and Best Practices” published by JB GIS and OOSA in 2010, another publication was prepared in the framework of an interdisciplinary project named VALID (The Value of Geo Information for Disaster and Risk Management). The VALID report, published by the JB GIS, the International Council for Science-GeoUnions (ICSU-GeoUnions), and OOSA, was officially launched on 3 September 2013 at OOSA in Vienna, Austria, and is available on-line at

<http://www.un-spider.org/sites/default/files/VALIDPublication.pdf>.

Based on a dedicated case study as well as a web-based global stakeholder survey, the VALID report gives evidence of economic, operational and strategic benefits of geoinformation in DRM. This two-fold approach was followed in order to ensure a detailed as well as a holistic view on the benefits of geoinformation, and to obtain best possible coverage of the disaster management cycle, addressing prevention as well as response aspects. Among other points, the survey results from end-users highlighted the benefit of all 10 geoinformation products shortlisted for appraisal for reducing losses in public economy and support of preventive strategies.

In addition to the benefit appraisal, the VALID report also provides detailed descriptions of the scientific and technical background of the geoinformation items assessed, also addressing such issues as methodology, data requirements, costs, access to available products and recommendations for future activities.

Periodic disaster risk assessments. IUGG together with IRDR and ICSU GeoUnions informed the scientific community at the ICSU General Assembly (Rome, Italy, 2011) about the importance of and urgency in periodic scientific assessments of disaster risks undertaken by an intergovernmental body, similar to the Intergovernmental Panel on Climate Change (IPCC) and Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). The ICSU General Assembly decided that the substance of the initiative merited consideration by the ICSU Executive Board. The Executive Board, in its turn, decided to invite the IRDR Scientific Committee, working together with the ICSU GeoUnions, to discuss with concerned ICSU Members and relevant U.N. bodies the need for an intergovernmental body for the assessment of disaster risk.

In 2013, the ICSU Executive Board considered the report from IRDR related to the initiative. The Executive Board recognized that the creation of an intergovernmental structure of the type originally proposed would require political and material support at the highest level and considered that an integrated, interdisciplinary scientific synthesis across all hazards of the state of knowledge and response, occurrences and impacts of hazards, and priorities for research in the decades to come would be important post-HFA to ICSU Members, U.N. bodies, and all governments. The preparation of such a synthesis should be carried out through scientific processes involving IRDR, ICSU GeoUnions, the ICSU Regional Offices, and other like-minded bodies of scientists. Early this year, an ad-hoc group, including experts from the mentioned ICSU bodies, was established in order to render this scoping process effectively.

The first meeting of the expert group was held at the ICSU Secretariat in Paris, France, on 2 May 2014, and co-sponsored by ICSU and IUGG. The international experts looked at the history and present state in scientific assessment of disaster risks and discussed various scientific approaches to DRR. They decided to prepare a scoping paper, which will highlight the urgent needs for

science-driven disaster risk reduction based on integrated research and assessment of the risks, with the aim to present the paper at the WCDR2015. The assessment and synthesis of the policy-relevant results of peer-reviewed published research should cover (i) understanding natural hazards and the vulnerability associated with disasters; (ii) the capability of predictive systems to disseminate timely and accurate information needed for policy and decision making; (iii) methodologies and approaches for reducing vulnerability and increasing resilience of societies; and (iv) the overall ability of societies to reduce disaster risk (prevent, mitigate and prepare for the increasing impact of natural events). The scientific assessment would contribute to the enhancement of the knowledge of disaster risks at local and regional levels, to the awareness of national governments and the people living with risk, and, ultimately, to reduction of disaster risks.

The IUGG initiative on disaster risk assessment, which is supported by several ICSU Scientific Unions and IRDR, fits well with the recent statement, issued by ICSU, the United Kingdom Collaborative on Development Sciences, Wellcome Trust, UNISDR, and UNESCO, on the need for a science advisory mechanism for disaster risk reduction (see item 5 “*News from ICSU*”). We hope very much that this initiative on disaster risk assessment will be recognized by the General Assembly of the International Council for Science (meeting in Auckland, New Zealand, 30 August – 3 September 2014) and be endorsed by scientific community. Also we hope that science-driven approach to DRR will be supported by the WCDR2015.

Science needs to help implement the best knowledge and rigorous assessments of disaster risks into all actions related to DRR.

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