Mapping Disaster Risk Reduction Institutions Using Web-based Accessible Information

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About the Series

This Working Paper Series is a new publication of Integrated Research on Disaster Risk (IRDR), following the decision of the IRDR Scientific Committee in April 2019 to act to 'Expand IRDR Network and Scientific Output' (No. 5 of the IRDR Action Plan 2018-2020).

IRDR is an international scientific programme under co-sponsorship of the International Science Council (ISC) and United Nations Office for Disaster Risk Reduction (UNISDR) and with support from China Association for Science and Technology (CAST) and Chinese Academy of Sciences (CAS). Started in 2010, the Programme has been pioneering in the promoting international and interdisciplinary studies on DRR and has made its contributions through scientific publication and policy papers as well as dialogue toward shaping international agenda in the understanding disaster risks, bridging science and policy gaps and promoting knowledge for actions, all required in the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) and its top priorities. Over time, the scientific agenda of IRDR has attracted many international renowned expertise and institutions. IRDR community is now, institutionally speaking, characterized by its strong Scientific Committee and six thematic working groups, thirteen IRDR national committees (IRDR NCs) and one regional committee (IRDR RC), sixteen international centres of excellence (IRDR ICoEs), a group of some one hundred fifty Young Scientists (IRDR YS) and a broad partnership with national, regional and international institutions working for SFDRR.

This Working Paper Series is thus specially made to facilitate the dissemination of the work of IRDR NCs, ICoEs, YS and institutions and individual experts that IRDR considers relevant to its mission and research agenda, and of important values for much broader range of audience working in DRR domains. As one will notice, all working papers in this series has anchored their relevance and contributions of their work toward SFDRR, IRDR, SDGs and Paris Agreement on climate change. It is the hope of the authors of the working papers and IRDR that this working paper series will not only bring new knowledge, experience and information toward disaster risk reduction, but also helped build better coherence of DRR with the mainstream agenda of UN today toward inclusive, resilient and sustainable human societies.

Team of IRDR-IPO

Mapping Disaster Risk Reduction Institutions Using Web-based Accessible Information

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Content

Abstract of this Working Paper

Disaster risk reduction (DRR) is a common, urgent, and evolving challenge. To understand how international and regional institutions and programmes are positioned and engaged in the global DRR endeavor through the Sendai Framework (SFDRR), the researchers map out details of typical DRR institutions using web-based accessible information. 32 active institutions are selected and analyzed in terms of their respective institutional nature, goals and missions, products and services etc. The evidence indicate that these institutions and programmes cover a wide spectrum of actions, including: a) monitoring, analyzing, and coordinating the implementation of the Sendai Framework; b) developing global platforms for disaster risk reduction; c) promoting multi-disciplinary and integrated disaster science research; d) establishing disaster monitoring and early warning networks; e) applying disaster prevention and mitigation engineering and information technology; f) establishing data, information and knowledge services; g) improving multi-scale disaster reduction practices. The evidence also demonstrates a shift of focus from hazard prevention towards risk management, and an increasing interest toward international cooperation, engaging more youth and young scientists. Finally, the authors make six recommendations to better future international cooperation: (1) establishing an orientation process to development safety in DRR; (2) improving global disaster risk assessment and early warning systems; (3) developing scientific guidance on interdisciplinary and transdisciplinary disaster reduction; (4) combining science, engineering, and technology in decision support and policy making; (5) supplying more products from DRR data, information, and knowledge; and (6) enhancing disaster risk reduction capacity building, platform construction, and partnership promotion..

Keywords

Indications of contributions to IRDR Science Plan and UN Agendas

IRDR Sub-objectives	2.1
SFDRR targets	F
SDGs and/or Climate Goals	SDG Target 9; 11; 13; 15
S/T Roadmap actions	1.1

1. How does this study contribute to IRDR research objectives?

The study contributes to Objective 2.1, identifying relevant decision-making systems and their interactions. There are 32 DRR institutions included in this survey. It is helpful to investigate the duties, actions, and impacts of relevant DRR decision-making systems and platforms. This paper draws ten trends and several recommendations for DRR, helping craft the research objectives for the next generation of DRR work.

2. How does this study contribute to SFDRR targets?

Article (g) of the SFDRR emphasized that it must "Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030." From the survey and analysis of these institutions for disaster risk reduction, we find that international cooperation among institutions focusing on disaster risk reduction is still relatively scattered, and lacks an in-depth and clear collaboration network. It is hence necessary and urgent to promote international cooperation in disaster risk reduction in various aspects.

3. How does this study contribute to Science & Technology Roadmap Actions?

The study looks to address Outcome 1.1 of the S/T roadmap, focusing on assessing and updating the current state of data, scientific and local and indigenous knowledge and technical expertise availability on disaster risk reduction and fill the gaps with new knowledge. Data, information, and knowledge on disasters is the base for DRR. To give but one example, we look at the trend of "focusing on data, information and knowledge services for disaster risk reduction," and recommend that "the products of data, information and knowledge in disaster risk reduction be strengthened, especially as the application of big data technology and artificial intelligence brings new opportunities and challenges."

Main Text

1. Introduction

Disaster risk reduction is a common and urgent global challenge. Under the dual influence of global climate change and human activities, the frequency and intensity of natural disasters have recently been increasingly frequent, and disaster losses have become increasingly severe. There are already many international and regional institutions for disaster risk reduction, which contribute to disaster prevention and mitigation from different perspectives and levels according to their respective missions. Understanding the respective foci and progress of these institutions can help us discover potential deficiencies and shortcomings, which may be used as reference for adjusting and optimizing international and regional disaster risk reduction cooperation in a timely manner. The institutions are selected to be broadly representative (with representativeness here looking at five different criteria, namely: organization affiliations, geographic regions, technological capabilities, platform applications, and social-policy influences). A total of 32 international institutions and regional institutions, mainly in Asia but including some in Europe, North America, South America, and Africa, were selected and mapped (Appendix 1). The selection also takes into account institutional profiles and include a range of organizations, including not only international organizations and non-governmental organizations but also universities, research institutions, and insurance companies. The main findings are summarized below.

2. Trends analysis

This survey adopts the method of simple network search and analysis of each selected organization - focusing on analyzing the contents, publications, and practical cases made available on the relevant institutions' website platforms. The information collected in each case includes the organization's name, website link, nature, affiliation, geographic location, organization composition, mission and vision, objectives, products and services, current plan and focus of work, summaries of practical cases undertaken, and more. The information and data collected through the survey are then sorted and analyzed, and organized into the following 10 trends:

(1) Emphasize and strengthen global monitoring, analysis, and coordination of the implementation of the Sendai framework. The United Nations International Strategy for Disaster Risk Reduction (UNDRR) [1] is the leading agency within the UN family to bring governments, partners, and communities together to reduce disaster risk and losses and to ensure a safer and sustainable future. UNDRR provides leadership to strengthen global monitoring, analysis, and coordination of the implementation of the Sendai Framework. It supports regional and national implementation to the Sendai Framework, and

promotes cooperative actions in countries and with partners. UNDRR's Scientific and Technical Advisory Group (STAG)[2] provides scientific and technical advice to the United Nations, allowing the UN to strategize for DRR based on a better understanding of science and technology and by strengthening scientific decision-making at the global, regional, and national levels. Further, STAG advise on the strategic engagement of science, research, and technology institutions in the implementation of the Sendai Framework. Finally, UNDRR also publishes the influential Global Assessment Report on Disaster Risk Reduction (GAR)[3].

GAR, which is published every two years, is known for breaking new ground on risk and the reduction thereof—challenging prevailing norms and provoking us to re-examine our behavior and choices. The latest GAR (GAR19) moves beyond disaster risk to consider the pluralistic nature of risk: in multiple dimensions, at multiple scales, and with multiple impacts. It provides an update on how we—as governments, communities, and individuals—understand our relationship with risk and its reduction. In other words, GAR 2019 is about better understanding the systemic nature of risk. It focuses on one hand on how we can recognize, measure, and model risk; and on the other on strategies to enhance the scientific, social, and political cooperation needed to move towards systemic risk governance. These are distilled down to ten easy to remember "take-home" observations: "Surprise is the new normal", "Growing risk in a shrinking world", "It's complex—let's deal with it", "The high cost of vulnerability", "Nothing undermines development like disasters", "Levelling the playing field", "Climate change—the great risk amplifier", "Data, direction, decisions", "Governments—why planning for a rainy day makes sense", and "Risk is everyone's business". These observations should provoke us to re-examine what and how we think about risk, the associated issues, and our corresponding actions.

Figure 1. GAR2019 Report

(2) Advocate and establish global platforms for disaster risk reduction. The Global Platform for Disaster Risk Reduction (GP) [4] is a biennial multi-stakeholder forum established by the UN General Assembly to review progress in, share knowledge of, and discuss the latest developments and trends in reducing disaster risk. GP is the most critical mechanism of the monitoring and implementation process of the Sendai Framework for Disaster Risk Reduction (2015-2030) and has now completed its sixth session. The International Research Institute for Disaster Science at Tohoku University (IRIDeS) [5] hosts the World Bosai Forum. Through the sharing of disaster data and information and the teaching of disaster knowledge, Bosai aims to build a sustainable society with good disaster resistance.

(3) Promote multi-disciplinary and integrated disaster science research. The International Science Council (ISC) attaches great importance to the application of science in disaster risk reduction. Its subordinate CODATA [6] and WDS promote the development of open science and scientific data services with quality assurance. CODATA supported a working group for Linked Open Data for Global Disaster Risk Research. Integrated Research on Disaster Risk (IRDR) for its part envisions an integrated approach to natural and human-induced environmental hazards through a combination of natural, health, engineering, and socio-economic sciences (which also consider the role of communications, and public and political response to reduce risk). Accordingly, it has formed Centres of Excellence to address these various perspectives (Table 1). The Disaster Prevention Research Institute, Kyoto University (DPRI) [7] has and continues to conduct basic research on various disaster-related themes at local to global scales from the viewpoints of natural science, engineering, and the human and social sciences. Moreover, it is engaged in practical projects that meet the needs of society by organizing interdisciplinary groups. Finally, the International Association for Disaster Risk Reduction (IADRR) focuses on both natural disaster risk prevention and comprehensive disaster reduction along all the "One Belt One Road", integrating ecological and environmental protection, collaborative disaster reduction mechanisms, sustainable development and personnel training.

Table 1 International Centres of Excellence under IRDR

Centre	Location and research foci
ICoE- CCOUC	Disaster and Medical Humanitarian Response, Hong Kong of China
ICoE- CI&SP	Critical Infrastructure & Strategic Planning, Germany
ICoE- CR	Community-based Resilience, New Zealand
ICoE- DCE	Disaster and Climatic Extremes, Pakistan
ICoE- DRHBPI	Disaster Resilient Homes, Buildings, and Public Infrastructure, Canada
ICoE- IRDRS	Integrated Research on Disaster Risk Science, Australia
ICoE- NEST	National Society for Earthquake Technology, Nepal
ICoE- RCS	Resilient Communities & Settlements, India
ICoE- REaL	Risk Education and Learning, South Africa
ICoE- RIA	Risk Interpretation and Action, UK
ICoE- RIG-WECEIPHE	Risk Interconnectivity and Governance on WEather/Climate Extremes Impact and Public Health, China

ICoE- SDS IDRR	Spatial Decision Support for Integrated Disaster Risk Reduction, the Netherlands
ICoE- SEADPRI-UKM	Disaster Risk and Climate Extremes, Malaysia
ICoE- Taipei	Capacity building, research, Taipei of China
ICoE- TDDR	Transforming Development and Disaster Risk
ICoE- UR&S	Understanding Risk & Safety, Colombia
ICoE- VaRM	Vulnerability & Resilience Metrics, USA

(4) Strengthen the application of disaster prevention and mitigation engineering information technology. The World Federation of Engineering Organizations (WFEO)[8] Committee on Disaster Risk Management (CDRM) works on the development and strengthening of a worldwide network of scientists and engineers who deal with hazardous natural phenomena. This committee has promoted sustainable and adaptable development based on a science and engineering approach to disaster risk management. This approach is ubiquitous in their work - which ranges from natural disaster-related damage prevention, reduction, and preparedness as well as adaptation to disaster risks under global climate change. The United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) [9] promotes the use of all types of space-based information in all phases of the disaster management cycle, including prevention, preparedness, early warning, response, and reconstruction. UN-SPIDER aims to improve actions to reduce disaster risk and support disaster response operations through knowledge sharing and the strengthening of institutions in the use of space technologies. The Global Risk Assessment Framework (GRAF) [10] aims to improve the understanding and management of current and future risks, identify anomalies and precursor signals, determine the correlations and dependencies of risks, and provide actionable insights, tools, and demonstrations at relevant scales to decision-makers. Finally, the National Research Institute for Earth Science and Disaster Prevention (NIED) [11] in Japan advocates the maximization of research and development results, with the aim of achieving a society in which each member has a high level of disaster prevention capabilities if given technical support. Through cooperation in various fields, NIED has been able to construct a widely used disaster monitoring-forecasting-simulation system, and information exchange and knowledge sharing have taken place to protect people from natural disasters.

(5) Strengthen the construction and coordination of disaster prevention and mitigation monitoring and early warning networks. The missions of the United Nations Educational, Scientific, and Cultural Organization's Disaster Risk Reduction programme (UNESCO DRR) [12] include four themes: networking for knowledge exchange, capacity building, policy recommendations, and multi-disciplinary approach. Following the 2004 Indian Ocean tsunami, the International Oceanographic Commission (IOC) began to coordinate the development of similar warning systems for the Indian Ocean, the Caribbean, and the North-East Atlantic, Mediterranean etc. The International Platform on Earthquake Early Warning Systems (IP-EEWS), launched by UNESCO, seeks to promote and strengthen the creation and development of products which would provide early-

warning of earthquakes for earthquake-prone regions worldwide. UNESCO's efforts here are focused on scientific knowledge exchange, international cooperation, and capacity building. Finally, the World Meteorological Organization (WMO) [13] provides leadership and expertise in international cooperation in the delivery and use of high-quality weather, climate, hydrological and related environmental services for the well-being of societies across the globe. Its strategic plan focuses on improving the accuracy and effectiveness of impact-based forecasting and multi-hazard early warning of high-impact meteorological, hydrological, and related environmental disasters.

WMO's Flood Management Tools Series, which is composed of short technical publications, is intended to provide quick guidance on specific aspects of flood management to practitioners. The publications cover several flood-related issues within the framework of an integrated approach to flood management and provide a concise overview of concepts in flood forecasting and early warning. They are thus of great help to flood managers and practitioners in developing and operating flood forecasting and early warning systems in flood-prone areas.

TSU (Technical Support Unit) for example has used a variety of publications from both the WMO (including the WMO Manual on Flood Forecasting and Warning (WMO No. 1072)) and other external institutions and agencies to develop tools customized to their own needs.
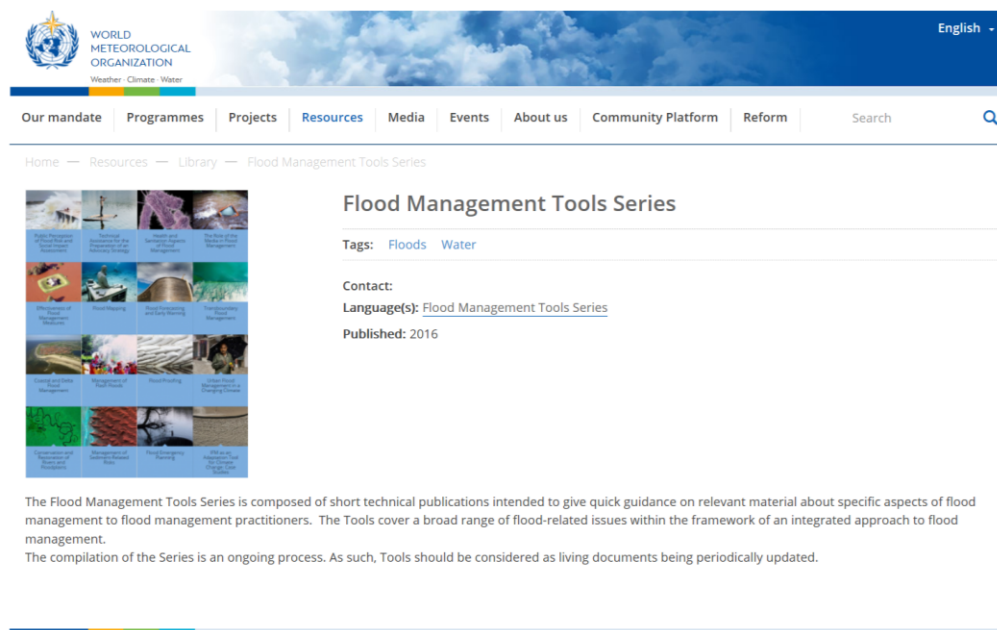
Figure 2. Flood management tools series on WMO website

(6) Focus on data, information, and knowledge services for disaster risk reduction. The historical disaster database EM-DAT [14], first created in 1988 with initial support from the WHO and Belgium, contains essential core data on the occurrence and effects of over 22,000 mass disasters in the world from 1900 to the present day. The database is compiled from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes, and press agencies. The Disaster Risk Reduction

Knowledge Service (DRRKS) of the International Knowledge Centre for Engineering Sciences and Technology (IKCEST) [15] under the auspices of UNESCO also does work in this area. Specifically, it seeks to: provide knowledge services in platforms and technologies, data, education, and knowledge for global and regional disaster risk reduction; accumulate scientific and academic resources such as disaster databases, product libraries, knowledge bases and so forth; and provide relevant services to international organizations, government agencies, scientific research and education institutions, enterprises, and the public over the long-term.

For example, driven by the UNESCO's DRR mission, DRRKS has and continues to construct a knowledge service system for disaster risk reduction with the following core contents: drawing up global standards or best practice on disaster metadata; establishing a global disaster meta-database; integrating cross-disciplinary, cross-field, and cross-regional data and information resources in earthquakes, drought, and flood disasters; pushing forward the database development method and the knowledge information service model for disaster risk reduction; establishing online knowledge application with the support of big data mining and analysis techniques; and conducting education, training, and technology exchange on disaster risk reduction. The platform has been active since 2017 (Figure 3). Since then, DRRKS has established 16 online knowledge applications, including quickly establishing a "Public opinion analysis for COVID-19" in early 2020 in response to the current crisis.

The International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM) [16] aims to serve as the global center of excellence for water hazard and risk management—focusing on data collection, storage, sharing and statistics, risk assessment, monitoring, and prediction of changes in water-related disaster risk. Finally, the International Consortium on Landslides (ICL) [17] integrates geosciences and technology within the appropriate cultural and social contexts to evaluate landslide risk in urban, rural, and developing areas, including cultural and natural heritage sites and contribute to the protection of the natural environment and sites of high societal value.

Figure 3. Homepage of Disaster Risk Reduction Knowledge Service in IKCEST, UNESCO

(7) Strengthen national, regional, and local disaster reduction practices. The International Centre for Integrated Mountain Development (ICIMOD) [18] aims to enable sustainable and resilient mountain development for improved and equitable livelihoods through knowledge and regional cooperation. The Digital Belt and Road (DBAR) [19] promotes international cooperation, making earth observation science, data, technology, and application an indispensable part of meeting the environmental and social challenges and achieving sustainable development goals in its Belt & Road initiative. The China-Pakistan Joint Research Center on Earth Sciences is committed to solving the scientific and technological problems of disaster risk prevention and control in the "China Pakistan Economic Corridor." Moreover, it aims to improve the level of ecological and environmental protection and the efficient and scientific use of natural resources. Finally, the Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM) [20] conducts holistic research on hazards and disasters at national and regional levels and strengthens resource allocation.

 (8) Paradigm shift from pure hazard protection to risk management. Different stakeholders actively provide risk-forward services for disaster prevention and mitigation. The National Platform for Natural Hazards in Switzerland [21] highlights the shift to better

risk management, with examples of impactful services, including building mobile flood protection for buildings along the Rhine at Wallbach, setting up warning systems with triggering alarms in steep areas of the Bis glacier, and the building the Thun relief tunnel. On the private side, insurance companies such as Munich Re Group [22] or the Swiss Re-Insurance Company [23] are innovative and increasingly able to provide insurance for uncertain disasters. Indeed, the Swiss Re-Insurance Company provides global clients with financial services such as risk transfer, risk financing, and asset management.

(9) Promote international cooperation in disaster risk reduction in a variety of ways. The UK's Global Challenges Research Fund [24] focuses on maximizing the use of new knowledge and driving innovation that helps ensure that everyone across the globe has access to food, health, education, equipment, energy, and other resources. The Belmont Forum [25] is a partnership committed to the advancement of transdisciplinary science for disaster risk, reduction, and resilience (DR3). Finally, the World Bank [26] provides low-interest and interest-free loans and grants to developing countries to support investment in education, health, public management, infrastructure, financial and private sector development, agriculture, and environmental and natural resource management. Moreover, it has designed several disaster-management projects with respect to flood control and forest fire prevention.

(10) Train youth and young professionals in the field of disaster prevention and mitigation. Periperi U [27], a partnership of African universities that spans across the continent, is committed to building local disaster risk capacity and has established partnerships with 11 African academic institutions. The IRDR Science Committee has recently recognized Periperi U as an International Centre of Excellence for Risk Education and Learning (ICoE-REaL). In China, the Sichuan University—The Hong Kong Polytechnic University Institute for Disaster Management and Reconstruction [28] is committed to becoming an international exchange center for disaster reduction and reconstruction, an interdisciplinary and interprofessional cooperation platform, and a comprehensive university with a dedication to forward-looking, continuing education. The Asia-Pacific U-INSPIRE Alliance [29] aims to foster Youth and Young professionals as the Generator of Innovation in Science, Engineering, and Technology for Disaster Resilience nationally and globally. Finally, the Disaster Risk Reduction Knowledge Service teams in IKCEAT and DBAR have organized several international training programs for disaster prevention and mitigation, focusing in particular on the topics of knowledge service for DRR and disaster data technology.

3. Further reflections

Although a limited analysis, the above summary helps to see the grouping of roles and functions in DRR already covered by the selected institutions. The landscape of disaster risk is shifting: risk is increasingly characterized not by its scope and the severity of its impact, but rather by its systemic, cascading and transboundary nature, making it highly inter-connected with countries' development process. DRR needs to become even more

cooperative, and gaps in DRR cooperation remain. The following five points suggest areas for improvement.

The first point is regarding the need to establish the notions of development risk and development safety. In essence, disaster risk reduction (DRR) is one of the major development challenges in all societies. It is the other side of the coin of disaster risk. It was not by coincidence that the Sendai Framework for DRR (Sendai Framework) came into being in 2015 in parallel with other prominent UN frameworks of 2030, including the Agenda for Sustainable Development, the Paris Agreement, the Addis Ababa Action Agenda and the New Urban Agenda. The failure to reach the targets of Sendai Framework will impact other UN 2030 frameworks' abilities to reach their respective goals and targets, and vice versa. Such notion can potentially help make clearer the relevance of disaster risk reduction to countries' development processes. Currently, there is still a lack of a development safety framework and guidance beyond risk management. The second point concerns early warning systems. Capacity building for disaster risk assessment and creation and use of early warning systems needs to be systematically across all governance levels, from international to local. Developing countries, in particular for regions and countries that are under fragile trans-boundary hazard conditions, often need to develop more good practices. Thirdly, multidisciplinary cooperation must be further strengthened. Disaster management and risk reduction are cross-disciplinary both in terms of research and practice. More cooperation is needed, especially as to long-term disaster risk evaluation, short-term disaster early warning, and emergency relief. The fourth point is about data sharing, or, to be more exact, the need to remove existing barriers to disaster and risk data sharing. These barriers originate from many domains, including social, political, economic, technical, scientific, and more [30], and need to be addressed in appropriate manners. Finally, the last point addresses knowledge service. Knowledge service needs to go beyond just data and information support for it to provide adequate basis for decision-making and/or policy making. How to employ big data and AI technologies safely and more effectively to obtain more knowledge that may service DRR is a major challenge that will need to be addressed.

Based on the analysis above, and considering the general trends in the implementation of the SFDRR in recent years, the authors propose the following to advance international cooperation among DRR related institutions.

- Strengthen awareness of disaster risk to development safety. Looking at major disasters with diffusion and cascading effects, and properly using those as examples, can be of great help. The current COVID-19 pandemic, which has caused immense global damage in human health, economy and social conditions, and the desert locust plague, which swept through multiple Asian and African nations, are good examples to use.

- Improve disaster risk assessment and early warning systems, and further improve the systems around word for food and water security, urban resilience, and ecological sustainability.

- Provide interdisciplinary and multi-disciplinary scientific guidance for comprehensive disaster reduction.

- Combine science, engineering, and technology to provide support for decisions, policy-making and provision of tangible solutions in DRR.

- Produce more and better products from data, information, and knowledge in disaster risk reduction, including using through the use big data technology and artificial intelligence (such as machine learning, deep learning, artificial networks, and social media mining).

Enhance disaster risk reduction institutions and capacity building, strengthen the construction of disaster risk reduction platforms, promote international centers of excellence in DRR, and build up both the quantity and quality of partnerships, encouraging stakeholders such as organizations, policymakers, scientific research and education institutions, and private entrepreneurs to action.

4. Conclusion

In order to understand the current focus and progress of international and regional institutions for disaster risk reduction, and to provide support for disaster prevention and mitigation strategies for the immediate future, 32 institutions for disaster risk reduction were selected for mapping analysis, using only public information made available on their web-based platforms. Of course, as the mapping does not cover all DRR institutions, the trends noted and changes suggested may not be complete. This is one limitation. Nevertheless, by looking through these selected institutions through a range of perspectives, including but not limited to objectives, missions, products and services, etc., the researchers were able to draw 10 main trends. These trends, which are quite indicative, will be useful for future mapping analyses. In addition, the authors were able to suggest several improvements for future research and work. Finally, in the future, a deeper mapping analysis can be achieved by adding additional relevant agencies and considering any additional research literature.

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Appendix 1

Name	Scope			Type						
	Global	Regional	National	Intergovernmental bodies	Governments	Research institutes	Research programmes	Networks	Founders	Platforms
Asian Disaster Preparedness Center		■		■				■		
Belmond Forum	■								■	
China Association for Disaster Prevention			■					■		
China-Pakistan Joint Research Center on Earth Sciences		■				■				
Disaster Prevention Research Institute of Kyoto University			■			■				
Disaster Risk Reduction Knowledge Service of IKCEST under the auspices of UNESCO	■									■
Emergency Event Database	■									■
Global Alliance of Disaster Research Institutes	■							■		
Global Risk Assessment Framework of UNDRR	■			■						
Institute for Disaster Management and Reconstruction of Sichuan			■			■				

Organization	1	2	3	4	5	6	7	8	9
University-The Hong Kong Polytechnic University			X			X			
Integrated Research on Disaster Risk	X			X			X	X	
International Association for Disaster Risk Reduction	X							X	
International Center for Integrated Mountain Development	X							X	
International Centre for Water Hazard and Risk Management under the auspices of UNESCO	X						X	X	
International Research Institute of Disaster Science of Tohoku University			X			X			
Knowledge-Action Network (KAN) on Emergent Risks and Extreme Event	X			X			X		
National Disaster Management Agency of Grenada			X		X				
National Disaster Reduction Center of China			X		X				
National Platform for Natural Hazards of Switzerland			X		X				
National Research Institute for Earth Science and Disaster Prevention			X			X			

Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), the National University of Malaysia			■			■					
The Digital Belt and Road Program		■					■	■			
The Global Challenges Research Fund of the UK			■							■	
The International Consortium on Landslides (ICL)	■							■			
The World Bank	■			■							
The World Federation of Engineering Organization	■			■							
U-INSPIRE Alliance	■							■			
UNDRR Scientific and Technical Advisory Group (STAG)	■							■			
United Nations Educational, Scientific and Cultural Organization	■			■							
United Nations Office on Disaster Risk Reduction	■			■							
United Nations Platform for Space-based Information for Disaster Management and Emergency Response	■										■
World Meteorological Organization	■			■							