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CONFERENCE REPORT

The 3rd Global Summit of Research Institutes for Disaster Risk Reduction: Expanding the Platform for Bridging Science and Policy Making

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Abstract The Global Alliance of Disaster Research Institutes held its 3rd Global Summit of Research Institutes for Disaster Risk Reduction at the Disaster Prevention Research Institute, Kyoto University, Japan, 19–21 March, 2017. The Global Alliance seeks to contribute to enhancing disaster risk reduction (DRR) and disaster resilience through the collaboration of research organizations around the world. The summit aim was to expand the platform for bridging science and policy making by evaluating the evidence base needed to meet the expected outcomes and actions of the Sendai Framework for Disaster Risk Reduction 2015–2030 and its Science and Technology Roadmap. The summit reflected the international nature of collaborative research and action. A pre-conference questionnaire filled out by Global Alliance members identified 323 research projects that are indicative of current research. These were categorized to support seven parallel discussion sessions related to the Sendai Framework priorities for action. Four discussion sessions focused on research that aims to deepen the understanding of disaster risks. Three cross-cutting sessions focused on research that is aimed at the priorities for action on governance, resilience, and recovery. Discussion summaries were presented

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in plenary sessions in support of outcomes for widely enhancing the science and policy of DRR.

Keywords Disaster risk reduction research · GADRI global summit · Policy · Science

1 Background to the Global Alliance of Disaster Research Institutes (GADRI) and the 3rd Global Summit of Research Institutes for Disaster Risk Reduction (GSRIDRR)

The Global Alliance of Disaster Research Institutes (GADRI) was organized to coordinate disaster research policy and activities. GADRI was established in 2015 as a collaborative platform for engaging discussion, sharing knowledge, and promoting networks on topics related to risk reduction and resilience to disasters. The founding of GADRI was driven by several considerations: (1) a lack of coordination, or communication, among disaster research institutes (DRIs); (2) the need for disaster research policy; and (3) the opportunities and synergies afforded by DRI collaboration. Another impetus was the Sendai Framework for Disaster Risk Reduction 2015–2030 and its call for prioritizing understanding of disaster risks at global and regional levels. The Sendai Framework requires implementers of the framework "to enhance the scientific and technical work on disaster risk reduction and its mobilization through the coordination of existing networks and scientific research institutions at all levels and in all regions" and "to enhance access to and support for innovation and technology, as well as in long-term, multi-hazard and solution-driven research and development in the field of disaster risk management" (UNISDR 2015, p. 16). The alliance concept in the GADRI name encompasses attributes that reach beyond any single network[1] or disciplinary group of institutions; GADRI is a network of networks guided by organizational values for disaster risk reduction (DRR) that are reflected in the GADRI Charter. This function extends to, but is not limited to, principles of institutional union, collective working, association, and cooperative actions, including through the facilitation of relevant conference activities such as the Global Summit of Research Institutes for Disaster Risk Reduction (GSRIDRR). There are currently 130 GADRI member research institutions based in 35 countries that form a General Assembly, of which 11 are geographically distributed Board institutions. The GADRI Secretariat is hosted by Kyoto University who also hosted the 3rd GSRIDRR in March 2017. The objectives of the summit were (GSRIDRR 2017, p. 1):

- To serve as an advocate for key research policy statements that are in line with real, evidence-based disaster research needs.
- To carry out a more detailed assessment of key research challenges and to identify priority research areas.
- To identify pioneering scientific initiatives to effectively reduce the gaps between science and practice in DRR activities.
- To share and build on achievements, and outcomes of past and ongoing GADRI activities addressing research gaps.
- To foster links between local and international organizations and their programs through the GADRI network.

The 2017 summit involved 251 participants from 38 countries within the United Nations, governmental and international organizations, private sector organizations, and educational and research sector institutions with varied backgrounds and disciplinary origins in DRR. For the purpose of this conference summary the terminology used for DRR associated concepts and practices is based on general usage in the English language and as currently agreed by The United Nations member states (UNISDR 2016b).

2 Evaluating Current Research Status and Identifying Future Research Themes

The process of evaluating current research status and identifying future research themes was facilitated by a pre-conference questionnaire through which GADRI members identified a sample of 323 research projects that represent current research. These were then allocated to session themes that reflected the four priority areas of the Sendai Framework. These priority areas are elaborated by expected outcomes of the UNISDR coordinated Science and Technology Road Map (Table 1). The road map was informed by the UNISDR Science and Technology Conference on the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030, held in Geneva, 27–29 January, 2016 (Aitsi-Selmi et al. 2016).

The GADRI summit sought to identify the most important research themes in the four priority areas that can be used to evaluate policies and practices of current research activities and identify gaps in DRR in relation to the Sendai Framework.

2.1 Deepening the Understanding of Disaster Risk

The first priority action theme of understanding disaster risk was addressed by four groups and their discussions are

[1] For an outline comment on current networking in the context of science and technology in disaster risk reduction see Trogrlić et al. (2017).

Table 1 Summary of the expected outcomes of the Science and Technology Road Map to support the implementation of the Sendai Framework. *Source* UNISDR (2016a, p. 3)

Sendai framework priority for action	Science and technology expected outcomes
Understanding disaster risk	Assess and update 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
	Synthesize, produce and disseminate scientific evidence in a timely and accessible manner that responds to the knowledge needs of policy-makers and practitioners
	Ensure that scientific data and information support are used in monitoring and reviewing progress towards disaster risk reduction and resilience building
	Build capacity to ensure that all sectors and countries have access to, understand and can use scientific information for better informed decision-making
Strengthening disaster risk governance to manage disaster risk	Support a stronger involvement and use of science to inform policy- and decision-making within and across all sectors at all levels
Investing in disaster risk reduction for resilience	Provide scientific evidence to enable decision-making of policy options for investment and development planning
Enhancing disaster preparedness for effective response, and to "build back better" in recovery, rehabilitation and reconstruction	Identify and respond to the needs of policy- and decision-makers at all levels for scientific data and information to strengthen preparedness, response and to "Build Back Better" in Recovery, Rehabilitation and Reconstruction to reduce losses and impact on the most vulnerable communities and locations

summarized in the following three subsections. The broadly defined risk groupings are not to be understood as a comprehensive consideration of all disaster risks, but rather as indicative of current research status and opportunities.

2.1.1 Water and Weather Related Risks

The discussion group considered that current research shows that these risks have become a "new normal" of everyday life, with research revealing increasing hazard trends (for example, floods and droughts) and amplified impacts due to increased population exposure, rapid and unplanned urbanization, poor land use, climate change, vulnerable global supply chains, and economic activities. This points to a requirement for extensive scientific innovation and DRR collaboration that reduces uncertainty, for better modeling, early warning, and more cost-effective approaches to hydrological and meteorological risks, both with respect to climate change and with respect to the translation of science and technology into actions. Estimating the edge of uncertainty requires megascale, data-based scientific projects.

The most important future direction of action is to implement the sharing of big data with a new approach—for example, it will not always be necessary to have precise comprehensive data (51% confidence could be acceptable). There is a need to interpret disaster risks in different countries with respect to the Sustainable Development Goals (SDGs) and to be able to better understand early warnings. Research will need to show how data can be translated into usable form for varying planning systems—for example, small island states only need a minimum amount of data, but need to understand the thresholds of safety. There is a need for cost-effective preparedness and response approaches based on evidence-based climate information, forecasts, and models. This requires research that strengthens weather and climate services at the national level. Urban vulnerability assessment methodologies need to take more account of urban social and economic aspects.

2.1.2 Earthquake, Volcano, and other Geohazard Related Risks

The discussion group evaluating earthquake and volcano risks also included compound disaster-related aspects. Progress in broadening out the field emphasizes uncertainty and effects-oriented perspectives across all seismic events (for example, earthquakes, tsunamis, volcanic ash eruptions, and extending to their impact through associated landslides, fires, health, food security, economics, and more). Existing initiatives, such as the Pacific Earthquake Engineering Research Center (PEER) Seismic Performance Observatory (SPO)[2] could indicate a route to a GADRI Global Disaster Effects Portal. The SPO approach draws on

[2] http://peer.berkeley.edu/news/tag/seismic-performance-observatory/.

visualizations, better management techniques, post-earthquake investigation, and archiving. The discussion group emphasized multi-hazard approaches and, drawing on the 2011 Tohoku Earthquake and Tsunami example in particular, drew attention to the need to engage with societal changes in the long periods between major events because they challenge performance-based risk reduction. Future directions could address uncertainty in the data, new methods and techniques, improvements in warnings, and understanding of economic losses (for example, those caused by large eruption impacts on aviation). Further discussion also led to recommendations for the Japan International Cooperation Agency (JICA) and emphasized the need to address urban geohazards through risk assessment and communication.

Another discussion group focused more specifically on geohazards such as landslides and landscape change processes and considered how better understanding of the mechanisms and processes, use of mapping and warnings, and linking of science to society underpinned much of the current research contributions. Multiple examples from across the world show how field research can expand to more complex modeling of geohazard scenarios, translate research into communication with communities and varied stakeholders, and draw on an improved conceptualization of scenarios. Challenges for future research include providing the evidence base sufficient for effective legislation. Research could support decision making for regulations and standards, including for construction of buildings and critical infrastructure. There is an ongoing need for understanding the history of land use and landscape evolution, landform processes, triggering factors, impacts, different scales of analyses, and the application of the right risk education and early warning for local needs, among other more detailed queries.

2.1.3 Social and Human Science Related Risks

The discussion group acknowledged that good work has been done to start to plug what has been a major gap in "human centered" research in the field of disaster risk reduction spanning many areas—for example, with respect to the special needs of different people and communities, the socioeconomic characteristics of risk, local political systems, group dynamics, cultural practices, land use, community disaster vulnerability, and risk perception. The concept of disaster risk has been variedly approached by different disciplines, such as sociology, psychology, anthropology, management, and planning. Emphasis has often been on building capacity to research risks. However, social aspects of DRR will need to become a stronger field to influence policy.

Some of the many recommendations for most important future directions of action included breaking down the disciplinary boundaries of "new science," the application of action research to real life situations, better understanding local needs (such as for communication), and bringing grand theory into direct interaction with practice at different scales. Some specific areas that could be more immediately addressed and strengthened are issues of communication, rethinking of direct and indirect impacts of disaster risk reduction research, making government policies more suitable for civil society, acknowledging the potential fallacy of "expert assessments," understanding of people's varying engagement (particularly generational), and how to better underwrite risks. This needs to continue across different social groups, particularly to identify the special needs of women, children, the disabled and elderly, and how best to address them. Longer-standing research areas identified as the likely most important research for at least the next 10–15 years included understanding community livelihoods as a path to resilience, linking risks and vulnerability with inequality, adaptive planning, all of society inclusion, risk governance (including self-governance systems), the voice of survivors, and the centrality of values and ethical procedures in socially oriented DRR research.

The summit was mindful of the need for the risk reduction agenda to intersect with climate and development related issues and targets. This became more explicit in global policy with the incorporation of national and local DRR measures as Sustainable Development Goal indicators, particularly as part of Goal 1 to reduce poverty, Goal 3 on health and well-being, Goal 11 on cities and human settlements, and Goal 13 on combatting climate change and its impacts (UNESC 2017). A strongly highlighted cross-cutting theme at the summit was the issue of joint natural and technological (Natech) risk accumulation that would need more research to inform regulations, standards, and control measures.

2.2 Enhancing Governance to Manage Disaster Risks

The discussion group acknowledged that the Sendai Framework addresses the necessity of clear vision plans, competence, and guidance and coordination within and across sectors, as well as participation of relevant stakeholders. The concept of governance was further explored, in part guided by the work of the International Risk Governance Council (IRGC), and also considered in the contexts of pre-disaster conditions in impacted locations, emergency response, and recovery. Variance of governance with respect to different types of hazards, geographies, and social systems drives a need for better understanding of

risk governance in locally specific contexts, including legal frameworks, rather than applying "one size fits all" solutions. There is also a need for proactive regional networks—a good example is the European Union Disaster Risk Management Knowledge Centre (DRMKC 2017), which was represented by the Disaster Risk Management Unit of the European Commission, Joint Research Centre (EC-JRC) at the summit.

While there has been progress in national and local policy frameworks, the establishment of agencies for disaster management, understanding mechanisms of hazards, and forms of local engagement, future research directions need to better address science-policy interfaces in disaster risk management. This still requires connecting science with decision making, promoting the evidence base, seeking affordable best practice, and organizing the collection and sharing of data. Dynamic systems of governance for adaptive management have to be understood, while management needs to, among new investments in DRR, build trust and effective communication. United Nations member states have local and national DRR plans to meet the target of the Sendai framework. These could be supported by better involvement of science and technology research in coordination mechanisms, including the national and local DRR platforms—for example, researchers based in UK research institutions launched the United Kingdom Alliance for Disaster Research (UKADR 2016) with this goal as an objective.

2.3 Disaster Risk Reduction for Resilience

The discussion group acknowledged progress in some common areas and directions surrounding "resilience," spanning for example research on infrastructure, risk analysis, resiliency as a process, social adaptability, local contexts, and ecosystems. The group also considered a number of significant knowledge gaps and methodological issues in the current research status that still impede effective DRR for resilience, for example the lack of a taxonomy of loss, data for disaster effects models, and measures of DRR effectiveness.

Moving forward, research could progress with multidimensional indicators, adaptable planning, increased exposure through integrated development strategies, local group-centered solution building (including, for example, school children), community cultures, better linking of building codes to societal needs, and better knowledge transfer. High priority areas are risk communication that communicates the vulnerability and capacity of society to engage with risk management, the knowledge of what could happen, and the better application of insurance. This led to the identification of important subgroups for implementation or risk reduction, tasks for public awareness and education efforts, and the need for laws and regulations that improve resilience.

2.4 Effective Response to Disaster Recovery and Build Back Better

The discussion group considered the state of science with respect to the disaster response mode to be directly related to pre-disaster resilience and that many of the well-published ideas about resilience also relate to the concept of restorative building back and ongoing development possibilities. It was acknowledged that the basic ideas driving build back better were well established in that those affected by, and usually those managing disaster recovery, aspire to achieve greater safety, where possible with better standards of living than previously—research to show the true mechanisms, barriers, and progress in this area is very much needed, however. Innovative research could be promoted in the insurance sector, particularly in developing regions. Despite the increasing number of studied disasters, research needs to identify solutions to recovery activities that currently remain inefficient and poorly managed. Restoration of damaged physical, social, economic, and environmental assets is a complicated and drawn-out process. Build back better therefore demands research based on understanding and action that is more holistic in nature, oriented towards the restoration of functional systems in addition to the restoration of assets. Research priorities identified included the need to examine all recovery-oriented studies to come up with testable and more comprehensive procedures based on ongoing DRR.

3 Future Directions of Disaster Risk Reduction Research and the Resolution of the 3rd Global Summit of Research Institutes for Disaster Risk Reduction

Several of the discussion groups emphasized the need to create GADRI forums, archives, and database systems for sharing information and experience through sub-communities, portals, and other communication networks. What is eventually needed is an institutional map of progress in DRR, and to support this GADRI based on its membership. This will create a prospectus that includes DRR research institutions by subject.

An overarching message that came out of the summit was the need to better recognize the new subject area of DRR across the educational system, in tandem with an ever strengthened paradigm of prevention. This reflects back effectively to the alliance concept as applied to cooperative science and technology DRR networks. The broad-based shifting of approach required by DRR needs to be reflected

in an ongoing learning and action process. Rather than notions of producing research excellence in isolated competitive framings, a truly effective process of transformation will require engaged processes of research capable of promoting learning and action across the field of DRR. This is already recognized as a matter requiring many different types of knowledge. The approach is also central to a pathway along which some delegates were considering a form of "superresilience" through building societal and institutional integrity, well-being, and a quality of life that would offset future disaster risk.

The summit produced the following overarching Resolution:

Resolution of the 3rd Global Summit of Research Institutes for Disaster Risk Reduction: Expanding the Platform for Bridging Science and Policy Making

1. Representatives from member institutions of the Global Alliance of Disaster Research Institutes (GADRI) and other participants met for the 3rd Global Summit on 19–21 March 2017 at the Disaster Prevention Research Institute, Kyoto University in Uji, Kyoto, Japan.
2. Recognizing the need for continuing and improving international efforts in disaster risk reduction, GADRI will strive to:
   - Facilitate coordination among research institutes;
   - Improve communication and engagement among trans-disciplinary groups and different communities that include researchers, practitioners, educators, media, and policymakers;
   - Promote priorities and directions that will make disaster reduction efforts more effective.
3. In order to promote more open communication and better sharing of research results and opportunities, GADRI will work towards improving networking among member and other institutes and encourage collaborative international research. Collection and integration of big data sets, along with facilitating their use through innovative database systems, are an important part of risk reduction studies.
4. GADRI will contribute to timely dissemination of research results and programmatic priorities related to disaster risk reduction, through publication of books, online communications, contributions to research journals, and other efforts in knowledge management.
5. For education and capacity building efforts, GADRI will promote the new interdisciplinary field of disaster risk reduction. GADRI encourages increased international participation of young researchers and practitioners in all activities.
6. GADRI will strongly contribute to the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 and its Science and Technology Roadmap. In support of the Sendai Framework, discussions at the Summit identified current research gaps and other areas where significantly more efforts are needed to achieve the goals of disaster reduction programs. Topics sit within the four Sendai Framework priorities of action themes of Understanding, Governance, Resilience, and Recovery in order to achieve the expected outcomes and actions for the delivery of the Sendai Framework. There is a need to identify priorities for research, implementation, education, and policy making in disaster risk reduction as an ongoing process.
7. The participants thank the Disaster Prevention Research Institute for hosting the 3rd Global Summit and recognize the support from Kyoto University and other sponsors.

Information for institutions wishing to join GADRI can be found at: http://gadri.net/members/membership/.

GADRI is also represented at the UNISDR Global Platform for Disaster Risk Reduction (22–26 May 2017, Cancun, Mexico) and the UNISDR Global Forum on Science and Technology Meeting (22–24 November 2017, Tokyo).

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