Concept of Periodic Synthesis Report

There is no lack of scientific knowledge, but it is fragmented and not easily accessible to policy makers and practitioners. The Sendai Science and Technology Roadmap calls for action to “Synthesize, produce and disseminate scientific evidence in a timely and accessible manner that responds to the knowledge needs of policy-makers and practitioners” (Expected Outcome 1.2).

Recommendations

1. Summarize the current status of science and technology in disaster risk reduction, as well as status of DRR in higher education. Publish this as a periodic synthesis report preferably during the Global Platform.

2. In the synthesis report, review three aspects of science and technology in DRR: 1) incorporation of science and technology by policy makers and practitioners, 2) priorities for investment in science and technology in DRR, and 3) impact of science and technology on people. Specific indicators would be developed under these three major aspects, and global/ regional/ national level analysis would be made. The indicators would be linked to SFDRR four priorities, seven targets and 38 indicators.

3. In the synthesis report, highlight the need for holistic approach, integrating all scientific branches (social, natural and applied sciences). Strengthen collaboration between “cognizing” science and “designing” science in existing disciplines in disaster risk reduction.

4. Identify gaps and opportunities in scientific knowledge for future research funding, as well in education curricula for increasing awareness of disaster risk reduction, which will eventually contribute to sustainable development.

5. Consider all aspects of disaster risk reduction, including vulnerability, resilience (systemic view), climate change and population dynamics (future risk) and underlying drivers.

6. Address all phases of the disaster cycle, including prevention, early warning, preparedness and response and recovery (Build Back Better) to promote increased resilience in disaster risk reduction.

7. Build on previous efforts, including from IRDR, IPCC, Disaster Risk Management Knowledge Centre, etc.
**Background and key directions**

Adaptation to climate change and reduction of disaster risks are major societal challenges to be addressed in order for human societies to develop sustainably. Science and technology are expected to play a leading role in tackling these challenges.

Science and technology for disaster risk reduction as a branch of academics has two aspects: one is the aspect of “cognizing” science that studies what it is and the other is the aspect of “designing” science that studies what it should be. The aspect of designing science further divided into two subcategories: “development” science that focuses the development of engineering approaches and legal systems for disaster risk reduction and “dissemination” science that focuses on the dissemination of developed measures for public use. For science and technology for disaster risk reduction to be effective in solving social issues, close collaboration between cognizing science and designing science, i.e., science of development and dissemination is essential.

To promote science and technology for society, it is necessary to find what society sees as problems in disaster risk reduction and how society wants to cope with them. Once solutions are presented but cannot be implemented easily, it is also important to find out what prevents them from implementation. To take all these steps, research on foresight, especially linking demand driven innovation becomes important. A group of experts in this area are nurtured to take the lead in facilitating discovery of social expectation in the field of disaster research.

Science and technology in disaster risk reduction is an interdisciplinary branch of academics involving science, engineering, information technology, social sciences, behavioral science, and health science and humanities. It is also a practical science aiming at the achievement of a specific goal of disaster risk reduction. Because of this unique nature, the “consilience” of knowledge and wisdom in disaster risk reduction is essential to strengthen science and technology in this area. The Science Council of Japan defines the consilience of knowledge and wisdom as: the creation of a universal system of knowledge and wisdom by establishing the compatibility of knowledge and wisdom based on common concepts, approaches and structures extracted from different disciplines. Applying this to science and technology in disaster risk reduction and common concepts, approaches and structures should be extracted from existing disciplines involving in disaster risk reduction.
Explanation of recommendations

1. Summarize the current status of science and technology in disaster risk reduction, as well as status of DRR in higher education. Publish this as a periodic synthesis report preferably during the Global Platform.

2. In the synthesis report, review three aspects of science and technology in DRR: 1) incorporation of science and technology by policy makers and practitioners, 2) priorities for investment in science and technology in DRR, and 3) impact of science and technology on people. Specific indicators would be developed under these three major aspects, and global/regional/national level analysis would be made. The indicators would be linked to SFDRR four priorities, seven targets and 38 indicators.

Why do we need synthesis reports? The Priority 1 of Sendai Framework highlights that policies and practices for DRM should be based on an understanding of disaster risk in all its dimensions as well as strongly stresses the effort of leveraging the knowledge for the purpose of pre-disaster risk assessment, for prevention and mitigation and for the development and implementation of appropriate preparedness and effective response measures to disasters.

What are the periodic synthesis reports? In response to Priority 1 the periodic synthesis reports aim to bridge science ad policy as well as operation community. It provides reviews of scientific solutions as well as their practical in various areas of DRM. The reviews of the scientific evidence base are summaries of the recent advances or outcomes of the scientific and technological research activities in the fields relevant to thematic areas of work under the Sendai Framework at global, international/regional and national levels. The process of the preparation of the synthesis reports promotes as well as requires the interdisciplinary and trans-disciplinary way of working together across different scientific branches. The information should be presented in a clear and straightforward manner to reach decision makers in policy and operational community globally in order to strengthen disaster risk governance to manage disaster risk at national and local level.

The important aspect to be considered at the Science Forum on Resilience: However, the effects of any communication of risk knowledge as well as consilience of scientific knowledge and wisdom are strongly sensitive to risk perception and capacities that are shaped through current state of local and indigenous knowledge developed by communities through the history of hazard events exposed to and has become the basis for local-level decision-making. The Science Forum on Resilience is an opportunity to explore the option to present the modular regional approach in production of Periodic Synthesis Reports as an alternative to global approach. This is the way to address the specific geopolitical and cultural context and related challenges of DRR strategies with sufficient level of detail and provide best-fit scientific solutions to strengthen the resilience of the societies in the
3. In the synthesis report, highlight the need for holistic approach, integrating all scientific branches (social, natural and applied sciences). Strengthen collaboration between “cognizing” science and “designing” science in existing disciplines in disaster risk reduction.

The advancement of science and technology in disaster risk reduction, which is both interdisciplinary and practical, requires deeper understanding of disaster risk, and development and dissemination of effective measures. These three should be closely collaborated with one another.

4. Identify gaps and opportunities in scientific knowledge for future research funding, as well in education curricula for increasing awareness of disaster risk reduction, which will eventually contribute to sustainable development.

Science and technology for disaster risk reduction as a social issue should start its research with the discovery of social expectations. To this end, it should be fostered specifically for the establishment of research opportunity and human resources on the discovery of social expectations.

5. Consider all aspects of disaster risk reduction, including vulnerability, resilience (systemic view), climate change and population dynamics (future risk) and underlying drivers.

Despite progress in disaster research, disaster damage has been increasing in both developed and developing countries. Moreover, due to climate change, risks that may lead to new types of disaster have also been increasing. All these suggest that disasters can occur and cause serious damage even when proper prediction is performed and necessary measures are taken to prevent as much damage as possible. Given this possibility, all stakeholders should join the effort to use all available measures to minimize the impact of disaster damage and recovery from it swiftly. It is this capability of a society that is called resilience. Resilience is the most comprehensive concept in disaster risk reduction, and thus the enhancement of resilience should be selected as the common structure in the promotion of science and technology in disaster risk reduction.

6. Address all phases of the disaster cycle, including prevention, early warning, preparedness and response and recovery (Build Back Better) to promote increased resilience in disaster risk reduction.

The Council for Science, Technology and Innovation of Japan proposes prediction, prevention and response as the key concepts of resilience. Since the enhancement of resilience should be the common structure for disaster risk reduction, these key concepts should be the common concepts in
promoting the integration of knowledge and wisdom.

7. **Build on previous efforts, including from IRDR, IPCC, Disaster Risk Management Knowledge Centre, etc.**

Special attention should be given to previous efforts of summarizing science. Work of Intergovernmental Panel on Climate Change (IPCC), Integrated Research for Disaster Reduction (IRDR) as well as the Disaster Risk Management Knowledge Centre (DRMKC). One example of science synthesis report is Asia Science Technology Status Report, published in the First Asian Science Technology Conference on DRR (ASTCDRR), hosted by Government of Thailand and UN ISDR in August 2017, which compiles data from 11 Asian countries, based on specific sets of indicators. Forty-two cases of application of science technology addressing different SFDRR priority areas are highlighted in the report. The other example of science synthesis answering to the Sendai Roadmap for Science is the report of the DRMKC “Science for disaster risk management 2017: knowing better and losing less”, launched at the 2017 Global Platform. It covers the main topics in understanding disaster risk as well as addresses the specific geopolitical and cultural context and related challenges of DRR strategies to strengthen the society’s resilience in Europe. It is the result of a complex process of science synthesis with 272 contributors from 172 organizations, spanning scientists, policy makers and practitioners, to produce a coherent book covering all hazards, all actors and all sectors. Although limited to mostly European contributors, much of the process and lessons learnt from the endeavor (as well as the content) are directly useful for a global, UNISDR-driven process. In 2008, the Integrated Research for Disaster Reduction, a joint initiative by the International Council for Science (ICSU), the International Students and Scholars Services (ISSS) and UNISDR, proposed the Forensic Investigations of Disasters (FORIN), the Risk Interpretation and Action (RIA) and the Disaster Loss Data (DATA) as key methods to facilitate science and technology in disaster risk reduction.