



# Participatory Risk Governance for Reducing Disaster and Societal Risks: Collaborative Knowledge Production and Implementation

Norio Okada<sup>1</sup> · Ilan Chabay<sup>2</sup> · Ortwin Renn<sup>2</sup>

© The Author(s) 2018

**Abstract** The background, purpose, and design of this special section are briefly explained in this introductory article. Three aspects emerged from the articles in this special section and are highlighted to provide a frame of reference for the reader: (1) a paradigm shift towards adaptive and integrative disaster risk governance; (2) a framework that situates adaptive and integrative risk governance in the context of transformation toward sustainability; and (3) the introduction of “implementation science” as a concept, method, and emerging field that brings natural and social sciences, engineering, and humanities jointly to bear in risk mitigation and adaptation.

**Keywords** Adaptive risk governance · Implementation science · Participatory risk governance · Societal risk factors · Sustainability transformation

## 1 The Background, Purpose, and Structure of This Special Section

How can we make progress in developing strategies for coping with growing impacts of natural hazard-induced disaster risks and other emerging societal risks in a rapidly changing world? What should be the roles and mission for scientists?

---

✉ Norio Okada  
kyotookanori@gmail.com

<sup>1</sup> Institute of Disaster Area Revitalization, Regrowth and Governance, Kwansei Gakuin University, Nishinomiya City 662-0891, Japan

<sup>2</sup> Institute for Advanced Sustainability Studies (IASS), 14467 Potsdam, Germany

In order to discuss such challenging issues, a small workshop was organized on 30 August 2017 at the Institute for Advanced Sustainability Study (IASS) in Potsdam, Germany. The meeting was intended as a mutual learning opportunity through exchange of knowledge and experiences. It brought together scientists and practitioners from the International Society for Integrated Disaster Risk Management (IDRiM), IASS, and other organizations in Europe.

The workshop addressed risk governance for a sustainable society with a view to extending and enhancing the mission and scope of integrated disaster risk management and governance. This special section outlines the synergistic research work that addresses “Participatory Risk Governance for Reducing Disaster and Societal Risks: Collaborative Knowledge Production and Implementation,” which was discussed and developed from the workshop. This effort comprises the following seven articles:

- (1) Introduction to the special section by Norio Okada, Ilan Chabay, and Ortwin Renn;
- (2) Risk Governance: Application to Urban Challenges by Ortwin Renn, Andreas Klinke, and Pia-Johanna Schweizer;
- (3) Distributional Considerations for Transboundary Risk Governance of Environmental Threats by Adam Rose;
- (4) Adaptive Process for SMART Community Governance under Persistent Disruptive Risks—The Case of Chizu, Japan by Norio Okada;
- (5) Taking Time, Sharing Spaces: Adaptive Risk Governance Processes in Rural Japan by Ilan Chabay;
- (6) The Difficult Path from Perception to Precautionary Action—Participatory Modeling as a Practical Tool

to Overcome the Risk Perception Paradox in Flood Preparedness by Gisela Wachinger, Patrick Keilholz, and Coral O'Brian; and

- (7) *Advancing the Disaster and Development Paradigm* by Andrew E. Collins.

After the introduction, article #2 introduces a comprehensive conceptual and methodological approach to risk governance based on the framework of the International Risk Governance Council. Article #3 picks up some of the challenges that the framework addresses and focusses on methods of integrating formal analysis of equity and policy making. The article includes a model for making this integration work. Articles #4, #5, and #6 place their emphasis on practical implementation of these conceptual requirements and develop field-based research approaches for participatory disaster risk governance that could lead to a more sustainable society. Two of the three articles, #4 and #5, focus on the same area and analyze the community case of Chizu, Tottori, Japan from different perspectives. In contrast, article #6 looks at a case study in Europe: it discusses risk perception, stakeholder involvement, and willingness to act in the case of flooding by the Danube River in Germany. Article #7 refers back to the conceptual mission of the special section: to show the new challenges of disaster management in the twenty-first century and develop new governance models to cope with them in the light of sustainable development. It provides a conceptual attempt to balance disaster management with sustainable development.

We want to highlight the following three points that are seen as key concepts running through these articles:

- (1) A paradigm shift toward integrated disaster risk management (as proposed by the IDRiM society);
- (2) A comprehensive framework for adaptive and integrative risk governance as a fundamental prerequisite for transformation to sustainable societies; and
- (3) Implementation science for bringing a comprehensive mix of natural and social science, engineering, and humanities to bear on risk governance issues.

We explore each of the three viewpoints below.

## 2 Paradigm Shift Toward Integrated Disaster Risk Management: Japan's Experiences

Table 1 contrasts the approaches before and after a cataclysmic event, the Great Hanshin-Awaji Earthquake that hit the metropolis of Kobe in 1995. As a result, the current approach stresses strategies that are proactive, anticipatory, precautionary, adaptive, participatory, and inclusive (Chennat and Okada 2007). The rationale is that

governments in Japan were of relatively little help immediately after a high-impact disaster. Lives in peril have been saved more by the actions of individuals and community residents than by official governmental first responders. Since then Japan has experienced a series of large earthquakes, floods, and other disasters among which the 11 March 2011 Eastern Japan Earthquake and Tsunami was very special, and caused the “unexpected accident” in the nuclear power plants in Fukushima. This disaster provided valuable lessons to add one more important dimension to integrated disaster risk management, that is, “to think the unthinkable” and “to govern systemic risks.” Systemic risks occur when a hazard will not only lead to negative effects in parts of the system, but also to failure of the system as a whole or trigger damages in functionally connected systems (Kaufman and Scott 2003, p. 372). How to recover and then restore innumerable village communities that were devastated by earthquake and tsunami also became an extremely urgent comprehensive policy issue related to integrated disaster risk management, as well as to the sustainable development of communities. For this, see also UNISDR (2017). This approach is in line with what IDRiM and other similar initiatives have undertaken, such as Integrated Research on Disaster Risk (IRDR 2015).

In this special section we highlight a bottom-up, participatory approach. This approach is not yet as well studied as a more top-down approach primarily conducted by the governments. The daunting challenge of mega disasters calls for even more participatory governance.

## 3 A Comprehensive Framework for Adaptive and Integrative Risk Governance as a Fundamental Component for Transformation to Sustainable Societies

The existential imperative—to address successfully the daunting challenge of enabling and effecting societal transformations to sustainable patterns of living at multiple temporal and spatial scales—is embodied in the Sustainability Development Goals (SDGs) advocated by the United Nations (2015). The SDGs set forth a complex set of 17 goals and 169 subsidiary objectives. At the same time, the adoption of the complex, interdependent goals and objectives raises awareness of the tremendous risk that failure to facilitate and guide transformation could have on human societies. Failure to understand and find viable approaches to transformations at all scales—global to local—clearly poses a daunting set of systemic risks to humanity (Renn 2016; Sharpe et al. 2016; Nanz et al. 2017; Webb et al. 2018). The approaches discussed in this special section suggest significant steps to address aspects of these risks through the concepts, tools and methods, practices, and

**Table 1** Perspective shift toward integrated disaster risk management from the 1995 Hanshin-Awaji Earthquake to the 2011 Eastern Japan Earthquake disaster (see Okada 2006, 2012)

Twentieth century	Twenty first century
Reactive	More proactive
Emergency and crisis management	More risk mitigation + preparedness approach
Narrowly-focused, sectoral countermeasures	Comprehensive management system
Predetermined planning	Adaptive planning and response
Top-down approaches	Participatory, bottom-up processes
	NOTE: Points below largely arose from critical lessons following the Eastern Japan Earthquake (Fukushima) disaster in March 2011
Limited experiential cases used for planning	Creatively-imagined worst-case scenarios with survivability-critical states identified
	Stress on governance, rather than management
	Governance of mega disasters and systemic risks at multiple spatial scales
	Governance of “natech” (linked natural and technological) disasters
	Build Back Better (even before the event)

research programs of adaptive and participatory risk governance.

#### 4 Implementation Science for Bringing a Comprehensive Mix of Natural and Social Science, Engineering, and Humanities to Bear on Risk Governance Issues

This special section of IJDRS highlights research on risk governance using a variety of approaches in diverse contexts. The articles describe conceptual frames, methods, and approaches to adaptive risk governance and present evidence in the context of each article for the importance of open and transparent engagement with stakeholders.<sup>1</sup> These articles, as well as others, strongly indicate that to be adaptive and effective, risk governance for practical and normative reasons (for example, fairness and social justice) must be attuned not only to physical, technical, and ecological conditions, but crucially also to the relevant societal context. That is, how is adaptive risk governance addressed in relation to the needs and well-being of communities? This raises questions of how scientific research, both conceptual and empirical, can be implemented in ways that best serve the needs of the communities at risk.

This requires more than applied science that generally seeks to achieve a singular or “optimal” engineered solution to a technically-defined problem in a technocratic

process. It requires rather a societally-engaged process that can bridge gaps between scientific and engineering knowledge, the capability and resources available to those affected and responsible, and societal needs. Thus, the term “implementation science”—referencing the original Latin meaning of *in + plere*: to fill (a gap)—is proposed as more appropriate in many cases than “applied science” to adaptive risk governance. It denotes a sustained, adaptive, and synergetic coproduction of knowledge and codesign of contextually-appropriate solutions. In the varied contexts discussed in the articles in this special section—rural, urban, developmental, transboundary—the importance of engaging with and incorporating representatives of an inclusive spectrum of social perspectives is highlighted as central to the processes of adaptive risk governance. This is closely related to the concept of transdisciplinary research with the added emphasis on coproduction of solutions (Caniglia et al. 2017). Implementation science is then a methodological framework for implementing transdisciplinary and transformative research.

The concept of implementation science incorporates three essential components. One is the recognition that a substantial amount of time is required to build community capacity and to achieve extended, contextualized knowledge coproduction. The second is a codesign process that fosters creative synergies between capabilities and knowledge on a level playing field (that is, fair and transparent conditions) for stakeholders, who have differing resources of time, expertise, power, and forms of knowledge. The third is finding or establishing an open, accessible venue or platform that serves as a common ground for dialogues in which shared visions of desirable future conditions, and

<sup>1</sup> Stakeholders are those who are affected by decisions and actions and those who influence the decisions and actions in the relevant context. Standing alongside the stakeholders are the researchers and facilitators who should be neutral in regard to the issues, yet are not uninvested or disinterested in the outcomes.

innovative, practical solutions to realize those visions, can be developed.

The articles in this special section serve well to illustrate several aspects of implementation science. Ortwin Renn, Andreas Klinke, and Pia-Johanna Schweizer point out the importance of models in addressing risk in terms of complexity, uncertainty, and ambiguity. Models are also central to economic arguments for policies to address inclusive transboundary environmental risk governance, as Adam Rose discusses. He addresses distributional information that is needed to evaluate the equity of policies and to provide information for public participation.

The article by Norio Okada demonstrates how to adaptively design participatory governance in the real rural town of Chizu, Tottori, Japan. In order to conduct decade-long research work to study this unique adaptive governance named the Zero-to-One Movement, it also needs to set up a special platform called the Case Station-Field Campus. He also proposes SMART (Small/Survivable, Modest/Multiple, Anticipatory/Adaptive, Risk-concerned/Responsive, and Transformative) governance under persistent disruptive risks.

A different type of model and method of use is discussed in the article by Ilan Chabay, in which the use of the Yonmenkaigi System Method of Norio Okada is an example of a process-focused qualitative model that is effectively and ethically implemented. The goal is to facilitate open dialogues on adaptive risk governance among community stakeholders. Notably, both Okada and Chabay propose complementary approaches to study and document much of the same implementation process under way in the town of Chizu, Tottori, Japan. The former's perspective is that of someone who has long been engaged in the study area, whereas the latter offers an outsider's viewpoint.

Gisela Wachinger, Patrick Keilholz, and Coral O'Brian provide another case example that implements a participatory governance approach. The major concern is to overcome the risk perception paradox in flood preparedness at the Danube River in Germany. From the viewpoint of the effectiveness of using models and tools for risk communication, the participatory modeling approach deserves special attention. Their ongoing challenge includes the adaptive process of setting up effective participatory platforms.

The article by Andrew Collins is intended to contribute to an ever-evolving paradigm of disaster and development risk that requires impetus from personal and collective values beyond calculations of disaster and development. The analysis proposes some consequent thematic fronts for increased investment. These include investing in early buildup of well-being before a disaster, better living with

uncertainty, and overcoming the barriers to desired disaster and development outcomes.

It is noted that all the articles that are included in this special section are interconnected and interwoven. For instance, the articles by Okada and Chabay are also related to Collins' approach, which is people centered and brings marginalized, high-risk communities in Africa and Asia to the attention of national and international audiences in a compelling fashion. His message also connects with the more visible participatory polder modeling work reported by Wachinger et al.

## 5 Conclusion

The background, purpose, and design of this special section have been briefly outlined in this introductory article. Three aspects have been highlighted to provide one possible frame of reference for the reader to map out the whole set of articles included in this section. It is also hoped that the proposed framework, though limited, will help the reader identify themes and approaches of relevance, as well as suggest further research efforts.

The application of disaster risk management and governance approaches has variously formed a part of integrated disaster and societal development studies over decades. Major disaster events immediately impact societies in ways dependent on perceptual, cultural, and contextual factors. At the same time, longer-term post-disaster recovery and improved human resilience affect pathways to sustainable development through environmental, societal, and economic factors. The articles in this section illustrate the value and usefulness of concepts, approaches, and models that address disaster risk governance challenges in a larger context of transformation to sustainability and make a case for further research and action.

**Open Access** This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

## References

- Caniglia, G., N. Schöpke, D.J. Lang, D.J. Abson, C. Luederitz, A. Wiek, M. Laubichler, F. Gralla, and H. von Wehrden. 2017. Experiments and evidence in sustainability science: A typology. *Journal of Cleaner Production* 169: 39–47.
- Chennat, G., and N. Okada. 2007. Designing new institutions for implementing integrated disaster risk management: Key elements and future directions. *Disasters* 31(4): 353–372.

- IRDR (Integrated Research on Disaster Risk). 2015. The Forin Project. Beijing, China. <http://www.irdrinternational.org/wp-content/uploads/2015/03/FORIN-Case-Studies-Booklet-WEB-13-MB.pdf>. Accessed 23 Nov 2018.
- Kaufman, G., and K.E. Scott. 2003. What is systemic risk, and do bank regulators retard or contribute to it? *The Independent Review* 7(3): 371–391.
- Nanz, P., O. Renn, and M.G. Lawrence. 2017. The transdisciplinary approach of the Institute for Advanced Sustainability Studies (IASS). Concept and implementation (*Der transdisziplinäre Ansatz des Institute for Advanced Sustainability Studies (IASS): Konzept und Umsetzung*). *GAIA* 26(3): 293–296.
- Okada, N. 2006. Perspective on integrated disaster risk management. In *Introduction to integrated disaster risk management*, ed. Y. Hagihara, N. Okada, and H. Tatano, 9–54. Kyoto: Kyoto University Academic Press (in Japanese).
- Okada, N. 2012. Lessons learned from recent disasters in Japan, and implications for ASEAN countries. Keynote presentation at ASEAN-Japan Meeting, Naha, 26 June 2013.
- Renn, O. 2016. Systemic risks: The new kid on the block. *Environment: Science and Policy for Sustainable Development* 58(2): 26–36.
- Sharpe, B., A. Hodgson, G. Leicester, A. Lyon, and I. Fazey. 2016. Three horizons: A pathways practice for transformation. *Ecology & Society* 21(2): 47.
- United Nations. 2015. Transforming our world: The 2030 agenda for sustainable development. <https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>. Accessed 23 Nov 2018.
- UNISDR (United Nations International Strategy for Disaster Reduction). Annual report 2017. [https://www.unisdr.org/files/58158\\_unisdr2017annualreport.pdf](https://www.unisdr.org/files/58158_unisdr2017annualreport.pdf). Accessed 3 Dec 2018.
- Webb, R., X.M. Bai, M.S. Smith, R. Costanza, D. Griggs, M. Moglia, M. Neuman, P. Newman, et al. 2018. Sustainable urban systems: Co-design and framing for transformation. *Ambio* 47(1): 57–77.