# MULTI-RISK GOVERNANCE: FROM SCIENCE TO POLICY-MAKING

Nadejda KOMENDANTOVA [1,2], Anna SCOLOBIG [3]

Risk governance is a systemic approach to decision and policy-making processes dealing with natural and technological risks, based on principles such as cooperation, participation, and effective risk management. It pertains to formal institutions empowered to enforce compliance, as well as informal arrangements, that stakeholders either have agreed to or perceive to be in their interest (Renn, 2008). As governance, in general, refers to the processes of decision making and implementation, risk governance applies the principles of good or sound identification, assessment, management and communication of risks (IRGC, 2011). Multi-risk governance, the concept at the core of this paper, focuses not only on single (individual) hazards and risks, but on multiple hazards and their associated risks, while being especially aware of the the effects of their possible interactions at all levels of the disaster assessment scheme. More precisely, multi-risk concerns events threatening the same elements at risk without chronological coincidence, or events occurring at the same time or shortly following each other, either independently, or because they are dependent upon one another, or because they are caused by the same triggering event or hazard (EU, 2000; EU 2007; EC 2010; SEC 2010).

The implementation of multi-risk governance and its actual use in decision-making processes in practice is still an open question. For example, the European Union Internal Security Strategy promotes the establishment of a coherent risk management policy, which should improve the link between risk (and multi-risk) assessment and decision-making (COM, 2010, p. 673). The scientific evidence shows that our knowledge about the assessment of multi-risk is increasing. Yet, the understanding of how existing and new knowledge can be used by practitioners within the framework of existing governance systems has only undergone preliminary development. Greater effort should be made in order to include knowledge about institutional settings and individual patters of decision-making, such as cognitive biases influencing perceptions of probabilities for multiple risks from different stakeholders. Also, more attention should also be devoted to the process of communication between science and policy-making in order to address the challenges which decision-makers are facing to reduce multiple risks.

In order to better address these challenges, two key points need to be taken into account. First, the perceptions of the probabilities and the following up strategies on risk mitigation are influenced by cognition from stakeholders, by how probable or destructive they assume the risk is in comparison to other risks. As scientific evidence shows, this process is often influenced by behavioural biases, from which the loss aversion, availability heuristics and limited worry are the most frequent ones (Komendantova et al., 2013). The process of decision-making is defined not only by the individual cognition of different stakeholders and institutional partners, in which the decision takes place, but also by the process of risk communication between science and policy.

[1] Dr., Risk, Policy and Vulnerability Program, International Institute for Applied Systems Analysis (IIASA), Laxenburg, E-mail: komendan@iiasa.ac.at

[2] Institute for Environmental Decisions (ETH) Zurich, Zurich, Switzerland, Email: nadejda.komendantova@usys.ethz.ch

[3] Dr., Institute for Environmental Decisions (ETH) Zurich, Zurich, Switzerland, Email: anna.scolobig@usys.ethz.ch

Second, to be able to understand how scientific knowledge on multi-risk can contribute to decreasing the losses from natural disasters, we need to examine the frameworks employed in the field of risk management as well as interactions between science and practice in terms of knowledge transfer and the applicability of results (Kappes et al., 2011). Successful risk mitigation strategies demand appropriate mechanisms to communicate and to transfer risk knowledge to different stakeholders. The communication process from science to policy-making could be facilitated through the application of decision-support tools. These tools could be also useful to avoid cognitive biases in individual decision-making. However, to be useful in decision-making, they must respond to the expectations and needs of practitioners and policy-making community. Currently developed tools for multi-risk can be too complex or require too high volumes of data to be useful for making decisions about preparing and planning for multi-risk disaster in a region and optimizing the allocation of resources. They can, however, be somewhat useful for practitioners and very useful for academics to understand the distribution of losses for different sectors and to compare risk scenarios (Komendantova et al., 2014).

Our recommendations based on interactions with stakeholders (Mrzyglocki, 2013) are that the multi-risk decision-support tools can be used for the communication of multi-risk parameters to different stakeholders and therefore for the correction of cognitive biases towards perceptions of probabilities of multiple risks. They can  also be used for the communication of results from science to policy-making, especially by applying visual presentations of what might happen in case of a multi-hazard disaster (Mignan et al, 2013).

## REFERENCES


COM. (2010). The EU Internal Security Strategy in Action: five steps towards a more secure Europe. 673 Final, Communication from the Commission to the European Parliament and the Council. Brussels 22.11.

EU (European Union). (2000). Directive 2000/60/EC establishing a framework for Community action in the field of water policy. *Official Journal of the European Union* L 327, 1-73.

EU (European Union). (2007). Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. *Official Journal of the European Union* L288, 27-34.

European Commission. (2010). Commission staff working paper: Risk assessment and mapping guidelines for disaster management. Technical report, European Commission, Brussels.

IRGC. (2011). Concept note: Improving the management of emerging risks: Risks from new technologies, system interactions, and unforeseen or changing circumstances. International Risk Governance Council (IRGC), Geneva.

Kappes, M. S., Keiler, M., Elverfeldt, von K., & Glade, T, (2012). Challenges of analyzing multi-hazard risk: A review. *Natural Hazards*, 64(2), 1925-1958. doi: 10.1007/s11069-012-0294-2.

Komendantova N, Mrzyglocki R, Mignan A, Khazai B, Wenzel F, Patt A, Fleming K (2014). Multi-hazard and multi-risk decision support tools as a part of participatory risk governance: Feedback from civil protection stakeholders. *International Journal of Disaster Risk Reduction*, 8 (2014) 50–67

Komendantova N, van Erp N, van Gelder P, Patt A. (2013). Individual perceptual and cognitive barriers to multi-hazard management. Deliverable 6.2, MATRIX Project (New Multi-Hazard and Multi-Risk Assessment Methods for Europe). MATRIX, Brussels.

Mignan A. D7.2 MATRIX-CITY User Manual, New methodologies for multi-hazard and multi-risk assessment methods for Europe. Deliverable 2013;7(2):78, http://matrix.gpi.kit.edu/downloads/MATRIX-D7.2.pdf.

Mrzyglocki, R., (2013). Contact to National Platforms V. Deliverable D8.12, MATRIX Project (New Multi-Hazard and Multi-Risk Assessment Methods for Europe). MATRIX, Brussels.

Renn, O. (2008). Risk governance: Coping with uncertainty in a complex world. London, UK: Earthscan.

SEC. (2010). Risk Assessment and Mapping Guideline for Disaster Management. A Community approach on the prevention of natural and man-made disasters Commission Staff Working Paper. 2010. Brussels, SEC (2010) 1626 Final.

Scolobig, A., Mechler, R., Komendantova, N., Lui, W., Schröter, D., Patt, A., (forthcoming). The co-production of scientific advice and decision making under uncertainty: lessons from the 2009 L´Aquila earthquake, Italy. *Planet @ risk*, State of the Art Collection category – Working paper section. Accepted in July 2013.