



Press Release

Risk analysis for systemic risks

Advancing Disaster Risk Reduction

Populations are growing in disaster-prone areas around the world. The interaction of natural hazards with physical infrastructure in these regions can trigger devastating chain reactions, harming societies and their technical foundations. What can be done to address these challenges? A team at the Institute for Advanced Sustainability Studies (IASS) has developed a multi-level risk governance concept for natural disasters.

By definition, natural hazards are natural phenomena that have negative effects on humans or the environment. But such phenomena rarely occur in isolation. From Germany's "Flood of the Century" in 2002, to Cyclone Kyrill in 2007, and the spate of forest fires in Brandenburg in 2018 – so-called natural disasters are frequently linked to or triggered by human interventions. In the examples named here, natural hazards interacted with infrastructure and other facilities, further complicating these events.

The interplay of natural hazards with non-natural risks is particularly apparent in the 2011 nuclear disaster in Japan, where an earthquake caused a tsunami to strike a densely populated coastline and the nuclear reactor complex located there. It was this series of events that led to the Fukushima Daiichi nuclear disaster.

Interactions between natural and human-induced disasters are a more recent phenomenon and are driven by the increased settlement of disaster-prone areas and the vulnerability of technological and urban infrastructure to natural hazards, with grave consequences for gas terminals, pipelines, chemical processing plants and other facilities located in affected areas.

Applying the concept of systemic risk to complex natural events

Sometimes natural hazards are influenced or triggered by human interventions, such as climate change. The interaction of natural and non-natural risks results in an extremely complex field of interrelationships: "Addressing this complexity requires a comprehensive approach to risk analysis," explains Pia-Johanna Schweizer, the lead author of the study "Governance of Systemic Risks for Disaster Prevention and Mitigation", which was published in the Global Assessment Report on Disaster Risk Reduction 2019 (GAR19) of the United Nations Office for Disaster Risk Reduction. "The study presents an approach to the appraisal and management of natural hazards and disasters which is underpinned by the concept of

systemic risk", explains Schweizer, who leads a research group on systemic risks at the Institute for Advanced Sustainability Studies in Potsdam.

What are systemic risks?

The authors identify five key characteristics of systemic risks: a high degree of complexity, their transboundary nature, their development is non-linear and includes tipping points, long periods of stability followed by a rapid collapse of the system once a tipping point has been reached, and they are frequently underestimated. All of these qualities can be observed in the interaction of natural hazards with man-made infrastructure.

Evaluation criteria for effective risk governance

The authors recommend the following approach to address the systemic risks posed by natural hazards:

1. In a first step, the risk should be defined with reference to the scale and context of the natural hazard.
2. This is followed by the risk appraisal, comprising a risk assessment and concern assessment. The latter presents a significant challenge; this is due not to a lack of scientific data, but to their complexity. Secondary impacts and interdependencies, the authors argue, should also be considered in the appraisal process.
3. The next phase focuses on knowledge characterization and risk evaluation.
4. The temporal aspect is another important factor and it is critical that natural hazards are addressed within appropriate time frames. Stakeholders should also be involved at this point in order to ensure that the process is informed by local and indigenous knowledge.
5. Information gathered in the preceding phases is utilised in the development of a risk management strategy by means of a multi-criteria analysis. The vulnerability of built environments should form a particular focus of this strategy.
6. Risk communication spans the formulation of the risk through to continuous communication between science and policymakers as well as public-facing communication in order to ensure that citizens are adequately informed of the risks and different points of view are taken into account. Risk communication provides for a constant flow of feedback between the various governance phases.

The study concludes with a number of recommendations for municipalities and administrative bodies. Among these, is the development of a metadata bank to connect existing regional, national and international databases. This would facilitate the



harmonisation of diverse databases and lay the foundations for a coherent and shared service for authorities and citizens with the aim of standardizing warnings to ensure they can be clearly understood across affected populations.

The study also identifies a clear need to bolster interdisciplinary competence, provide integrated training for experts for civil defence and crisis prevention, and build efficient networks of experts to foster the exchange of knowledge and expertise, in particular with respect to those natural hazards that are embedded in larger systemic risks. Developing a network of this kind will require resources to create competence teams across countries.

Call for an independent institute for risk assessment

In their conclusion, the authors make a case for the establishment of an independent institute for systemic risk assessment and governance, with the aim of detecting both natural and technological risks at an early stage in light of the increasingly interlinked nature of these risk types. Addressing the heightened risk of forest fires in many parts of Germany, lead author Pia-Johanna Schweizer recommends: "Steps should be taken immediately to review and update evacuation plans for hospitals, schools, kindergartens, and other public institutions. In addition to this, official coordination centres for disaster relief should be established at the state-level," explains Schweizer "Simulations should also be carried out in order to identify and address potential vulnerabilities and planning deficits."

Publication:

Pia-Johanna Schweizer und Ortwin Renn: Global Assessment Report on Disaster Risk Reduction (GAR), chapter 2 Global Risk Trends - Governance of Systemic Risks for Disaster Prevention and Mitigation, UNDRR, 15.5.2019.

For further information, please contact:

Sabine Letz

Press & Communications

Institute for Advanced Sustainability Studies

Institute for Advanced Sustainability Studies e.V. (IASS)

Berliner Straße 130, 14467 Potsdam

Tel. +49 (0)331 288 22-479

E-mail sabine.letz@iass-potsdam.de

<http://www.iass-potsdam.de>



The Institute for Advanced Sustainability Studies (IASS) conducts research with the goal of identifying, advancing, and guiding transformation processes towards sustainable societies in Germany and abroad. Its research practice is transdisciplinary, transformative, and co-creative. The institute cooperates with partners in academia, political institutions, administrations, civil society, and the business community to understand sustainability challenges and generate potential solutions. A strong network of national and international partners supports the work of the institute. Among its central research topics are the energy transition, emerging technologies, climate change, air quality, systemic risks, governance and participation, and cultures of transformation. The IASS is funded by the research ministries of the Federal Government of Germany and the State of Brandenburg.

*If you no longer wish to receive IASS press briefings, please send an e-mail with the subject line "**Unsubscribe**" to media@iass-potsdam.de*