

IIASA's Contribution for the Integrated Disaster Risk Management

International Institute for Applied Systems Analysis (IIASA)

“Risk” has been part of IIASA’s activity profile since the Institute’s foundation. This theme is critical, as the prospect of unintended consequences from technological, environmental, and social policies continues to stir intense debates that shape the future of societies across the world. Relying on probability calculations, risk became a theoretical focus designed to bolster a scientific, mathematically-based approach toward uncertainty and risk management.

Early controversies in the 1970’s and 1980’s on nuclear power, liquid natural gas storage, and hazardous waste disposal – all early research topics at IIASA – made clear to the expert community, however, that probabilistic calculations of risk, although essential to the debates, are not sufficient to settle issues of public acceptance. In response, IIASA has pioneered research on risk perception (Otway and Thomas 1982), “objective” versus “subjective” assessments (Kunreuther and Linnerooth 1982), systemic cultural biases (Thompson 1990) and risk and fairness (Linnerooth-Bayer 1999).

As a critical part of this history, IIASA is widely recognized for its advancements in stochastic and dynamic systems optimization (e.g., Ermoliev 1988), treating endogenous uncertainty and catastrophic risks in decision-making processes (reviewed in Amendola et al. 2013), and advancing statistical methods for probabilistic assessment (e.g., Pflug and Roemisch 2007). The hallmark of IIASA’s risk research is the integration of these multiple strands of mathematical and social science research.

One important in-house model taking an integrated perspective in the RISK program at IIASA is the so-called CatSim model (Catastrophe simulation), which focuses on the government and its fiscal risk in the face of natural disaster events. It is a mainstay of the Program’s methodological and policy research and was first developed to aid public officials in developing countries to assess catastrophic risks from natural hazards and analyze options to enhance their country’s financial resiliency. The model takes a “systems approach” by integrating catastrophe risk modeling with financial and economic modeling. The model enables users to explore the impact of traditional and novel financial instruments, including reinsurance and catastrophe bonds, terms of the costs of reducing the risk of a financing gap. CatSim has proven useful in other contexts as well, e.g., for allocating climate adaptation and development funds to support disaster resilience in the most vulnerable countries. Based on the model framework, assessed exposure and financial vulnerability to extreme weather events on the global scale can be performed too (Hochrainer-Stigler et al. 2014)

Beyond modeling, IIASA has pioneered the exploration of novel financing instruments to provide safety nets to vulnerable communities and governments facing climate risks (Linnerooth-Bayer, J. & Amendola 2000). These instruments now feature prominently on the agendas of development organizations and NGOs, and they are also gaining attention in the climate change adaptation community (Linnerooth-Bayer and Hochrainer-Stigler, 2015). In an early influential policy paper, IIASA scientists argued

that donor-supported risk-transfer programs, some based on novel instruments, would leverage limited disaster-aid budgets and free recipient countries from depending on the vagaries of post-disaster assistance (Linnerooth-Bayer et al. 2005).

As a final mention, IIASA's contributions to integrated disaster risk management have included the design and implementation of new forms of bottom-up governance, most notably stakeholder processes which co-design policy options with experts, and explicitly recognize large value differences.

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Collaboration between DPRI and IIASA and establishment of IDRiM Society

The move to set up the IDRiM Society was based on the success of a series of nine Forums on Integrated Disaster Risk Management organized by the Disaster Prevention Research Institute (DPRI) of Kyoto University and the International Institute for Applied Systems Analysis (IIASA) located in Austria. The first forum was in 2001 which was the starting point for cross-collaboration with the aim to strengthen a new disciplinary area of integrated disaster risk management. As indicated, after eight annual conferences and active interactions under this initiative, this led ultimately to the formation of the IDRiM Society in 2009 which officially was launched on October 15, 2009 in Kyoto, Japan, at the 9th IIASA-DPRI Forum on Integrated Disaster Risk Management. The launching of the IDRiM Society was promoted also by many national and international organizations including Beijing Normal University, International Institute of Earthquake Engineering and Seismology (IIEES), National Research Institute for Earth Science and Disaster Prevention (NIED), the United Nations International Strategy for Disaster Reduction (UN/ISDR), the Joint Research Centre of the European Commission (JRC/EC) and other organizations. The IDRiM Society was enthusiastically welcomed and its Charter approved by more than 100 international experts, practitioners, and individuals from more than 20 different countries working in the disaster risk management field. Since then, 7 international conferences on Integrated Disaster Risk Management were held around the world, including Austria, USA, China, the U.K., Canada, India and Iran.

Past IIASA-DPRI Conferences

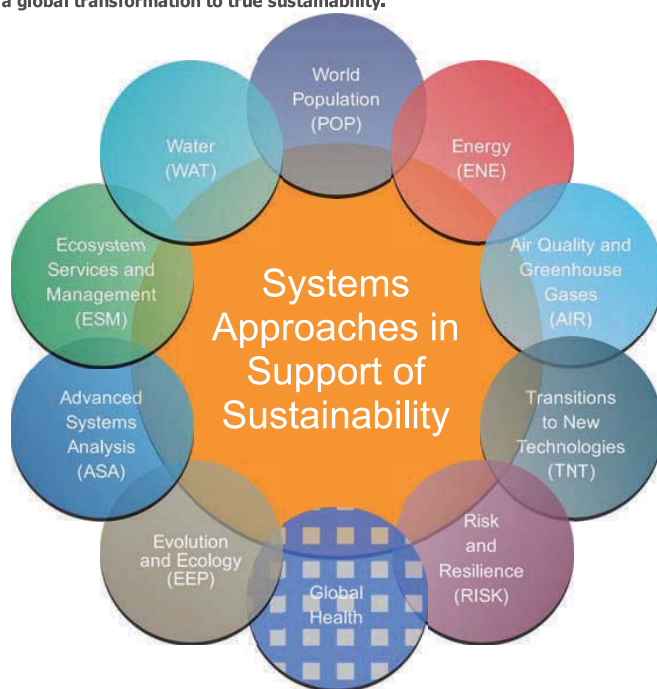
<p>9th IIASA-DPRI Conference on Integrated Disaster Risk Management: “Scientific Challenges in Implementing Integrated Disaster Risk Management in a Changing World.”</p>	<p>Kyoto Japan.</p>	<p>12-16 October 2009</p>
<p>8th IIASA-DPRI Conference on Integrated Disaster Risk Management: “Integration and Multi-disciplinarity.” .</p>	<p>Induno- Olona Italy</p>	<p>1-2 September 2008</p>
<p>7th IIASA-DPRI Conference on Integrated Disaster Risk Management: “Coping with Disasters: Global Challenge for the 21st Century and Beyond.”</p>	<p>Stresa Italy</p>	<p>19- 21September 2007</p>
<p>6th IIASA-DPRI Conference on Integrated Disaster Risk Management: “Risk and Challenges for Business and Industry.”</p>	<p>Istanbul Turkey</p>	<p>13-17 August 2006</p>
<p>5th IIASA-DPRI Conference on Integrated Disaster Risk Management: “Innovations in Science and Policy.”</p>	<p>Beijing China</p>	<p>14-18 September 2005</p>
<p>4th IIASA-DPRI Conference on Integrated Disaster Risk Management: “Challenges and Implementation.”</p>	<p>Ravello Italy</p>	<p>3-7 July 2004</p>
<p>3rd IIASA-DPRI Conference on Integrated Disaster Risk Management: “Coping with Regional Vulnerability.”</p>	<p>Kyoto Japan</p>	<p>3-5 July 2003</p>
<p>2nd IIASA-DPRI Conference on Integrated Disaster Risk Management: “Megacity Vulnerability and Resilience.”</p>	<p>Laxenbourg Austria</p>	<p>29-31 July 2002</p>
<p>1st IIASA-DPRI Conference on Integrated Disaster Risk Management: “Reducing Socio-Economic Vulnerability.”</p>	<p>Laxenbourg Austria</p>	<p>1-4 August 2001</p>

Annual Conferences of IDRiM Society

<p>The 1st Conference of the International Society for Integrated Disaster Risk Management (IDRiM2010) : Sharing IDRiM experiences under different socio-economic and cultural contexts</p>	<p>University Natural Resources and applied Life Sciences Vienna, Austria</p>	<p>1 – 4, September 2010.</p>
<p>The 2nd Conference of the International Society for Integrated Disaster Risk Management (IDRiM2011): Reframing Disasters and Identifying Deficits in Risk Governance</p>	<p>the University of Southern California (USC), Los Angeles, United States</p>	<p>14-16 July 2011</p>
<p>The 3rd Conference of the International Society for Integrated Disaster Risk Management (IDRiM2012) : From surprise to Rationality: Managing unprecedented Large-Scale Disasters</p>	<p>Beijing Normal University Beijing, China</p>	<p>7-9 September 2012</p>
<p>The 4th Conference of the International Society for Integrated Disaster Risk Management (IDRiM2013): From Opportunity to Action: Bridging the Gap between Disaster Reduction and Development through Science(s), Technology and People Centred Actions</p>	<p>Northumbria University, Newcastle upon Tyne, UK</p>	<p>4-6 September 2013</p>
<p>The 5th Conference of the International Society for Integrated Disaster Risk Management (IDRiM2014): Building Disaster Resilient Communities</p>	<p>Western University, London, Ontario, Canada</p>	<p>30 October – 1 November 2014</p>
<p>The 6th Conference of the International Society for Integrated Disaster Risk Management (IDRiM2015): Disaster Risk Reduction: Challenges and Opportunities for Sustainable Growth</p>	<p>Scope Convention Centre, New Delhi, India</p>	<p>28 - 30 October 2015</p>
<p>The 7th Annual Conference of the International Society for Integrated Disaster Risk Management (IDRiM 2016): Disasters and Development: Towards a Risk Aware Society</p>	<p>Hotel Abbasi, Isfahan, Iran</p>	<p>1 – 3 October 2016</p>

Research Programs

There are currently nine IIASA research programs carrying out research into the dynamics of global change. These programs use holistic approaches and effective, interdisciplinary collaborations to identify the multiple solutions needed to bring about a global transformation to true sustainability.



The IIASA research programs are shown in the interactive diagram above. The outer circles show the current nine research programs and the proposed new Global Health Program. The inner circle represents integrated research activities at IIASA. Importantly, the diagram shows how each of the research programs intersect and contribute to these integrated projects, an increasing focus of IIASA research.

In addition to contributing to large-scale integrated projects and cross-cutting initiatives, each research program is responsible for undertaking research and maintaining and developing core competencies in their areas of expertise. It must be stressed that the IIASA research programs are not discipline-based, but are themselves interdisciplinary and house a diversity of scientific expertise, across the natural (e.g., biology, chemistry), physical (e.g., physics, mathematics, engineering), and social sciences (e.g., economics, demography, geography) that together focus on a particular research theme.

RESEARCH AT IIASA

- » Research Overview
- » Impact of IIASA research

RESEARCH FOUNDATIONS

- » IIASA Strategic Plan 2011-2020
- » IIASA Research Plan 2016-2020
- » IIASA Highlights 2011-2015
- » IIASA Annual Report
- » IIASA Scientific Update

MODELS AND TOOLS

- » Overview of analytical tools used in IIASA research

RESEARCH PROJECTS

- » Overview of current research projects

RESEARCH PARTNERS

- » Overview of current research partners

ACHIEVEMENTS

- » Impact of IIASA research

PUBLICATIONS

- » **Yillia P** (2016)
Water-energy-food nexus: framing the opportunities, challenges and synergies for implement...
- » Palokangas T (2016)
Regulation versus subsidies in conservation with self-interested policy maker
- » **Crespo Cuaresma J**, Feldkircher M, Huber F (2016)
Forecasting with global vector autoregressive models: a Bayesian approach



Risk and Resilience

The Risk and Resilience (RISK) Program aims to better understand the risks to economic, ecological, and social systems arising from global change and to help transform the ways in which societies manage them.



Woman with Orange Umbrella. Muddy Road China © Pavliha | iStock

Society needs to make effective responses to the risks associated with global change. To that end, scientists must understand the systemic and dynamic linkages of environmental, social, and economic risks and how these are impacted by different policy measures. This will enable risk management and governance systems to be improved in order to facilitate long-term sustainable development.

Systems analysis, risk modeling, and transformative governance are fundamental to the mission of Risk & Resilience (RISK). The Program examines environmental and socioeconomic risks and policy options across multiple spatial and temporal scales to provide an analytical foundation for improved management and governance of natural disasters, address climate change, and ease the technological and ecological transitions to sustainability.

The Program has four specific goals:

- To advance the conceptual and methodological development of risk and vulnerability research
- To carry out selected risk and vulnerability assessments
- To carry out integrative stakeholder-led case studies, and
- To develop interactive tools for training on vulnerability and adaptation.

The program builds on the methodologies, activities and experience gained from the previous IIASA Risk, Modeling and Society (RMS) and Risk, Policy and Vulnerability Programs. It integrates across other IIASA programs and links closely with the vulnerability/resilience research communities.



Risk analysis and modeling

The Risk Analysis and Modeling research theme investigates how to manage the risks arising in socio-ecological systems, including risks from climate extremes and other types of hazards. [More](#)



Risk Management and Adaptation

This thematic research area focuses on developing policy-relevant methodological insight for informing risk management and adaptation strategies; the aim of which is to support the multi-scale integration of agendas on risk management, climate change adaptation and sustainable socio-economic development. [More](#)



Governance in Transition

The Governance in Transition research theme analyzes how governance structures shape decisions and subsequent outcomes by building on and contributing to research on decision-making processes, public acceptance, risk perception, cognitive biases, and cultural perspectives, as well as participatory governance design. [More](#)



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NEWS

ASA researchers participated in the international workshop on Heterogeneous Dynamic Models of Economic and Population Systems

02 December 2016

Study maps the climate impact of agriculture

29 November 2016

Executive Assistant (m/f) to the Director General/CEO

29 November 2016

From Kobe to Sendai.

Tracing progress in risk discourse and analysis for informing risk management and climate adaptation.

Reinhard Mechler

Deputy Program Director, Risk and Resilience Program, IIASA

Risks associated with natural disasters and climate change rank high among global socio-economic sustainability challenges. These risks, the outcomes of coupled socio-ecological systems' interactions, can lead to large adverse developmental consequences (erosion of livelihoods, increase in poverty, loss of human, economic, environmental and social assets, migration) and have been at the centre of attention of disaster management and climate negotiations. Concepts, methodologies, methods and metrics associated with risk have been of fundamental and increasing saliency for informing policy and action on these interlinked challenges. The talk traces the evolution in conceptualisation, modelling and assessment as well as policy related to risk analysis for the examination and management of disaster and climate risks. Building on work done by the presenter with many colleagues, the central line of argumentation of the talk is to show how thinking and analysis on disaster and climate-related risk over the last few years has seen important evolution towards broad-based debate concurrently encompassing epistemological, instrumental, reflective and participative discourses, thus providing great potential for informing action on key challenges associated with extreme event risks across multiple scales along the science-society interface.

Dr. Reinhard Mechler

Personal Profile

Reinhard Mechler has more than 15 years of experience working on the economics of disaster risk, risk modelling and climate change. He currently is deputy director of the 'Risk, Policy, Vulnerability' research program at the International Institute for Applied Systems Analysis (IIASA) and a senior lecturer at the University for Economics and Business in Vienna. Specific interests of his include catastrophe risk modelling, the impacts of extreme events and climate change on development, the use of novel risk financing mechanisms for sharing disaster risks, and the assessment of the efficiency and equity of climate change response measures. He was a lead author on IPCC's special report on adaptation to extreme events (SREX) and is a lead author on the chapter on the Economics of Adaptation in the upcoming 5th assessment report. He has been leading and contributing to many projects for international and donor organizations including the European Commission, DFID, CIDA, the UN, ProVention Consortium, World Bank, Asian Development Bank, Inter-American Development Bank, Caribbean Development Bank and GIZ.

Areas of expertise

Economics of natural disaster risk management and adaptation, disaster risk sharing instruments and insurance, systems modelling, climate change adaptation and mitigation strategies, development economics, ecological economics.

Editorial boards

Climate Risk Management, Mitigation and Adaptation Strategies for Global Change, @Risk

Qualifications

2003. Ph.D. Economics University of Karlsruhe, Germany
1998 Diploma in Economics, University of Heidelberg, Germany
1993-1994 Academic year, University of Massachusetts, Amherst, USA
B.A. equivalents Economics 1995, Mathematics 1992, English 1992

Positions held

2013 to present Deputy program leader "Risk, Policy, Vulnerability," IIASA
2006 to 2013 Leader research group "Disasters, Adaptation and Development," IIASA
2009 to present Senior lecturer at Vienna University of Economics and Business
1999 to 2006 Research scholar, IIASA
1998 to 2001 Ph. D. researcher, University of Karlsruhe
1994 to 1998 Research Assistant, Centre for European Economic Research (ZEW), Mannheim

Languages

English	Fluent
German	Mother tongue
Spanish	Basic
French	Basic
Italian	Basic

Peer-reviewed publications

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