Preliminary Version

Book of Abstracts

RISK
in time & space

www.srae-athens2024.gr

32nd Annual Conference

SRA Europe 2024 ★ Athens, Greece

2-5 June 2024

Harokopio University of Athens,
Department of Geography

ΧΑΡΟΚΟΠΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ
HAROKOPIO UNIVERSITY

SRA EUROPE

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ABOUT THE CONFERENCE

SRA-E Athens 2024 Conference

Risk in Time and Space is the central theme of the SRA-E Athens 2024. Variability of risks in time and space is one of the most challenging elements. All types of risks (socio-natural, NATECH, technological or other man-induced) are space and time dependent regardless of their hazard origin.

Variability of risks in time and space is associated to variability of their components: hazard, exposure, vulnerability, sensitivity, resilience and adaptive/coping capacity. Hazard variability and unpredictability is mostly evident in the case of climatic and meteorological hazards showing not only unexpected changes over time but also variations between one place and another. Exposure is, indeed, increasing not only because of intensification and higher frequency of certain extreme events but expanding spatial development as well and constant mobility / flows of potentially exposed elements (people, goods and services, investment capital etc.). Regarding vulnerability and resilience/adaptive capacity these are probably the most volatile properties of the exposed entities. Indeed, complex processes of vulnerability transformation, transference and interaction amongst the several vulnerability facets (human, social, economic, institutional, physical) unfold in time and space.

Not only scientific and objective but perceived and subjective risks also are time and space dependent because communities change in the course of their development history and they are featured by different risk experiences, risk knowledge, risk culture, levels of acceptable and tolerable risk and risk governance patterns.

The Conference attracted contributions related to risk assessment, risk characterization, risk perception, risk communication, risk management, risk governance, and policy relating to risk. All hazards and consequent risks for individuals, public and private sector organizations, and communities at local, national, regional, or global levels were of concern. A special emphasis was placed on risk variations as well as on risk management and risk governance transformations and differences in time and space.

Key Topics

RISK ANALYSIS FUNDAMENTALS

- The Risk concept in history and across various scientific domains;
- Variability of risk determinants/components: exposure, hazard, vulnerability, adaptive capacity, resilience;
- Spatial and temporal aspects of systemic risk;
- The past and the future of risks, crises and disasters;
- Risk in education and learning in Europe and beyond;
- Risk in law across Europe;

RISK ASSESSMENT

- Spatial data-bases for risk assessment and mapping;
- Risk assessment methods capturing variability of risk;
- Areas/world regions, hot-spots for hazards, risks and disasters (geophysical, meteorological, hydrological, climatological);
- Vulnerability- and resilience-based social-spatial inequalities;
- New technologies for hazard and risk observation and monitoring;

(DISASTER) RISK MANAGEMENT

- Historical and contemporary (disaster) risk management paradigms;
- Spatial and temporal issues of the disaster risk management cycle;
- Urgency and uncertainty in crisis management;
- Management models adapting to variability of risk;
- Engineering and non-engineering safety regulations in different eras and contexts;
- Past and new technologies in risk and crisis management;

RISK PERCEPTION, COMMUNICATION AND GOVERNANCE

- Risk perception and communication in different regions, cultures and eras;
- Systemic risk communication and governance;
- Risk governance case studies for different regions;

(DISASTER) RISK MITIGATION IN SECTORAL POLICIES

- Policies for enhancing personal, community, institutional, urban resilience;
- Climate Change mitigation and adaptation policies;
- Risk-based Spatial Planning;
- Risks and Insurance across Europe;

MONITORING AND COPING WITH REAL RISK PROBLEMS

- Temporal / spatial analysis and management of geophysical hazards and risks;
- Temporal / spatial analysis and management of Climate Change hazards and risks;
- Technological and Na-tech risk assessment, mapping and management;
- History and geography of public health, epidemic and pandemic risks;
- Cyber security risk assessment for critical infrastructure in Europe;
- Food Security/Safety in Europe and beyond;
- Operational Aspects of Crisis Management;

RISK AND ETHICS

- Risk Culture and Acceptable Risk in Europe and beyond;
- (Disaster) Risk management and cultural Inclusion.

Sponsors

SRA Europe

The Society for Risk Analysis - Europe (SRA Europe) aims to bring together individuals and organizations interested in risk analysis in its various facets such as risk assessment, risk management, risk governance and risk communication in Europe.

SRA-Europe (SRA Europe) is a regional, interdisciplinary organisation which addresses emerging issues in risk analysis, management and policy. The society emphasizes the European dimension in the promotion of interdisciplinary research and education, and in practical application in society, industry, businesses and the government. It provides a platform for academics and practitioners, policy makers, NGOs members, industry and business administrators and other stakeholders, to discuss future directions, to understand concerns about risk, to promote efficient risk mitigation and to develop effective communication about hazards.

The society encourages those interested in all aspects of risk analysis to communicate, collaborate and develop new methodologies for risk analysis and risk management.

SRA-Europe shares a common purpose with the International Society for Risk Analysis (SRA). SRA operates world-wide and has many regional organizations currently including Africa, Asia, Australia & New Zealand and U.S.A. regional organizations.

It provides a platform for academics and practitioners, policy makers, NGOs members, industry and business administrators and other stakeholders, to discuss future directions, to understand concerns about risk, to promote efficient risk mitigation and to develop effective communication about hazards.

Harokopio University of Athens

Harokopio University of Athens is a public university dedicated to promoting research and learning in a small, well focused set of intellectual areas. The University originates from an educational institution that he established in 1929, and gained the status of University in 1990 while it admitted its first students during the academic year 1993-1994.

It takes its name from the national benefactor Panagis Harokopos, who envisioned an educational institution with excellent building facilities and equipment, in harmony with the natural environment, which could offer contemporary science.

Today Harokopio University comprises three Schools and four Undergraduate Departments:

- School of Environment, Geography and Applied Economics with the Department of Home Economics and Ecology (since 1993) and the Department of Geography (since 2000),
- School of Health Science and Education with the Department of Nutrition and Dietetics (since 1994),
- School of Digital Technology with the Department of Informatics and Telematics (since 2007).

The University offers six postgraduate programmes:

- MSc “Sustainable Development”,
- MSc “Education and Culture”,
- MSc “Applied Dietetics – Nutrition”,
- MSc “Applied Geography and Spatial Management”,
- MSc “Informatics and Telematics”,
- International Master Programme “Sustainable Tourism Development: Heritage, Environment, Society”.

High quality research developing in the University contributes to the promotion of scientific knowledge, as well as to the improvement of public health, and to economic and social development.

The University is growing rapidly while it is distinguished for the quality of its educational and research work. It is the first to complete the national certification process of all its units in 2018 with full compliance. It participates in ranking lists by international bodies in a high position at national level and internationally. With an international orientation, it demonstrates excellent international research collaborations and footprint, while supporting successful joint study programs with other Universities, from Greece and abroad.

Department of Geography

HAROKOPIO UNIVERSITY
GEOGRAPHY DEPARTMENT

The Department of Geography at Harokopio University of Athens was founded in 1999 and welcomed its first students during the academic year 2000-2001. It was one of the two Hellenic university departments dedicated to Geography, a dynamic scientific field at the intersection of physical and social sciences.

The multi-facet mission of the Department of Geography is:

- to promote the science of Geography, to provide high-quality education at undergraduate and post-graduate level, combining scientific ethos and theories of Geography with an understanding of the problems society faces and its demands and needs,
- to develop basic and applied research in the fields covered by Geography at international level, and
- to assure the appropriate academic environment so that students, researchers and staff members may perform at their best their capabilities.

Within its mission, it aims at strengthening the topic of Geography as crucial scientific field in the academia and an important topic for the society, as well as achieving a high standard of geography education and research in response to contemporary needs of the society.

The Department offers one Undergraduate Program and the MSc “Applied Geography and Spatial Management” which comprises three Streams: Stream A΄: Management of Natural and Human Induced Disasters, Stream B΄: Spatial Policies and Development in Europe, and Stream C΄: Geo-informatics.

Research is an integral part of the academic operating mode of Harokopio University. The research carried out at the Department of Geography focuses on contemporary fields of the geography science in the fields of Human Geography, Geosciences, Environment, Spatial Planning and Geoinformatics. Research achievements are highlighted and promoted through schietific publications and the participation of the Department’s scientific staff and students in international conferences.

Currently, the Department of Geography counts 15 Academic staff members, with recognition amongst the academics and intense presence in research.

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SHORT PROGRAM

SUNDAY 2 JUNE 2024

12.30 - 17.00	Pre-conference Workshops				
17.00 - 18.30	Pre-conference registration (Room/Venue: Central building outside the Amphitheater)		Welcome Cocktail (Room/Venue: Ceremony Hall - Geography Building)		
18.30 - 20.00	Poster Session (Room/Venue: Central building outside the Amphitheater)				

MONDAY 3 JUNE 2024

08.00 - 09.00	*Conference Registration*				
09.00 - 09.45	Opening Ceremony (Room/Venue: Amphitheater)				
09.45 - 10.45	Moderator: Dr. Miranda Dandoulaki	Keynote Speech: (Room/Venue: Amphitheater)	Title: Risk and Crises as Social Constructs in a Comparative Perspective Professor Virginia Garcia Acosta		
	Coffee Break : 10.45 - 11.15 (Room/Venue: Ceremony Hall)				
	PARALLEL SESSIONS M1 (11.15-12.45)				
	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	The Risk concept in history and across scientific domains	Risk assessment models adapted to risk variability	Climate Change mitigation and adaptation	(Disaster) Risk perception and impacts: Different regions, cultures and eras	Climate Change hazards and risks: Temporal / spatial analysis and management
	Regional Chapter Meetings (Room 1.2 and Seminar Room, Geography Building) & Lunch break (Ceremony Hall): 12.45 - 13.45				
13.45 - 15.00	PANEL DISCUSSION: CONSIDERING RISKS IN (SPATIAL) DEVELOPMENT POLICIES: FOCUS ON THE MEDITERRANEAN REGION (Room/Venue: Amphitheater)				
	PARALLEL SESSIONS M2 (15.00 - 16.30)				
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	The past and the future of disaster risk approaches	Mapping hazard, exposure, vulnerability and adaptive capacity I	Crisis management: Urgency and uncertainty	Risk Communication and Governance in different regions	Geophysical hazards and risks: Temporal / spatial analysis and management
	Coffee Break : 16.30 - 16.45 (Room/Venue : Ceremony Hall)				
	PARALLEL SESSIONS M3 (16.45-18.15)				
	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Systemic risk: Spatial and temporal aspects	Mapping hazard, exposure, vulnerability and adaptive capacity II	Symposium: "Intuitive Risk Management" in the 21st Century – Bridging Different Perspectives	Systemic risk Communication and Governance	Technological and Na-tech risk assessment, mapping and management
18.15 - 19.15	PANEL DISCUSSION: RISK PRIORITIES AT PERSONAL, COMMUNITY, INSTITUTIONAL LEVEL (Room/Venue: Amphitheater)				

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SHORT PROGRAM

TUESDAY 4 JUNE 2024

08.30 - 09.30	*Conference Registration*				
09.30 - 10.30	Moderator: Prof. Kalliopi Sapountzaki	Keynote Speech: (Room/Venue: Amphitheater)	Title: Disaster risk reduction and prevention through spatial and development policies in world regions. Professor Allan Lavell		
	Coffee Break : 10.30 - 11.00 (Room/Venue : Ceremony Hall)				
	PARALLEL SESSIONS T1 (11.00-12.30)				
	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Risk in education and learning	New technologies for hazard and risk observation and monitoring	Risk-based Development and Spatial Planning I	Risk culture and acceptable risk I	Public health, epidemic and pandemic risks
	SRA-E General Assembly Meeting (Amphitheater) & Lunch Break (Ceremony Hall) : 12.30 - 13.45				
13.45- 14.30	PANEL DISCUSSION: ADAPTATION TO CC: WHAT CAN BE THE ROLE OF TECHNOLOGY, SPATIAL PLANNING AND RISK COMMUNICATION? (Room/Venue: Amphitheater)				
	PARALLEL SESSIONS T2 (14.30-16.00)				
	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Symposium: The relationship between risk and ethics in an AI-dominated future	Symposium: Planning for the worst: European experiences of relocation in the context of flood risk	Risk-based Development and Spatial Planning II	Risk culture and acceptable risk II	Cyber security risk assessment for critical infrastructure
	Coffee Break : 16.00 - 16.15 (Room/Venue: Ceremony Hall)				
16.15 - 17.15	Moderator: Prof. Marja Ylonen	Keynote Speech: (Room/Venue: Amphitheater)	Title: Transboundary and transsectoral dimensions of systemic risks: Implication for governance and communication Professor Ortwinn Renn		
17.30 - 20.30	Trip along the Athens Riviera and guided tour to the Archeological site of the Temple of Poseidon in Sounio				
20.30 - 23.30	Dinner at a restaurant near the area of Sounio and return to Harokopio University by coach				

SHORT PROGRAM

WEDNESDAY 5 JUNE 2024

08.30 - 09.30	*Conference Registration*				
09.30 - 10.30	Moderator: Dr. Tom Jansen	**Keynote Speech:** (Room/Venue: Amphitheater)	**Title: Communicating the Climate Crisis** **Professor Wändi Bruine de Bruin**		
	Coffee Break : 10.30 - 11.00 (Room/Venue : Ceremony Hall)				
	PARALLEL SESSIONS W1 (11.00-12.30)				
	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Round-table: Teaching risk in schools	Enhancing personal, community, institutional, urban resilience	Novel approaches to compounding disaster management	Symposium: Hazard and risk: how to communicate the difference between these two concepts across Europe?	Food Security/Safety in Europe and beyond I
	Lunch Break : 12.30 - 13.45 (Room/Venue: Ceremony Hall)				
	PARALLEL SESSIONS W2 (13.45-15.15)				
	Geography Building	Main building			
ROOM/VENUE	2.1		Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES		(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Symposium: Risk-based uncertainty management: linking science to policy actions		Engineering and non-engineering safety regulations	Round-table: Network of Networks for Risk Based Decision Making (N²RBDM) An International Initiative for a worldwide assessment of the SENDAI objectives	Food Security/Safety in Europe and beyond II
15.15 - 16.15	Moderator: Dr. Miranda Dandoulaki	**Keynote Speech:** (Room/Venue: Amphitheater)	**Title: Mobile Public Alert and Warning in the Climate Change Era: Reconsidering a Risk Communication Consensus** **Professor Hamilton Bean**		
	Coffee Break : 16.15 - 16.30 (Room/Venue: Ceremony Hall)				
16.30 - 17.45	**PANEL DISCUSSION: RISKS OF THE PAST, PRESENT AND FUTURE** (Room/Venue: Amphitheater)				
	Awards Ceremony : 17.45 - 18.00 (Room/Venue: Amphitheater)				
18.00 - 18.15	**Closing Ceremony** (Room/Venue: Amphitheater)				

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PROGRAM

SUNDAY 2 JUNE 2024

Pre-conference Workshops

TITLE (Room/Venue)	ECP: Risk Science and Communication Room A1 (Main Building)		Trade-Offs in Chemical Risk Management Room A6 (Main Building)		
12.30 - 17.00	12:30-13:00	Introduction to SRA-E (Conference, chapters and activities)	Session 1:	Perspectives of human health and environmental risk assessors on environmental chemicals	Speakers: Dr. Lothar Aicher, SCAHT; Dr. Alexandra Kroll, Oekotoxzentrum
	13:00-13:30	Talk: Marja Ylönen "Reflections on Risk Science"			
	Break		Session 2:	Perspective of the chemical manufacturing industry	Speaker: Dominique Werner, scienceindustrie
	14:30-14:45	Introduction to the group work	Session 3:	Perspective of the social sciences on intuitive risk management and on risk communication	Speakers: Dr. Angela Bearth, HF Partners; Dr. Tom Jansen, National Institute for Public Health and the Environment, RIVM
	14:45-16:15	Group work			
	16:15-16:45	Discussion of key points in the big group	Session 4:	Group work and discussion round	
	16:45-17:00	Feedback to workshop/input for future etc.			
17.00 - 18.30	Pre-conference registration (Room/Venue: Central building outside the Amphitheater)		Welcome Cocktail (Room/Venue: Ceremony Hall - Geography Building)		
18.30 - 20.00	Poster Session (Room/Venue: Central building outside the Amphitheater)				

	Poster Titles and Authors	
1	Risk research practice in the 21st Century: Guiding Principles from the ACCESS Project	Warren G.
2	Well-intended policy intervention, but for whom? Government actions and human security amid the pandemic in the United States	Yeo J., Kwak H.
3	Understanding food hygiene behaviours in food business kitchens	Cheng C., Kaptan G., Weller J.
4	Tick-borne encephalitis (TBE) in Italy: investigating the behaviour and risk perception of citizens living in high-risk areas	Pinto A., Mascarello G., Crovato S., Mantovani C., Lenzo F., Zago M., Montarsi F., Bregoli M.
5	Assessing the tsunami hazard in Greece: A comprehensive study	Batzakis D., Karymbalis E., Tsanakas K.
6	Climate change disbelief, what do you disbelieve?	Kim M., Hyung S., Kim S.
7	Motivation for Participation in Seoul's Climate Card Policy to Reduce Greenhouse Gas Emissions in S.Korea	Hwang J., Hwang J., Hong E., Kim S.
8	How climate change emotions affect climate change action: a focus on self-efficacy	Kim M., Hwang J., Kim S.
9	Factors influencing climate change response behavior: Focusing on emotional and rational sympathy	Kim M., Jeon S., Kim S., Soobin K.
10	How are Solar Energy Facilities Perceived by Residents?: Focusing on Local Acceptance of Solar Energy Facilities and Exploring Factors.	Hwang J., Hwang J., Jeon S., Kim S.
11	Acceptance of climate change policies (eco-friendly vehicle subsidy policies) according to urban and rural residential areas	Hyeji H., Hyung S., Kim S.
12	Effect of treated water discharge on nuclear power acceptability: Focusing on the moderating effect of political bias (Anchor effect)	Kim S., Han H., Kim K.
13	The role of knowledge in the acceptance of high-level radioactive waste disposal sites: focusing on types of knowledge	Jeon S., Kim M., Kim S.
14	Effect of information type on acceptance of nuclear power generation: Focusing on differences in effect by type of information	Jeon S., Hyung S., Hong E., Kim S.
15	Public perceptions of bioplastic: insights from a sentiment analysis on Reddit	Cruz B., Faria A., Domingos S., Possidonio C., Loureiro A., Luis S.
16	Micro-mobility risks for vulnerable road users	Good D.
17	Socio-economic Adaptation to Ongoing Taranaki Volcanism	Wala M.
18	Multi-Risk Instruments for Emergency Response	Hochrainer-Stigler S.
19	How does the reason for migration and the origin influence the willingness to accept immigrants?	Caserotti M., Tedaldi E., Conta B., Rubaltelli E.
20	Debris flows in Gizhgit valley (Caucasus): reassessment of hazard to a tailings site half a century later	Derkacheva A., Gurinov A., Iudina V.
21	Systemic vulnerability modeling under an Impact Chain approach. Examining earthquakes, floods, and the COVID-19 pandemic	Armas I., Albulescu A., Dobre D.
22	Crisis management presentation in media: floods case study	Pappa M.
23	Examining the relationships between urban resilience and disaster resilience: Evidence from Athens.	Goulara M., Dandoulaki M.
24	Methodological Solutions for Interactive Socio-Spatial Vulnerability "Dashboards" in Risk Assessment	Balčiekienė A., Budrytė P.
25	The importance of using risk-based methods as tools for the prevention and remediation of environmental damage.	Ntzeremes P., Rentizelas A.

PROGRAM

MONDAY 3 JUNE 2024

08.00 - 09.00	*Conference Registration*		
09.00 - 09.45	**Opening Ceremony** **Moderator:** **Daphne Ioannidi** Room/Venue: Amphitheater	Welcome address by the Rector of Harokopio University, Professor Maria Nikolaidi	
		Welcome address by the Head of the Geography Department, Professor Petros Katsafados	
		Welcome address by the SRA - Europe Board President, Professor Marja Ylonen	
		Opening address by the Fire Academy Chief Konstantinos Theofilopoulos	
		Opening address by representative of the Hellenic Association of Insurance Companies (EAEE)	
		Opening address by representative of the Hellenic Institute for Occupational Health and Safety (ELINYAE)	
		Welcome address by the Chair of the SRA-E Athens Conference Organizing Committee, Professor Kalliopi Sapountzaki	
		Welcome address by the Student's Chair of the SRA-E Athens Organizing Committee, Ioannis Daskalakis	
09.45 - 10.45	Moderator: Dr. Miranda Dandoulaki	**Keynote Speech:** (Room/Venue: Amphitheater)	**Title: Risk and Crises as Social Constructs in a Comparative Perspective** **Professor Virginia Garcia Acosta**

Coffee Break : 10.45 - 11.15
(Room/Venue: Ceremony Hall)

PARALLEL SESSIONS M1 (11.15 - 12.45)

	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	[DISASTER] RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	The Risk concept in history and across scientific domains	Risk assessment models adapted to risk variability	Climate Change mitigation and adaptation	(Disaster) Risk perception and impacts: Different regions, cultures and eras	Climate Change hazards and risks: Temporal / spatial analysis and management
	Chaired by: Aven T., Duckett S.	*Chaired by: Logan T., Bubbico R.*	*Chaired by: Filatova T., Tzatzaki V.*	*Chaired by: Árvai J., Hanoch Y.*	*Chaired by: Moirasgentis S., Spence E.*
1	Trends in risk research: A bibliometric analysis Warren G., Duckett S., Lofstedt R.	Global Perspectives on Climate Risk Assessments: An evaluation of local climate risk assessments for effective adaptation planning. Anderson M., Logan T.	Does climate change risk perception influence people's intention to invest in solar farms vs. nuclear power plants? Tedaldi E., Casarotti M., Sellaro R., Girardi P., Rubaltelli E., Lotto L.	Silver Spoons and Toxic Soaps: The Impact of Wealth on Health Risk Perceptions Near a California Hot Lab Blyler J., Árvai J., Marcos A., Tiegar L., John R.	Perspectives on CDRs from Malaysian Borneo Spence E., Payne M., Lim R., Cox E., Pidgeon N.
2	Risk Governance in the 21st Century: Addressing the Existential Risks of Algorithmic Decision-Making Systems Alba J., Scharffscher K.	Combining scientific accuracy and practical needs in NaTech risk assessment: the case of Seismic risk in the Chemical Process Industry Bubbico R., Novelli F., Pesce F.	Does climate change distress undermine environmental policy support? An examination of climate change anxiety, fatigue, scepticism and inefficacy in Korea Kim K., Kim S.	Worker Perceptions of Disaster Risk Management in Saudi Arabian Hospitals Alshehri S., Dawson I., V. Katsikopoulos K.	Who influences risk perceptions and climate change adaptation intentions? Using cross-country survey data to identify archetypes of social influence Wagenblast T., Filatova T., Warnier M., Ghorbani A.
3	The role of time in risk and risk analysis Logan T., Aven T., Flage R., Guikema S.	Uncovering the dynamics of systemic risks and cascading impacts of hydrological extreme events: A methods overview Schweizer P., Madruga de Brito M., Sodoge J., Fekete A., Hagenlocher M., Koks E., Kuhlicke C., Meusori G., de Ruiter M., Ward P.	Towards a better understanding of household climate change adaptation decisions: insights from large-scale, multi-country, longitudinal survey data Verbeek L., Filatova T.	Is 5G everywhere? Citizen's situational exposure perceptions of EMF from mobile communication technology – a ten-country study. Link S., Eggeling M., Abacioglu F., Boehmert C.	How much precipitation has changed in Greece over the past century? Dimitriadis P., Koutsoyiannis D., Tsiopoulou T., Tepetidis N., Sargentis G., Mamassis N.
4	Risks and disasters in history: ideas, myths and fears Audefroy J., Montesinos T.		Protected areas and climate change mitigation: Multilevel governance and policy reform in Greece. Tzatzaki V.	Can you spot the fraudulent ticket: The role of critical thinking, impulsivity and risk preference Hanoch Y., Eskinazi N.	Effects of air pollution and climate change on all-cause mortality: a case study in the Po Valley, Italy Girardi P., Prodocimi I., Gaetan C.
5			The challenge of zero-carbon energy transition: the case of Western Macedonia Kavouras K.	Mapping Urban Insecurity: Analyzing the Spatial Dynamics of Safety Perception Kundak S., Oruc Ertekin G.	

Regional Chapter Meetings (Rooms 1.2 and Seminar Room, Geography Building) & Lunch break (Ceremony Hall): 12.45 - 13.45

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SRA Europe 2024 • Athens, Greece
2-5 June 2024
Harokopio University of Athens, Department of Geography
32nd Annual Conference
SRA EUROPE

PROGRAM

MONDAY 3 JUNE 2024

13.45 - 15.00	**PANEL DISCUSSION: CONSIDERING RISKS IN (SPATIAL) DEVELOPMENT POLICIES: FOCUS ON THE MEDITERRANEAN REGION** (Room/Venue: Amphitheater) Moderator: Dr. Yorgos Mellisourgos Panelists: Dr. Miranda Dandoulaki, Prof. Adriana Galderisi, Prof. Cassidy Johnson, Prof. Patrick Pigeon, Prof. Emeritus Louis Wassenhoven, Prof. Emeritus Costis Hadjimichalis

PARALLEL SESSIONS M2 (15.00 - 16.30)

	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	[DISASTER] RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	The past and the future of disaster risk approaches	Mapping hazard, exposure, vulnerability and adaptive capacity I	Crisis management: Urgency and uncertainty	Risk Communication and Governance in different regions	Geophysical hazards and risks: Temporal / spatial analysis and management
	Chaired by: Pigeon, P., Bosher L.	*Chaired by: Deliadetsimas P., Thoidou E.*	*Chaired by: Xanthopoulos G., Quigley K.*	*Chaired by: Schweizer P., Boehmert C.*	*Chaired by: Kalligeris N., Kundak S.*
1	Understanding and identifying climate risk factors using a matrix-based approach: a scalable and replicable methodological advancement Ellena M., De Vivo C., Barbato G., Mercogliano P.	Mapping the links between social impacts and social capacities to support flood risk planning and management Guadalupe Ortiz G., Aledo A., Mañas-Navarro J., Tur-Vives J., Aznar-Crespo P., Jimeno-Miranda I.	Patterns in risk perception of natural hazards and their influence on behaviour in crisis situations Wellmann A.	Communicating precaution regarding electromagnetic fields in mobile communications: Does personal relevance make a difference? Eggeling M., Boehmert C., Link S., Abacioglu F.	Temporal and Spatial Seismic Risk Scenarios of Istanbul Kundak S., Goksu C., Arslanli K., Asci A., Kalkanli D., Yilmaz A., Mert Sabah C., Özden Pak E., Ergun Konukçu B.
2	Stop going around in circles: Embracing temporality and complexity through a reconceptualisation of the disaster risk management phases Bosher L., Chmutina K., van Niekerk D.	Feeling hot is being hot? Comparing the mapping and the surveying paradigm for urban heat vulnerability in Vienna Seebauer S., Friesenecker M., Thaler T., Schneider A., Schwarzinger S.	Working across Disciplines to Understand and Improve Mass Evacuations for People with Disabilities Quigley K., Lowe K.	Understanding the communication ecosystem of climate adaptation professionals Forde N.	Tsunami hazard and evacuation planning in Larnaca, Cyprus, within the framework of the CoastWAVE project Kalligeris N., Aguirre Ayerbe I., Lorito S., Pilidou S.
3	Philosophical aspects of cost-benefit analysis in seismic risk prevention: A critical evaluation Organo M., Chiffi D., Petrini L.	Assessing organisational resilience in micro, small scale enterprises: in search of the right resilience indicators. Okoli J.	Civic Coalition against Democratic Backsliding in Crisis Response: Following the 2022 Halloween Crowd Crush in Seoul Yeo J., Yoo E.	Communicating and governing emerging risks in North and Sub-Saharan Africa. Oramah C., Ngwu T.	Enhancing housing resilience to earthquakes: Factors influencing private autonomous adaptation in urban regeneration planning Hung H., Lu C.
4	Shedding light on Disaster Risk Management cycle model (DRCM) in the face of risks variability. Pigeon P.	Socio-demographic Determinants of Earthquake Coping Capacity: the case of the Corinthiakos Gulf, in Greece Niforatos S., Panagiotakos D.	Teaching an Old Dog New Tricks: Using Theory of Change for Dog Bite Risk Management Owczarczak-Garstecka S., Williams C., Murray J., Christley R.	Assessing deliberative and participatory techniques for risk governance – Results from the Horizon 2020 REAL DEAL project Schweizer P., Blanchet T., Chabay I., Droy S., Giesbers E., Gurzawska A., Hafen F., Heffernan R., Jaeger C., Johannsen L., Martins M., Niestoy I., Renn O., Sperrin A., Stec S., Stock A, van der Burg S., Zimmer-Tantan U.	Forensic investigations aftermath of Kahramanmaraş earthquake sequence, 6th February 2023 Kundak S., Goksu C., Yavuz Arslanli K., Asci A., Kalkanli D., Yilmaz A., Mert Sabah C.
5		Table-top exercise for identifying communication-related vulnerabilities in disasters Torpan S.		Specifying the Role of Knowledge, Misinformation, Confidence in Climate Change Attitude and Action Kim S., Kim S., Kim K.	Estimating the Probable Maximum Loss of Public Buildings in Sumatra due to Tsunamis Generated from Sunda-Megathrust Segments Syamsidik S., Syafruddin S., Idris Y., Ulia A., Khalgillah A., Al Farizi M.

Coffee Break : 16.30 - 16.45
(Room/Venue: Ceremony Hall)

PROGRAM

MONDAY 3 JUNE 2024

PARALLEL SESSIONS M3 (16.45 - 18.15)

ROOM/VENUE	Geography Building	Main building			
	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Systemic risk: Spatial and temporal aspects	Mapping hazard, exposure, vulnerability and adaptive capacity II	Symposium: "Intuitive Risk Management" in the 21st Century – Bridging Different Perspectives	Systemic risk Communication and Governance	Technological and Na-tech risk assessment, mapping and management
	Chaired by: Lambert J., Ntzeremes, P.	*Chaired by: Kundak S., Balzekiene A.*	*Coordinator: Bearth A.*	*Chaired by: Ylönen M., Poldakaki A.*	*Chaired by: Markoulaki E., Yang J.*
1	Order Sensitivity Index Method of Systems Analysis and Risk Analysis Lambert J.	A comparative study of residential trajectories of migrants under different housing regimes: Evidence from three Nordic capital cities Torpan K., Wessel T., Kenjy Chihaya Da Silva G., Sinitsyna A., Tammaru T.	Intuitive Toxicology in the 21st century - Perspectives of European risk assessors and the public Bearth A., Roth N., Wilks M., Siegrist M.	From Play to Preparedness: Evaluating the Impact of Serious Gaming on Natech Risk Communication Tzioutzios D., Cruz A., Dandoulaki M., Paltrinieri N.	Managing PFAS risks amid uncertainty:Personal relevance, conflicting information, and information Behaviors Liu Z., Yang J.
2	Introducing the Risk-Tandem Framework as a Holistic Approach Towards the Assessment and Governance of Systemic Risks. Hofbauer B., Schweizer P., Cumiskey L., Parviainen J., Bharwani S., Hochrainer-Stigler S., Zhu Q., Einhäupl P., Cubie D.	From Risk to Resilience: Evaluating the Marmara Region Through the Resilience City Index Gökçe P., Ronael M.	Romantic perception of nature results in biased perceptions Siegrist M., Berthold A.	Risk evaluation regarding potential retrieval of nuclear waste. A case study with a group of German citizens. Seidl R., Mintzlaff V., Othmer J.	Data-Driven Risk Analysis and Emergency Management for Rail Hazmat Transportation Vaezi A., Izadpanah M., Asgary A.
3	Setting the Stage for Innovating Systemic Risk Assessment and Governance Einhäupl P., Hofbauer B., Schweizer P.	People speak, but nobody listens. Participatory research in water-insecurity risk analysis to stimulate collaborative water and risk governance Montoya Pachongo C., Evans B., Camargo-Valero M., Bayona Valderrama Á.	Citizen's location preferences for mobile phone base stations: More than just a question of distance? Link S., Eggeling M., Abacioglu F., Boehmert C.	The impact of fear appeals on individuals' climate change attitudes, intentions, and behaviors: A meta-analysis Conteh Y., Inwald J., Miller L.	Spot on ! Preparedness & expectations of citizens during a long-term power black-out. De Pauw E., Vandekerckhove S.
4		Residential Building Exposure Development including Socioeconomic Dimensions in Saint Lucia. State of the art in methodology Gaspari M.	Price increase vs. loss of purchasing power: How investment decisions are influenced by the way inflation is framed. Boehmert C., Tschirpke A., Weinschenk P.	Turning eco-anxiety into pro-environmental behaviour: Risk perception as mediator. Luis S., Loureiro A., Soro J., Possidónio C., Sampaio F., Gaspar R .	The Impact of Political Factors on the Relationships between Releasing Fukushima Radioactive Water and the Acceptance of Nuclear Energy Kim S., Kim K., Kim I.
5				Comparative Analysis of End-Users' Perceptions of Recycled Radioactive Building Materials Love N., Perko T., Leroi-Wereld S., Geysmans R., Schroeyers W., Malina R .	
18.15 - 19.15	**PANEL DISCUSSION: RISK PRIORITIES AT PERSONAL, COMMUNITY, INSTITUTIONAL LEVEL** (Room/Venue: Amphitheater) Moderator: Prof. Maria Kousis Panelists: Prof. Wändi Bruine de Bruin, Prof. Silvia Luis, Dr. Roland Nussbaum, Dr. Apostolos Veizis, Prof. Jeroen Warner				

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PROGRAM

TUESDAY 4 JUNE 2024

08.30 - 09.30	*Conference Registration*		
09.30 - 10.30	Moderator: Prof. Kalliopi Sapountzaki	**Keynote Speech:** (Room/Venue: Amphitheater)	**Title: Disaster risk reduction and prevention through spatial and development policies in world regions.** **Professor Allan Lavell**
	Coffee Break : 10.30 - 11.00 (Room/Venue: Ceremony Hall)		

PARALLEL SESSIONS T1 (11.00-12.30)

ROOM/VENUE	Geography Building	Main building			
	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES	RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES	(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Risk in education and learning	New technologies for hazard and risk observation and monitoring	Risk-based Development and Spatial Planning I	Risk culture and acceptable risk I	Public health, epidemic and pandemic risks
	Chaired by: Löfstedt R., Jardine C.	*Chaired by: Laban M., Spyrou C.*	*Chaired by: Galderisi A., Mellisourgos Y.*	*Chaired by: Luis S., Wardman J.*	*Chaired by: Jansen T., Hanoch Y.*
1	The Power of Language and Meaning in Equitable Risk Communication and Management Jardine C.	Remote sensing methods application in vulnerability assessment of urban areas to hazards Laban M., Popov S., Draganic S., Popovic L.	Developing Risk-Informed Sustainable Development Policies: Directions for Disaster Risk Management at National and Subnational Levels Raikes J., Henstra D., Thistlethwaite J.	Effect of information provision and visualization on user's confidence, comprehension, and decision-making for long-range energy projections Sorgato V., Trutnevyte E.	Delayed synergies are harder to be seen: an experimental investigation of factors influencing synergistic judgements of health risks Barjakova M., Macchi L.
2	Risk education: The cobblers children are the worst shod! Parchment A.	Implementation of NASA-EMIT Satellite Mineralogy in METAL-WRF model and implications for dust aerosols in the Mediterranean. Spyrou C., Solomos S., Bartsotas N., Kalogeri C., Zerefos C.	Social and Economic Adaptation and Resilience after Hurricane Otis in Acapulco, Guerrero Montesinos E., Cabrera B., Auferoy J., Dominguez N., Leal E.	Social media, climate doom, and support for radical action related to climate change Yang J., Buck H.	Medical decision-making under risk and uncertainty: Anaesthetists' decision to attend an operation Hanoch Y.
3	Children citizen geo-science for climate adaptation Atun F., Martinez J., van Hooijdonk M.	How do people react during a disaster ? : observations of concrete situations and experiments based on simulated situations Provitolo D., Dubos-Paillard E., Berred A.	Assessment Criteria for Climate-Resilient Public Spaces: Perspectives from Istanbul Ronael M., Oruç Ertekin G.	Bioplastics: risk factors for industry and consumer acceptance Domingos S., Farias A., Possidónio C., Luis S., Loureiro A., Cruz B .	Biotechnology: "Devil's Trick" or "God's Gift"? The case of mRNA preparations of SARS-CoV-2 Ravasopoulos Petrakis M.
4	Understanding childrens' knowledge about the 1.5-degree climate policy target Engler J., Kause A.	Optimization of sensor networks for detection of wildfires leading to natural and Na-Tech disasters Gómez-González J., Marcoulaki E., Konstantinidou M., Cantizano A., Caro R., Castro M .	How to improve cultural heritage protection policies at the European level : insights from field experiences Ancona S.	Cooperation in Adolescence: The Role of Risk Aversion, Scarcity of Resources and Perceived Peer Social Support Mastromatteo L., Caserotti M., Scrimin S.	Different Perceptions of Risk and Management of African Swine Fever: Results from a Social Research Zago M., Crovato S., Lenzo F., Mascarello G., Feliziani F., Iscaro C., Vio D., Citterio C.
5	Cultivating Resilience: Sustainable Strategies in Western Balkan Higher Education Institutions for Climate Action Grabova P., Pojani E.		Seafront planning in the era of climate change: challenges for risk prevention and beyond, through an integrated resilience approach Foutakis D., Thoidou E.	Engaging tangata whenua: Understanding the social and cultural impacts of cascading risks for Māori communities in Aotearoa New Zealand Scadden M., Logan T., Brown C.	
	SRA-E General Assembly Meeting (Amphitheater) & Lunch Break (Ceremony Hall) : 12.30 - 13.45				

PROGRAM

WEDNESDAY 5 JUNE 2024

PARALLEL SESSIONS W2 (13.45 - 15.15)

	Geography Building	Main building			
ROOM/VENUE	2.1	A1	Amphitheater	A6	A4
TRACK	RISK THEORY: CONCEPTS AND APPROACHES		[DISASTER] RISK MITIGATION, REGULATION AND MANAGEMENT	RISK PERCEPTION, COMMUNICATION AND GOVERNANCE	MONITORING AND COPING WITH REAL RISK PROBLEMS
Session Title	Symposium: Risk-based uncertainty management: linking science to policy actions		Engineering and non-engineering safety regulations	Round-table: Network of Networks for Risk Based Decision Making (N²RBDM) An international initiative for a worldwide assessment of the SENDAI objectives	Food Security/Safety in Europe and beyond II
	Coordinator: Bouder F.		*Chaired by: Laban M., Stene L.*	*Coordinators: Nussbaum R., Atun F.*	*Chaired by: Hallman W., Tiozzo Pezzoli B.*
1	Breaking down uncertainties is risk governance: Challenges and opportunities for risk management and communication. Jansen T.		Non-cognitive factors and methodological choice in regulatory science Todt O., Luján J.		Awareness, Understanding and Use of FDA/EPA Advice About Eating Seafood for Women Who Are/Might Become Pregnant. Hallman W., Errickson L., Hallman, II W.
2	'All we have to do is be uncertain': assessing the 'amplification of institutional incertitude' in European food safety risk governance Wardman J., Bouder F.		Risk in Critical Infrastructure Protection approach adopted in Poland Tomalska A.		Fridge storage for food safety: the role of psychosocial factors to improve food safety risk communication Tiozzo Pezzoli B., Demasi V., Russo M., Gianetta M., Ricci A., Mari S.
3	Risk analysis, uncertainty, and innovation: what does this mean for the Dutch energy transition? Bouder F., Löfstedt R., van Ginkel E.		Challenging the risk regulating models. The Security Act and the Ocean Industry Authority (Havtil) Engen O., Hansen S., Jore S.	Roundtable Participants: - Dr. Passas N. (Region of Attica) - Dr. Dandoulaki M. - Represenative from the Hellenic Association of Insurance Companies	Immigrants food security in Greece Michalis A., Panagiotakos D., Papadopoulos A., Costarelli V.
4	Navigating regulatory challenges: Uncertainty surrounding Titanium dioxide in food and medicines Mrksic Kovacevic S., Bouder F.		Avoiding unintentional poisonings with household chemicals: Comparing the appeal to children from the perspectives of children, caregivers and experts Bosshart N., Bearth A., Wermelinger S., Daum M., Siegrist M.		
5			How can different risk perception between public and private sector affect security of critical maritime infrastructure against unknown threats? Stene L., Utne R.		
15.15 - 16.15	Moderator: Dr. Miranda Dandoulaki	**Keynote Speech:** (Room/Venue: Amphitheater)	**Title: Mobile Public Alert and Warning in the Climate Change Era: Reconsidering a Risk Communication Consensus** **Professor Hamilton Bean**		
	Coffee Break : 16.15 - 16.30 (Room/Venue: Ceremony Hall)				
16.30 - 17.45	**PANEL DISCUSSION: RISKS OF THE PAST, PRESENT AND FUTURE** (Room/Venue: Amphitheater) Moderator: Prof. Kalliopi Sapountzaki Panelists: Prof.Terje Aven, Prof. Virginia Garcia Acosta, Prof. Allan Lavell, Prof. Dimitris Kaliampakos, Prof. Ragnar Löfstedt				
	Awards Ceremony: 17.45 - 18.00 (Room/Venue: Amphitheater)				
18.00 - 18.15	**Closing Ceremony** **Moderator: Ioannis Daskalakis** (Room/Venue: Amphitheater)	Closing address by the co-Chair of the SRA-E Athens Conference Organizing Committee, Dr. Miranda Dandoulaki Closing address by the President of SRA Europe, Professor Marja Ylönen			

Conference Program

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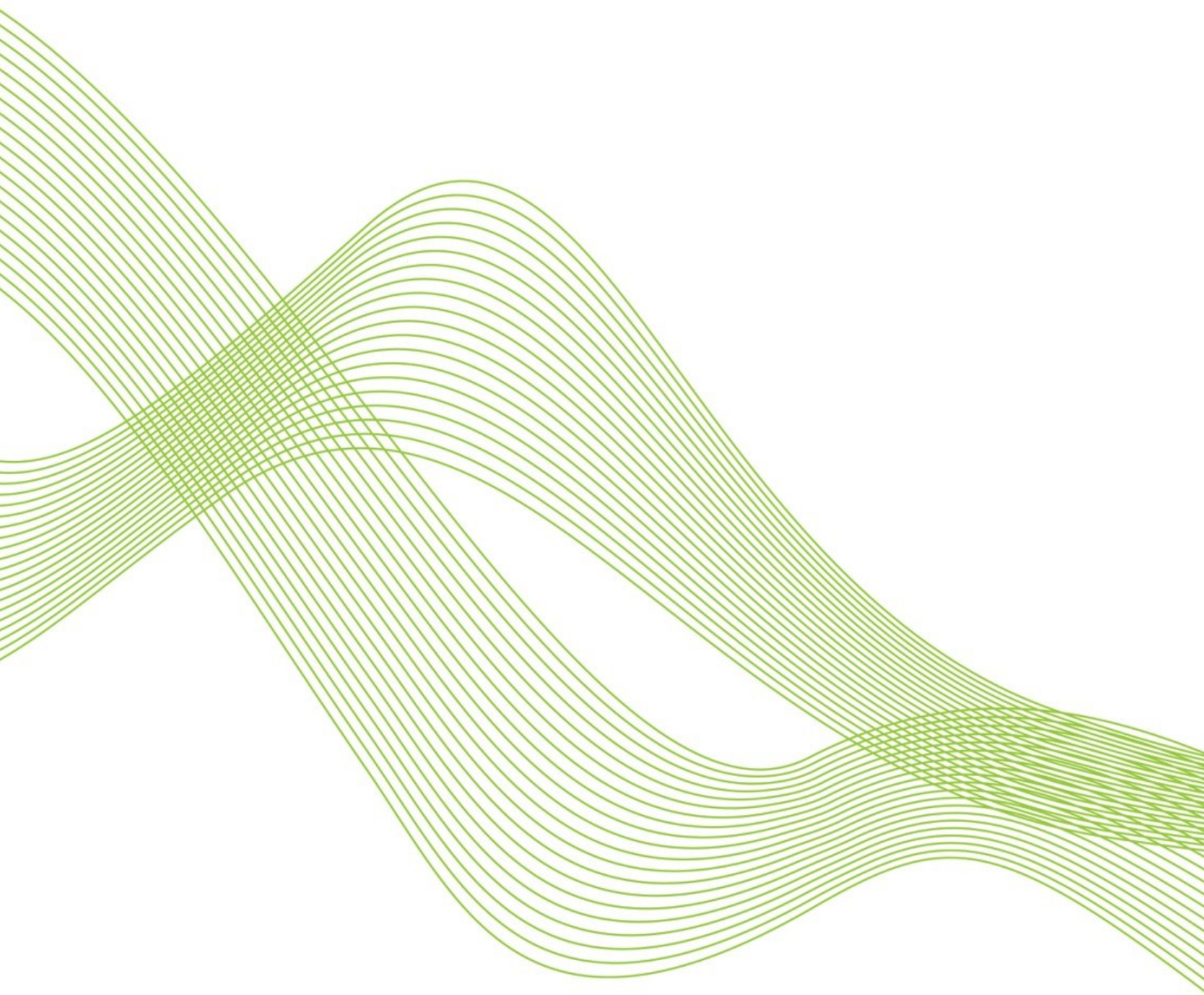
ABSTRACTS OF INVITED SPEECHES
– Part A



Professor Virginia García Acosta | Keynote speech title: Risk and Crises as Social Constructs in a Comparative Perspective

The study of risks and disasters, especially those associated with natural hazards, has powerfully attracted the attention of social scientists from different disciplines for more than a century. Anthropology and History have become major contributors to the understanding that what has increased over time is not the presence of natural phenomena, but the presence of growing risks and vulnerabilities, which we call the social construction of risks.

This conference will address, from the starting point that disasters are processes, how research, based on ethnography and historical documentation coming from a wider global south, can help to understand how society generates contexts that are vulnerable to such a degree that the context itself becomes a hazard and, consequently a factor of risk generation. Some of the main theoretical and methodological paths developed up to now will be addressed. The general idea is to discuss that progress to date shows that interdisciplinary and comparative dialogue has been instrumental in the progress made and needs to be continued.

Brief CV:

Professor Virginia Garcia Acosta is a Mexican Social Anthropologist and Historian.

Background: Professor-Researcher at CIESAS (Center for Research and Higher Studies in Social Anthropology, Mexico) since 1973. Full member of the Mexican Academy of History (chair number 5), of the Mexican Academy of Sciences and Emeritus Researcher of the National System of Researchers. She was CIESAS General Director from 2004 to 2014 and its Academic Director from 1997 to 2000.

Areas of expertise: 1) Anthropology and History of risk and disasters in Mexico and Latin America. 2) Comparative studies on climate and society on both sides of the Atlantic 3) Anthropocene and Climate Change: Historical and Anthropological Perspectives Anthropology & History: Theories and Methodologies.

Publications: as an individual or coordinating author she has published 30 books and more than a hundred articles or book chapters in Mexico and abroad. Some of her main books are: a) three volumes of Historia y Desastres en América Latina (History & Disasters in Latin America), 1996, 1997, 2008; b) two volumes of Los sismos en la historia de México (Earthquakes in Mexican History), 1996, 2001, with G. Suárez; c) Desastres agrícolas en México (Agricultural Disasters in Mexico), 2003, with, JM. Pérez Zevallos & A. Molina; d) Les catastrophes et l´interdisciplinarité (Disasters and Interdisciplinarity), 2017, with A. Musset; e) The Anthropology of Disasters in Latin America. State of the Art, Routledge, 2020 (translated to Spanish and published in 2021).

Professor Hamilton Bean | Keynote speech title: Mobile Public Alert and Warning in the Climate Change Era: Reconsidering a Risk Communication Consensus

Dr. Dennis S. Mileti's research underwrites U.S. and international officials' approach to mobile public alert and warning. Mileti emphasized the importance of complete messages in his 2018 FEMA PrepTalk: "[U.S. Department of] Homeland Security funded a lot of social psychologists and sociologists and communication people to study warnings a few years ago, and there were many breakthroughs learned. One of the things that was learned that that 90-character WEA messages accomplished nothing" (FEMA, 13:50). He asked the audience, "But what impacts protective action initiation behavior in Americans the most?" His answer: "It's the message contents. It's the message contents. It's the message contents" (15:53). Mileti's PrepTalk has become the cornerstone of FEMA's IPAWS training, reaching hundreds of state, county, and municipal officials. Taken at face value, Mileti's claim that "it's the message contents" risks downplaying the principle that meaning is generated through the interaction of text and context. The risk communication consensus potentially overemphasizes message effects, creating a false sense of security. While recent mobile public alert and warning policy and practice developments in the United States have rightly affirmed the importance of text, the task is now also to improve context.

Brief CV:

Hamilton Bean, Ph.D., MBA, APR, is Professor in the Department of Communication at the University of Colorado Denver. He also serves as Director of the University of Colorado Denver's International Studies Program. He has taught courses at the International College Beijing (ICB) and served as a guest researcher (2018, 2024) and visiting professor (2021) at Kyoto University's Disaster Prevention Research Institute (DPRI). In 2022, he began serving as a non-resident fellow for the U.S. Joint Special Operations University (JSOU). He specializes in the study of communication and security with an emphasis on mobile public alert and warning systems and messages. He was part of a U.S. Department of Homeland Security-funded research team that investigated the optimization of Wireless Emergency Alert (WEA) messages for imminent threats. He has consulted for international, federal, and state agencies, as well as contributed to U.S. Federal Communications Commission rulemakings concerning the WEA system.

He holds a doctorate in organizational communication from the University of Colorado Boulder (2009). He has earned research funding from the U.S. Federal Emergency Management Agency (FEMA), U.S. National Oceanic and Atmospheric Administration (NOAA), and the Japan Foundation to study mobile public alert and warning systems and messages. He is Associate Editor for Natural Hazards Review and the Journal of Integrated Disaster Risk Management. He is also an editorial board member for Communication Law Review, Intelligence and National Security, Secrecy and Society, Rhetoric & Public Affairs, and Management Communication

Quarterly. In 2022, he earned the Aniello Amendola Distinguished Service Award from the Integrated Disaster Risk Management Society (IDRiM). His research has been published in numerous international academic journals and edited volumes. His latest book, Mobile Technology and the Transformation of Public Alert and Warning (Praeger Security International, 2019), won the 2021 Sue DeWine Distinguished Scholarly Book Award from the Applied Communication Division of the National Communication Association.

Professor Wändi Bruine de Bruin | Keynote speech title: Communicating the Climate Crisis

Climate change poses a serious threat to people around the world. Organizations such as the Intergovernmental Panel on Climate Change (IPCC) are tasked with communicating about climate change with international audiences of policy makers and members of the general public. These communications can be complex and, in the words of one of our research participants, "talk over people's heads." In this presentation, I will discuss my ongoing work with various organizations on understanding and informing public perceptions of climate change, and making climate change communications more accessible.

Brief CV:

Wändi Bruine de Bruin is Provost Professor of Public Policy, Psychology, and Behavioral Science at the University of Southern California (USC), where she serves as the director of the USC Behavioral Science and Well-Being Policy initiative. Her research aims to understand and inform how people make decisions about their personal health, their carbon footprint, and their household finances. She has published more than 150 peer-reviewed publications on these topics. She is an editorial board member for the Journal of Experimental Psychology:Applied, Perspectives on Psychological Science, the Journal of Behavioral Decision Making, Decision, Medical Decision Making, the Journal of Risk Research, and Psychology and Aging. She recently served on the National Academy of Sciences committee on Respiratory Protection for the Public and Workers without Respiratory Protection Programs at their Workplaces. She previously served on expert panels for the National Academy of Sciences on Communicating Science Effectively and for the Council of the Canadian Academies on Health Product Risk Communication.

Professor Allan Lavell | Keynote speech title: Disaster risk reduction and prevention through spatial and development policies in world regions

Structural and residual disaster risk reduction are key priorities of the intergovernmental Sendai agreement as they were for Hyogo and are key in achieving the UN Sustainable Development Goals. Structural DRR comprises two differentiated practices, firstly corrective, mitigatory reduction of existing risk and secondly, preventative, prospective, avoidance or control of potential future risk. Residual risk reduction can be achieved through compensatory, pre and post hazard event impact actions, whether through early warning and anticipatory action, response, recovery and reconstruction or resilience building in general.

Despite the priority nature of these practices, a very large gap exists between policy and concept and on the ground practice, with the result that disaster risk has and grows rapidly in many parts of the world today, severely challenging the achievement of the SDGs. As disaster risk is predominantly a social construction, a result of failed or skewed development practice, DRR, particularly its prospective mode, can only be satisfactorily achieved through the use and risk dimensioning of existing development instruments and strategies, including those of a spatial, sectoral (social and economic), and environmental nature. The conference will examine disaster risk construction processes and the corresponding necessary development based DRR mechanisms at different scales and locations in more developed countries and the global south.

Brief CV:

Allan Lavell was born in England and has lived continuously in Latin America for 50 years. He has a PhD and M.Sc. in Economic Geography from the London School of Economics and Political Science-LSE. Specialist in urban and regional development, since 1989 he has been dedicated to the study of disaster risk and climate change and its management. Currently an associate researcher at the Latin American Faculty of Social Sciences, Costa Rica, he has been a professor and researcher at the University of London, Middlesex University, the Metropolitan Autonomous University of Mexico and UNAM, the Central American Higher University Council and the University of Costa Rica. He has written more than 150 chapters, articles, documents and scientific books on the topics of risk and disasters and urban development, has given more than 150 international conferences in 42 countries around the world and has carried out nearly 90 consultancies in 32 countries on five continents. He has been a member of numerous global and regional scientific committees and editorial boards of journals and books and was a co-founder of the Network for Social Studies in Disaster Prevention in 1992. He has been a recipient of the UN Sasakawa Prize. in 2015 from 88 applicants, in recognition of his contributions to the development of risk management worldwide.

Professor Ortwin Renn | Keynote speech title: Transboundary and transsectoral dimensions of systemic risks: Implication for governance and communication

One of the most critical challenges facing humanity is the increasingly urgent need to find and implement pathways to sustainable futures. While humans living in Earth's environment on which survival of all forms of life depends have been subject to disasters and faced crises at global to local spatial scales and temporal scales from immediate to long-term threats to future generations, a new type of risks, called systemic risks, are now increasingly acute and potentially irreversible with disastrous consequences leading to simultaneous polycrises. They include, e.g., the COVID-19 pandemic, food security, shifting geopolitics and war, climate change impacts, transgression of planetary boundaries, and systemic inequity and injustice.

With respect to adequate governance responses to deal with systemic risks, the complexity literature suggests a number of systematic approaches and instruments such as stress tests, reverse stress tests, critical transition trajectories, black swan scenarios and others. In addition, network theory provides tools with which to investigate the structure of global connectivity, including the interactions between networks. A special challenge refers to risk communication for systemic risks. The threat is often counterintuitive, the relationships are mostly stochastic, complex and non-linear, and tipping points may obscure the eminence of the dangers. The paper will address these challenges and suggests some options to design effective risk communication programs.

Brief CV:

Prof. Ortwin Renn is a social scientist focusing on risk governance. He retired as scientific director at the International Institute for Advanced Sustainability Studies (IASS) in Potsdam (Germany) in December 2022 and serves as a professor emeritus for environmental sociology and technology assessment at the University of Stuttgart. He directs the non-profit company DIALOGIK, a research institute for the investigation of communication and participation processes. Renn is Adjunct Professor for "Integrated Risk Analysis" at Stavanger University (Norway), Honorary Professor at the Technical University Munich and Affiliate Professor for "Risk Governance" at Beijing Normal University. His research interests include risk governance (analysis, perception, communication), stakeholder and public involvement in environmental decision making, transformation processes in economics, politics and society and sustainable development.

Ortwin Renn has a doctoral degree in social psychology from the University of Cologne. His career includes teaching and research positions at Clark University (Worcester, USA), the Swiss Institute of Technology (Zuerich) and the Center of Technology Assessment (Stuttgart). His honours include the National Cross of Merit Order, honorary doctorates from the Swiss

Institute of Technology and the Midsweden University, the “Outstanding Research Award” of the Society for Integrated Disaster and Risk Management (IDRiM) and the “Distinguished Achievement Award” of the Society for Risk Analysis (SRA). In 2019, he was awarded the Order of Merit from the State of Baden-Württemberg for special achievements in scientific policy advice.

Renn is a member of the German National Academy of Sciences “Leopoldina”, the Berlin-Brandenburg Academy of Sciences (Berlin), and of the Board of Directors of the German National Academy of Technology and Engineering (Acatech). He chairs the Sustainability Council of the State of Brandenburg and the associated sustainability platform in which ca 170 sustainability initiatives are organized. In 2011 he served on the Ethics Commission "The Future of Energy" appointed by Chancellor Angela Merkel. Until 2014, he was a member of the "Science and Technology Advisory Council", an advisory body for EU Commission’s President Jose Manuel Barroso.

Renn has published more than 30 monographs and over 250 peer reviewed articles. His most prominent English publication is the book “Risk Governance. Coping with Uncertainty in a Complex World (London: Earthscan 2008).

ABSTRACTS OF ORAL PRESENTATIONS
– Part B

TRACK 1:
RISK THEORY: CONCEPTS AND APPROACHES

Session Title:
The Risk concept in history and across scientific domains

◆ Chaired by:
Terje A, Duckett S.

Trends in risk research: A bibliometric analysis

Warren G.[1], Duckett S.[2], Löfstedt R.[2]

[1]University of Surrey
[2]King's College London

Abstract: In the over 40 years since the founding of the Society for Risk Analysis, the risk topics, environments and populations examined by risk researchers have changed greatly (Balog-Way et al., 2020; see Goerlandt & Li, 2022). Understanding these changes in foci are important both in understanding what risk research has examined, but in extricating potential future avenues of opportunity and reflecting on why certain topics of risk research have received more or less research attention. This study presents results from a bibliometric analysis of journal article keywords from two key journals: Risk Analysis and Journal of Risk Research. Here, we present trends in risk research in five-year blocks, aiming to show how the field has grown and developed. In addition, we show how foci of published articles change over time, particularly examining key topics and concepts or theories commonly-known to those highly engaged with the Society for Risk Analysis. The findings help to show where the Risk discipline has emerged from, and where it may go to next topic-wise and conceptually. This is with the aim of aiding those planning future research strategies by examining what has come before and the history that has led to the current makeup of the community, allowing experienced members to reflect on the accomplishment and change they have seen within the community, and informing the Society for Risk Analysis in how to grow this community of risk researchers further.

Keywords: Risk research; Bibliometric analysis; History

Risk Governance in the 21st Century: Addressing the Existential Risks of Algorithmic Decision-Making Systems

Alba J.[1], Scharffscher K.[1]

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Abstract: This text aims to challenge Algorithmic Decision-Making Systems (ADMS) in risk governance policymaking. We argue that ADMS perpetuates 'traditional' biases in risk governance, exacerbating social, structural, and institutional power imbalances. In analyzing two case studies of predictive policing and recidivism in the United States, we argue that purely technical assessments are insufficient in mitigating the discriminatory harms of ADMS. To locate and situate the societal vulnerabilities that underpin ADMS' integration, five intersectional capacities are applied in our micro-meso-macro analysis: the self, knowledge, processes, power, and agency. Further, we engage the Pressure and Release (PAR) framework to shed new light on the Root Causes, Dynamic Pressures, and Unsafe Conditions inherent in ADMS' existential risks. Notably, we do not relate the existential risks of ADMS in terms of human extinction but instead as targeted prejudice via unfair policy provisions, thereby leading to a loss of community, identity, and sociopolitical power and agency for marginalized communities. To that end, we argue that Intersectional Governance advances a society-oriented perspective to risk governance in the 21st Century, thus providing the opportunity to legislate equitable ADMS policies.

Keywords: Algorithmic Risks; Intersectionality; Risk Governance

The role of time in risk and risk analysis

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[3]University of Michigan

Abstract: There is a persistent misconception that risk analysis is only suited for considering the immediate consequences of an event. Such a limitation would make risk analysis unsuitable for many challenges, including resilience, sustainability, and adaptation. Fortunately, there is no such limitation. However, this notion has stemmed from a lack of clarity regarding how time is considered in risk analysis and risk characterization. In this talk, I outline and reflect on our work on this issue and discuss how risk science provides concepts and frameworks that can appropriately address time. I will discuss some of the challenges, limitations, and opportunities that we identified. I aim to encourage wider discussion on how time is considered within risk science.

Keywords: Concept; Foundations of risk; Time

Risks and disasters in history: ideas, myths and fears

Audefroy J.[1], Montesinos E.[2]

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Abstract: We are interested in showing how current scientific thinking about risks and disasters has been the heir of various observations, interpretations, imaginaries, and discourses that have developed from ancient times to the modern era. This work also has the purpose of bringing us closer to the relationships that exist between natural phenomena and the discourses socially constructed by various cultures and societies on both sides of the Atlantic. Since ancient times, philosophers have tried to explain celestial phenomena that they did not understand. Pythagoras (569-475 BC) had concluded that the earth was a sphere and Aristarchus of Samos (310-230 BC) thought that this earth revolved around the sun. Platon's legend about the disappearance of Atlantis due to an earthquake or flood remained a hypothesis because scientific evidence was still lacking. In Mesoamerica, the construction of myths explained the world and its disasters: we also find the myth of the flood in the Mayans as well as in the Christian Bible. Throughout history, wise men and clerics have invented concepts to try to understand and protect themselves from hydrometeorological and geological phenomena. From Europe to Latin America, the Church has been the protagonist of dogma to explain disasters with the key idea that men have sinned and consequently have been punished by the almighty God. When the concepts of risk, responsibility, and pollution were born in the 19th century, the evolutions had already taken place in factories, mines, and in all industrialized places. The modern period, starting with the 20th century, leads, on the one hand, to the State taking charge of dangers and, on the other, to the naturalization and secularization of catastrophes. It is a process that had begun in the 19th century, it is the consequence of the process of social construction of risks. Starting in the second half of the 20th century and continuing into the 21st century, a new perspective on disasters appears: the anthropological perspective that threats. This look allows us to return to the disaster as an object, and also as a framework to read the world. This view does not focus on vulnerabilities or the urgency of a response (the emergency), nor on risks, but on social groups, on their discontinuities, on their events, memories and rituals.

Keywords: Disasters; Risks; History; Europa; Mexico

Session Title:
The past and the future of disaster risk approaches

◆ Chaired by:
Pigeon, P., Bosher L.

Understanding and identifying climate risk factors using a matrix-based approach: a scalable and replicable methodological advancement

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Abstract: The rising global temperatures and the consequent impacts of climate change underline the urgent need to accelerate worldwide adaptation efforts. Despite potential successes in mitigation, climate risks persist due to the cumulative and cascading effects of climate-related impacts. As highlighted by the 6th Assessment Report of the IPCC, residual risks result in both economic and non-economic losses even after ambitious adaptation efforts. To minimize these risks, it is imperative to focus intensely on preventive, timely, fair, and effective approaches. Recognizing vulnerabilities and risks within and across systems is crucial and requires an understanding of localized manifestations of the effects of climate change. While various methodologies exist for quantifying climate risks, a matrix-based risk assessment approach emerges as a valid and easily replicable application, especially when coupled with the active involvement of key stakeholders. This step-by-step approach, integrating information on hazard, exposure, and vulnerability, provides a systematic framework for the precise identification and assessment of climate risks in the system under consideration. The resulting matrix, intuitively color-coded, facilitates an understanding in each phase, for each exposed element of the system and for the selected emissive scenario under consideration. This research delineates the crucial role of risk assessment and vulnerability analysis in shaping and implementing adaptation strategies, unveiling a gradual process from hazard identification to risk specification. The replicability, flexibility, and integrability into various spatial and temporal contexts make this risk assessment approach a valuable tool for evaluating climate risks in critical environments, such as across the least developed countries, contributing to facilitating and strengthening global efforts in risk assessment in the area of climate change adaptation. Recognizing the importance of risk assessment as an initial step of the iterative adaptation cycle, as emphasized in the first Global Stocktake (GST) from COP 28, is therefore imperative for the construction of long-term adaptive capacity across nations.

Keywords: Risk; Matrix-based approach; Adaptation

Stop going around in circles: Embracing temporality and complexity through a reconceptualisation of the disaster risk management phases

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[2]Loughborough University
[3]North-West University

Abstract: The way that disasters are managed, or indeed mis-managed, is often represented diagrammatically as a 'disaster cycle'. The cyclical aspects of the disaster risk management concept, comprised of numerous operational phases, have in recent years been criticised for representing disasters in an overly simplistic way that typically starts with a disaster 'event' - and subsequently leads onto yet another disaster. Subsequent cyclical thinking has been proven to not be very useful for the complexities associated with understanding disasters and their risks. The 'Disaster Risk Management (DRM) Helix' is a conceptual contribution that has been developed through a review of the literature, decades of research and practical experience and discussions between the authors, as a counterpoint to the pervasive 'disaster cycle'. The 'Helix' is presented as an alternative way of conceptualising the DRM phases. The helictical conceptualisation of DRM phases is intentionally presented to start a discussion (rather than as an end point) on how best to move away from the constraints of the 'disaster cycle'. It is envisaged that the helictical conceptualisation of DRM can be suitably malleable to include important factors such as temporal and spatial considerations and the underlying root causes that create differential levels of vulnerability and create disaster risks. It is thus the intention that the DRM Helix can provide a catalyst for stimulating discussions, within and across disciplines, and that future adaptations of the diagram that can better capture the dynamic (non-cyclical) nature of disasters and risk creation.

Keywords: Disaster; Risk; Management; Phases; Helix

Philosophical aspects of cost-benefit analysis in seismic risk prevention: A critical evaluation

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Abstract: The management of natural risks is a complex endeavor, which encompasses a plurality of measures intervening at different stages – from prevention to preparedness, response, and recovery. But given that the resources to be dedicated to this endeavor are limited, choices need to be made among alternative measures, to ensure that risk management is both effective and efficient. One of the principal tools to make decisions concerning the best use of limited resources is cost-benefit analysis – a tool which, however, may be of limited use in contexts of severe uncertainty. In this paper, we connect perspectives from philosophy of science and earthquake engineering to explore the applicability of cost-benefit analysis to the assessment of measures of seismic risk prevention. We do that by highlighting the limits imposed by different types of uncertainty on cost-benefit analysis and their implications in the context of seismic risk. To support our study, we rely on two case studies taken from recent Italian seismic history. The first case focuses on an analysis performed in the literature to evaluate alternative retrofit measures for RC-frame buildings in L'Aquila. By looking at their research work, we illustrate the role played by different types of uncertainty in the application of cost-benefit analysis to ex-ante assessments. The second case discusses the ex-post evaluation of some prevention measures implemented in the town of Norcia. By drawing comparisons both within and outside of Norcia, we identify contextual information that can be used to effectively reduce the uncertainty surrounding ex-post alternative scenarios. Building on both the theoretical discussion and the cases presented, we illustrate some general approaches to accurately represent and properly deal with different types of uncertainty in cost-benefit analysis. We conclude by stressing that, while ex-ante evaluations are more frequent thanks to their direct connection with decision making, ex-post analyses can still play many important roles in improving seismic risk management.

Keywords: Prevention; Uncertainty; Ex-post evaluation

Shedding light on Disaster Risk Management cycle model (DRCM) in the face of risks variability

Pigeon P.[1]

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Abstract: This presentation discusses how the widely known and used disaster risk management cycle model helps investigating why "variability of risks in time and space is one of the most challenging elements" when it comes to understand/represent and manage risks. DRCM does not look fully consistent with risks understanding and prevention, especially in the face of a radical (A) and a building back better (B) type approach. A.DRCM does not take long-term duration under consideration explicitly enough, be it before the occurring disaster/damage or after it. It is still hazard-centred. Consequently, DRCM is not totally in line with a radical approach of risks. B.DRCM may also challenge the capacity to build back better. The representation gives the impression that it would be possible to come back to a similar if not to the same situation which existed before the damage/disaster occurred. How can we explain that the model is still dominant in spite of such shortcomings?In order to investigate this questioning situation, we will: 1.present the DRCM. The circle it uses is supposed to depict a feedback loop, and for a limited time span. It could also be a vicious circle : coming back to a similar situation, almost a closed circle.2.present more explicitly systemic type of representation, more turned towards risks prevention.3.confront DRCM to the French 2010 La Faute-sur-Mer disaster case study, in order to test how the model helps making sense of risks prevention policies, in spite of its limitations. Outcomes and discussion: DRCM focusses on a specific risk type and for a limited time-span. Compensating DRCM limitations demands to take a multi-risks/multistakeholders approach under consideration. Whatever the specific type of risk addressed, it should not be understood and managed only apart from a wide range of other risks political decisions have to handle. DRCM : a reductive solution especially in the face of risks variability, yet still existing because it is easier to grasp. It also suggests risks prevention policies limitations and trade-offs, without making them explicit enough. Using spirals and taking long-term duration to compensate for those limitations is possible. Yet such representations need to come closer to local contexts; they can shed light on previous existing political trade-offs between a wider range of risks; such representations are much more complex, and harder to read.

Keywords: Risk representation; Systemic risk

Session Title:
Systemic risk: Spatial and temporal aspects

◆ Chaired by:
Lambert J., Ntzeremes, P.

Order Sensitivity Index Method of Systems Analysis and Risk Analysis

Lambert J.[1]

[1]University of Virginia

Abstracts: System orders are prevalent in application domains of risk analysis, including for endangered species, vulnerable hardware or software components, essential workers or stakeholders, at-large criminals or terrorist organizations, human and animal pathogens, cleanup sites, health allergens and toxicity vector, environmental contaminants, and sources and channels of information. Disruption of system orders by emergent and future conditions is an exciting focus of risk philosophy, particularly for new quantifications of risk and resilience. For example, scale-free measures of order disruption can enable systems analysis and selection of countermeasures to proceed across unlike sources of risk that compete for resources of government, enterprise and the military. This presentation will introduce the order sensitivity index method (OSIM) to characterize tradeoffs among traditional performance objectives and objectives of system order for optimization of systems across the design lifecycle. Partitions of order in the top and bottom ranks of system components are a particular interest. Though system orders of policies, safety rules and regulations, network nodes, assets, investments etc. will be described. Risk will be quantified as a degree of disruption of system order. Resilience will be quantified as the trajectory of return to system order. The OSIM will be shown to illuminate an interduality of utility and uncertainty, with importance for the theory and foundations of risk analysis and systems analysis. Implications of the OSIM will be described with several examples of several high-technology products and services across global logistics systems and Industry 5.0. The presentation will be of interest to managers of programs for quality, safety, assurance, security and risk. The principles will address latest recognized gaps and opportunities in the field of decision making under risk and uncertainty.

Keywords: Uncertainty; Sensitivity; Decision making

Introducing the Risk-Tandem Framework as a Holistic Approach Towards the Assessment and Governance of Systemic Risks

Hofbauer B.[1], Schweizer P.[1], Cumiskey L.[2], Parviainen J.[3], Bharwani S.[3], Hochrainer-Stigler S.[4], Zhu Q.[4], Einhäupl P.[1], Cubie D.[2]

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Abstract: This paper introduces a holistic, multi- and interdisciplinary framework for the identification, assessment, and governance of systemic risks. The Risk-Tandem framework, developed in the context of the DIRECTED Horizon Europe project, is an integrative approach that brings together risk governance insights from economics, the modelling community, as well as various strands within the social sciences, namely co-production and stakeholder engagement, institutional analysis, and the existing risk governance framework by the IRGC. The need for such a holistic framework stems from a lack in adequate assessment and evaluation approaches for systemic risks. The inadequate and lacking governance of systemic risks poses a major threat to modern societies, which are highly interdependent and technology-driven, and thus prone to vulnerabilities derived from systemic risks. Consequently, systemic risks can lead to breakdowns in systems which provide vital functions on which our societies depend. The framework is built on five main pillars that together, allow for the comprehensive assessment and governance of systemic risks. First, the Institutional Analysis and Development model provides a conceptual background that lays out the underlying theoretical assumptions of how decision-making processes among the relevant institutions take place. Second, the International Risk Governance Council's approach alongside tried and tested stakeholder engagement strategies provide insights into assessing stakeholder needs and structuring the identification and the active participation of those affected through given systemic risks. Third, the risk-layering approach, originally developed within the economic and insurance sector, provides tools for the quantitative assessment of systemic risks. Fourth, the integration of a general data fabric allows for the translation of different potential risk factors throughout varying scenarios, allowing for a generic application of the framework within the modelling community. Finally, tandem co-production through stakeholder capacity and needs assessments ensures a bottom-up inclusion of the equitable theory building and management of systemic risks. Importantly, none of these approaches have conceptual primacy. Rather, they serve their function of systemic risk governance through the synergies that their applications create.

Keywords: Risk Governance; Risk Assessment

Setting the Stage for Innovating Systemic Risk Assessment and Governance

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Abstract: Systemic risks, characterized by their complexity, non-linearity, and transboundary nature, significantly challenge modern, interdependent societies. They emerge from the interaction of dynamic natural and societal systems, potentially causing large-scale disruptions, such as pandemics, or ecological crises. While several frameworks exist, addressing disaster risks or climate change risks, systemic risks still lack adequate assessment and governance approaches. This gap is compounded by the absence of a coherent toolbox for systemic risk assessment. The mutual dependency between the framework and the toolbox calls for an integrated development. Framework development is hindered by the uncertainty, i.e., the incomplete knowledge about methodological requirements for systemic risk assessment, while selecting methods for a toolbox approach is surrounded by the normative ambiguity, i.e., the dependency on diverse value perspectives, of guiding principles they should align with. Furthermore, predominantly qualitative analysis of systemic risks' characteristics, has led to a valuable, but incomplete understanding of how these characteristics interact with dynamic systems. Additional quantitative advances must be made to enhance comparability and modeling approaches. Hence, the integration of both qualitative and quantitative data is necessary, emphasizing the analysis of their interrelations, transcending the use of qualitative data as a contextualizing element. This entails a thorough examination of how qualitative contextual data influences quantitative datasets and models, and vice versa. Our research addresses these gaps in systemic risk scholarship, advocating for an integrative framework for identifying, assessing, and governing systemic risks. Such a framework entails the qualitative identification and assessment of systemic risks, integrated with quantitative analysis, as well as ethical and societal implications. Its aim is two-folded: Firstly, it should augment our understanding of complex risk assessment, leading to further research integration, technological development (e.g., warning systems), and adaptive strategy development. Secondly, it should enhance systemic risk governance. This entails better informed decision-making, as our understanding about interactions between and effects on sub-systems progresses, as well as trans- and interdisciplinary policy development, due to an enhanced awareness of affected stakeholders. In the presentation, we propose a set of guiding principles, address main challenges, and recommend selected methods, including system dynamics modeling and institutional analysis. The methodological innovation of this framework lies in its integrative and holistic approach, assembling known elements into a comprehensive and adaptable assessment and governance framework. It stands out for its incorporation of ethical and societal considerations, and its focus on integrating qualitative and quantitative data to provide an improved understanding of systemic risks.

Keywords: Systemic Risk; Sustainability; Governance

Session Title:
Risk in education and learning

◆ Chaired by:
Löfstedt R., Jardine C.

The Power of Language and Meaning in Equitable Risk Communication and Management

Jardine C.[1]

[1]University of the Fraser Valley

Abstract: Language matters. Moreover, the meanings of words are constantly changing through usage and intention. Many words have become so commonplace in our risk vernacular that we frequently fail to examine their use with respect to the targeted populations, nor how these words can rob people of their power to control their risks and mitigate consequences. Three such words are discussed in the context of recent concerns about their usage and meaning in various risk discourses. First, 'vulnerable' is frequently used to describe populations at increased risk. However, the blanket use of this term fails to distinguish between susceptibility (more likely to be affected because of exposure) and sensitivity (more likely to suffer severe consequences if exposed). Additionally, being labelled 'vulnerable' may suggest blame or shame, and often obscures underlying reasons for vulnerability, such as structural racism. Second, labelling a population as 'resilient' may also mask underlying issues, power differentials and racial bias. Many people are now decrying that 'resilient' has come to mean they should continue to endure more suffering, deprivation or environmental degradation in the future instead of changing the factors that cause these conditions. Third, the word 'risk' itself is used quite generally and cavalierly without consideration of the myriad factors encapsulated in this single term. From a technical perspective, 'risk' involves hazard, probability and consequences. Risk also denotes chance and uncertainty. Colloquially, risk may mean danger, or even a venture or opportunity. Finally, any discussion of risk must include the time frame over which the risk will be considered, and an understanding of the importance of human values (i.e. what harm matters to those affected) in determining the nature and significance of the risk.The purpose of this discussion is not to simply make people stop using these terms. Rather, it is to encourage risk communicators and managers to critically think about the words they are using and how these may be interpreted by others. Often, it is necessary to further consider and describe the circumstances and nuances of a broadly defined term such as 'risk'. We may need to think carefully about using terms like 'vulnerable' and 'resilient' to erroneously describe entire populations instead of specific population sub-sectors and/or individuals. Finally, we need to consider how we should instead be addressing the underlying causes of 'vulnerability' and the need to be 'resilient' instead of making those affected responsible for dealing with the effects of these circumstances.

Keywords: Language; Vulnerable; Resilient; Risk; Communication

Risk education: The cobblers children are the worst shod!

Parchment A.[1]

[1]University of Surrey

Abstract: The management of risk is an essential part of business, yet it is not explicitly visible in the curriculum of business schools. Although business students may be taught about enterprise risk management this does not prepare students for the applied nature of risk management. At best graduates tend to be focused on the risks associated with their specific business discipline. Actuaries have an arm's length approach to risk identification which is focused on modelling and the quantification of risk. Bankers are concerned with the robustness of financial instruments, markets, credit risk and the outcome of stress tests to meet regulatory requirements. Prior to the quantification of risk, identification is required. Few graduates of business will have the interdisciplinary knowledge to identify non-financial risks in their business. Many of the emerging risks result in a financial implication but these emerging risks are not identified, characterised, or understood by business graduates. This paper presents a provocative critique of the quality of risk education in business schools. Students are taught about Sustainable Development Goals but not the risks associated with these goals. Additionally, Environment Social Governance reporting has risks attached to it which need to be identified. The emerging risks at present include climate change litigation, the impact of chemicals such as Polyfluoroalkyl substances (PFAS) which result in emerging liabilities. Graduates of business schools should be able to construct a risk register and understand the interconnectivity and dimensions of generic, interface, causation, and accumulation risks across disciplines. Additionally, the exponential use of generative AI requires business personnel to understand, identify and manage this risk. The complexity and interconnectivity of risk requires democratisation of risk education so that existing and emerging risks are identified by all business professionals. The need for democratisation of risk knowledge was recently highlighted by the lack of preparedness resulting from current wars and social disruption on every continent, impacting global supply chains, energy, and food security. The identification and management of risk is an essential skill and should be explicitly included in the curriculum as evidence of responsible management education in business schools.

Keywords: Risk, Education, Identification, Interconnectivity, Interdisciplinary

Children citizen geo-science for climate adaptation

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Abstract: Children are considered vulnerable to the impacts of climate change. Biological factors and their dependence on adults for survival are not the only reasons for their vulnerability. However, the main reason of their vulnerability is being excluded from information exchange and decision-making processes. Our previous experience with children has shown that labelling children as vulnerable and passive agents is wrong. Children have certain capacities and are able to effectively communicate not only their fears and concerns but also their ideas and solutions. They are knowledgeable agents who can understand complex phenomena like climate change. Indeed, they can develop innovative and responsible solutions to create a liveable environment that contributes directly to achieving strategies and solutions for climate-adaptive cities. Considering that decisions taken by each individual affect the spatial pattern of a city, to decrease the vulnerability of future cities and societies, it is necessary to focus on the largest segment of the future population, today's children. We see children as competent actors with a social agency of their own. They are not only influenced by the social world. They also have the power to influence their social world. Children are a highly interactive group and able to succeed in recognising the collective good. Despite their true potential, children are considered passive victims with no role to play in communicating. Sharing their knowledge and perception about their neighbourhood proves their capability to respond appropriately. The climate school strike triggered by one child also shows that children would like to participate in decision-making and processes and take roles in reducing the impacts of climate change. We applied a qualitative GIS approach, including participatory mapping, to enable a connection between the macro-scale urban phenomenon and the micro-scale of the perceptions of the individual child. The children geo-citizen science project highlights the capacities of children, as co-researchers, to understand the problems in their community and their capacity to find strategies and solutions to the identified climate change related challenges. In this presentation, we will share the result of the children citizen geo-science project where children between 9-11 years old are involved as co-researchers in the project gaining first-hand research experience instead of being mere data collectors. Children were part of every research step from the beginning till the end, i.e. collecting and analysing data, deciding and communicating actions that support the structural transformation in cities to reduce the impact of climate change.

Keywords: Children; Led; Climate; Adaptation

Understanding childrens' knowledge about the 1.5-degree climate policy target

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Abstract: Public support for policies that enable a successful transition of the world economy towards a (more) sustainable trajectory requires public understanding of the goals behind such policies. A policy goal that has received widespread public attention and media coverage is the Paris Agreement's goal to limit global warming to 1.5C above pre-industrial levels. While there is some first evidence of widespread confusion about the 1.5C goal from a series of surveys and interviews among German adults (Kause et al., in prep.), it is not well-studied what children know about the 1.5C goal and how they perceive it. Here, we therefore study children's knowledge and perception of the 1.5C goal with a sample of N = 284 German school children from the rural town of Lohne in the district of Vechta, Lower Saxony. Children aged 6 to 13, equivalent to grades 1 to 6, were surveyed in June and July 2023 in close collaboration with school principals and teachers, following questionnaire development and pre-testing in March 2023. First results indicate that while the majority of respondents (81%, N = 208) said they never heard about the 1.5C goal before, 44% (N = 112) were able to identify the correct past time reference, i.e. the beginning of industrialization. Moreover, 62% (N = 159) were able to identify the correct intent of the 1.5C goal, i.e. that the average temperature rise on Earth should not exceed 1.5C. However, respondents' prior knowledge about the 1.5C was likely stochastically independent of their ability to identify the correct past time reference ($X^2 = 2.38$, df = 1, p = .12). Stronger environmental worldviews according to the NEP-C scale (Manioli et al. 2007) did not lead to better knowledge of the 1.5C goal in general (W = 4328, p = .60). Stronger perceptions of climate change as a real phenomenon were likely stochastically independent from the ability to identify the correct past time reference ($X^2 = 5.54$, df = 3, p = .14). Based on these findings, the results of the aforementioned study (Kause et al., in prep.) and the wider literature on environmental education and risk communication, we identify strategies for effective communication of climate policy and sustainability transformation.

Keywords: Climate; Perception; Communication; Children

Cultivating Resilience: Sustainable Strategies in Western Balkan Higher Education Institutions for Climate Action

Grabova P.[1], Pojani E.[1]

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Abstract: Education systems are much affected by climate change, encompassing both challenges and opportunities. In particular, climate change affects education provision causing interruptions of teaching flows, jeopardizes the safety and security of teachers and students involved in education activities, causes displacement and migration of current and future pupils and students and displays economic impacts exacerbating poverty and reducing families' ability to invest in education. In the meantime, education has been recognized as a powerful tool for addressing global challenges, including climate change. By raising awareness, fostering critical thinking, and promoting behavior change, education can empower individuals and communities to take meaningful action towards sustainability. Moreover, education can cultivate a sense of responsibility and solidarity, motivating collective efforts to mitigate and adapt to climate change. Studies show that climate change awareness is still to be built in the WB region. A survey conducted by Balkan Barometer 2023 in the region finds that 49% of citizens consider climate change a serious problem. The report recommends that proper information of citizens about the green transition and green socio-economic recovery should be prioritised along with effective mechanisms for effective public participation. This requires the implementation of initiatives that enhance understanding and awareness of the relationships within the environmental and climate science. This aim of this research is to explore the integration of climate change actions and sustainable development within higher education institutions (HEIs) in Western Balkan countries, focusing on Bosnia, Albania, and Montenegro. This study employs a mixed-methods approach. A review of relevant literature provides the theoretical framework, while analysis of documentation from institutional websites of HEIs in Bosnia, Albania, and Montenegro forms the basis for validating the integration of climate and sustainability practices. The preliminary results indicate that Climate Change and Sustainable Development integration in Western Balkan HEIs is still in its nascent stages. Despite some European project initiatives, there is a need for greater consistency and coherence in Climate change and Sustainable Development practices across the higher education sector in the region. This study contributes to the broader discourse on sustainable development in higher education and provides insights for policymakers, institutional leaders, and stakeholders to advance sustainability agendas within Western Balkan HEIs. Further research is recommended to explore deeper into specific challenges and opportunities for enhancing sustainable development integration in the region.

Keywords: Education; Climate; Western Balkan; Sustainability

Symposium:
The relationship between risk and ethics in an AIdominated future

- Coordinator: Hayes J.

From rigid orderliness to barely controlled chaos: risk, uncertainty and AI in aviation

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Abstract: The aviation industry has a strong focus on safety given the potentially catastrophic consequences of errors, faults and poor decisions but the understanding of the relationship between risk and safety varies across the sector. The pace of change in the sector has traditionally been slow but introduction of AI amongst other things is changing that, driving the need for a sector-wide review of risk, safety and uncertainty. Based on interviews with European aviation sector safety experts, this study aims to understand the strengths and vulnerabilities in current aviation safety processes, particularly in relation to management of uncertainty and, how processes and practices may need to be adapted to address safety in AI. Aircraft manufacturing is highly controlled bottom up process of certification against detailed standards. Even in airline operations, the actions of pilots are rule based. For every threat, for every error, there is a procedure. Some interviewees insist that such a compliance approach takes actors beyond the need for risk management and that uncertainty is effectively eliminated. The extent to which rule-based approaches have prevailed in aviation is indicated by the recent release of ICAO Annex 19 Safety Management. While requirements for risk-based safety management systems have been in place in other hazardous industries for several decades, this new standard introduces risk-based SMS to aviation. When it comes to safety in air traffic management, in Europe and Australia risk and associated concepts have been at the forefront with requirements for design and operational safety cases in place. With multiple actors making judgment-based time pressured decisions, one interviewee described the environment as 'barely controlled chaos'. Uncertainty is high and risk-based processes prevail. Introduction of AI technologies into aviation systems presents challenges, to both compliance-based and risk-based safety management processes. Incorporating technology where the outputs for a given set of conditions are not known in advance presents challenges for both certification and risk assessment. To date, this has been managed by permitting use of AI only in non-safety related activities and tasks and by banning machine learning during operations. By restricting the possible adverse consequences of using AI technologies, this approach also severely restricts the possible benefits. This presentation unpacks these issues and looks at possible ways forward for the sector, including proposals to focus on ethics rather than risk in assessing the acceptability of new technologies.

Keywords: Aviation; Ethics; AI; Risk

Risk communication and governance approaches to AI and Digital Ethics

Engen O.[1], Skotnes R.[1]

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Abstract: This paper addresses communication strategies concerning vulnerability, risk, and uncertainties of Artificial Intelligence (AI), and how such risk communication contributes to building public awareness about digital ethics. Floridi et al. (2019), defines digital ethics as the branch of ethics that studies and evaluates moral problems related to information and data (including generation, recording, curation, processing, dis-semination, sharing, and use), algorithms (including AI, artificial agents, machine learning, and robots), and corresponding practices and infrastructures (including, responsible innovation, programming, hacking, professional codes, and standards), in order to formulate and support morally good solutions (e.g., right conduct or right values). According to Mannes (2020), a robust risk communications agenda induces discussions about fundamental rights and ethical, legal, and social implications of AI. AI is embedded in complex systems that include not only hardware and software, but people, organizations, and other social entities. Complex interactions between these components can cause an array of failures. AI can cause harm, such as physical injury and financial loss, as well as instantiating human bias or undermining individual dignity (Mannes 2020). The complexity of AI algorithms, especially in advanced fields like machine learning, can result in unpredictable and sometimes inexplicable outcomes (Nordström 2021). Lack of transparency in AI systems, particularly in deep learning models that can be complex and difficult to interpret, obscures the decision-making processes and underlying logic of these technologies (Marr 2023). All these factors contribute to uncertainties surrounding AI, creating scenarios where outcomes and impacts are not only unknown but are also continuously changing and evolving. Risk communication and risk perception are entangled processes (Löfstedt 2003, Renn 2004, Sataøen et al. 2024). Risk communication is supposed to be an open process in which risk assessments and information about potential future damage and related hazards in a community are exchanged between experts, public authorities, interest groups, and citizens. With a successful risk communication program, people and communities will better understand the AI with which they are interacting, which, according to Mannes (2020), should reduce accidents and mistakes. This paper is empirically anchored in the Norwegian Government`s AI strategy and reveals to what extent this strategy explicitly addresses public awareness about digital ethics. Drawing on relevant public documents, the paper thus examines how the Norwegian Government's communication strategy regarding AI intends to raise awareness of digital ethics and how these strategies should contribute to public transparency of the AI technology in Norway.

Keywords: Artificial Intelligence; Digital Ethics; Communication

Artificial intelligence (AI) risks and ethics – examples from Law Enforcement Agencies (LEA)

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Abstract: At the European level efforts have been made to enhance the use of AI technologies and tools in Law Enforcement Agencies (LEA) including police, customs, and border management, while improving capabilities to identify and respond to AI related threats. These efforts have appeared as topics for both European Horizon research calls and in the customs reform at the European level (2023-2038), the aim of which is to enhance the exchange of information between customs agencies and to promote the use of AI tools, and at the same time to promote the identification of potential threats and risks related to the use of AI tools. The objective of this presentation is to provide reflections on how the benefits and risks of AI are described in the context of Law Enforcement Agencies and in the innovative projects using the AI applications. In particular, the duality of AI in promoting security and at the same time creating security threats is the focus of reflections together with the relationships between ethics and risks. Theoretical and conceptual framework consist of institutional isomorphism, risk governance and theories on ethics. The secondary data consist of studies on AI in improving societal security, studies on the malicious use of AI, documents related to AI and interviews with experts representing LEAs.

Keywords: Artificial Intelligence; Risk; Ethics

Round-table: Teaching risk in schools
◆ Coordinator: Sarah Duckett

Roundtable Participants:

- Prof. Bruine de Bruin W.
- Prof. Lofstedt R.
- Prof. Bouder F.

[PHOTO]

Symposium:
Risk-based uncertainty management: linking science to policy actions

◆ Coordinator:
Bouder F.

Breaking down uncertainties is risk governance: Challenges and opportunities for risk management and communication

Jansen T.[1]

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Abstract: Increasing transparency, rapid (technological) advancements and increasing public engagement make that governmental agencies need to qualify, quantify and communicate risks when uncertainty about the mere existence of these risks may still be prevalent. These uncertainties can have different levels, be present at different stages of the risk governance process, and have many different sources. This makes identifying, qualifying and quantifying uncertainties about risk a complex and difficult endeavour. Different representations of uncertainty might have very different consequences risk management and risk communication. Therefore, efforts must be taken to minimize the room for misinterpretation of the evidence base for risk and to bridge assessment frameworks of different societal groups. In this talk I will present one of these efforts in which we characterized epistemic uncertainties in chemical risk assessment and studied implications for risk communication. Based on this effort we will discuss the value of developing work on a so called 'risk governance profile,' a framework is meant for clarifying uncertainties in risk governance, that aims to provide concrete starting points for a more systematic approach to uncertainty in risk management and communication.

Keywords: Risk communication; Uncertainty; Risk governance

'All we have to do is be uncertain': assessing the 'amplification of institutional incertitude' in European food safety risk governance

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Abstract: This paper addresses efforts made by the European Food Safety Authority (EFSA) in recent years to foreground the identification, representation, and public disclosure of scientific uncertainty in its risk assessment procedures and communications, a process aptly characterised in this paper as the 'amplification of institutional incertitude'. We argue that while the introduction of EFSA's novel uncertainty reforms has opened a welcome space for academic and policy dialogue, this strategic initiative will nevertheless struggle to reconcile ongoing stakeholder concerns about the legitimacy, direction, and authority of the agency's scientific opinions and expert advice. We observe that the instigation of EFSA's uncertainty reforms is prefigured by a longstanding policy tension running at the heart of the agency's directives requiring officials to be both open and transparent on the one hand, whilst being free from political influence and remaining distanced from risk management decisions on the other. The uncertainty reforms adopted may accordingly be understood as a way for EFSA to reconcile a current 'uncertainty paradox' facing the agency by accommodating wider concerns about uncertainty and opening itself up to further scrutiny of its risk assessment processes without relinquishing independence. We argue that prior policy tensions are unlikely to be resolved by simply 'being uncertain' however, because this prescriptive 'solution' offers only limited congruency with the wider problem diagnoses facing the agency. Moreover, we caution that as institutional incertitude is increasingly amplified, EFSA will in turn be further prompted to rethink and refresh its stakeholder engagement initiatives in order to improve its standing in the food safety field amidst ongoing criticisms and calls for greater inclusion, oversight, and input that follow. Finally, we offer some policy recommendations and highlight the need for future lines of research inquiry to take greater account of the socio-political context in which the assessment and communication of risk and uncertainty takes place.

Keywords: Uncertainty; Risk communication; Food safety

Risk analysis, uncertainty, and innovation: what does this mean for the Dutch energy transition?

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[2]King's College London
[3]Leiden University

Abstract: The objective of this presentation is to present how specific concepts grounded in risk analysis may assist the Dutch government when facing scientific uncertainties in relation to the energy transition. Of particular interest are concepts and approaches that create and maintain a balance between the need to enable innovation and the need to ensure high levels of protection to human life and the environment. The presentation will address the following aspects: the definition and clarification of the relationship between risk and uncertainty (i), a tolerability of risk approach to the management of uncertainties (ii), and finally some recommendations (iii). Specific illustrations will provided drawing on two case studies, namely the building of on-shore windfarms and the use of deep geothermal energy.

Keywords: Uncertainty; ToR; Energy transition

Navigating regulatory challenges: Uncertainty surrounding Titanium dioxide in food and medicines

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Abstract: Titanium dioxide is an additive with wide-ranging applications, including food, medicines, paints, and plastics. In 2021, the European Food Safety Authority (EFSA) banned its use as a food additive (E171). The EFSA explained that it is not possible to rule out genotoxicity concerns. However, the European Medicines Agency (EMA) continues to allow its use in medicines. The EMA's decision is backed up by preventing potential supply shortages of medicinal products, which could negatively affect both human and animal health. This regulatory disparity poses a significant challenge to effectively communicating risks and uncertainties, potentially eroding trust in regulatory decisions. We explore this regulatory dilemma through the lens of risk science, aiming to contribute to risk-informed decision-making and enhance approaches to managing and communicating uncertainty in regulatory contexts.

Keywords: Titanium-dioxide; Uncertainty; Risk science

TRACK 2:
RISK ASSESSMENT: REPRESENTATIONS, TECHNIQUES, TECHNOLOGIES

Session Title:
Risk assessment models adapted to risk variability

◆ Chaired by:
Logan T., Bubbico R.

Global Perspectives on Climate Risk Assessments: An evaluation of local climate risk assessments for effective adaptation planning

Anderson M.[1], Logan T.[2]

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Abstract: Adaptation to climate change is intrinsically spatial, yet many climate risk assessments fail to consider the explicit spatial nature and distribution of present and future impacts. This study presents a global examination of local climate risk assessments, aiming to evaluate their effectiveness in supporting adaptation planning. The research addresses critical challenges in climate risk assessments, including interconnectedness, uncertainty, spatial and temporal variations, and the adaptive capacity of the receiving communities, ecosystems, or infrastructure. Failing to provide fit-for-purpose risk assessments will see adaptation planning practitioners ill-prepared to engage their communities and make effective decisions. Inadequate assessments may lead to maladaptive interventions and an exacerbation of vulnerabilities and inequities. Ill-informed decisions based on incomplete or inaccurate assessments can result in significant social, economic, and environmental costs. Furthermore, the loss of community trust in the adaptation planning process can hinder future intervention efforts. Therefore, the imperative for developing appropriate risk assessments is not only to understand the impacts but also to avoid maladaptation, preserve community trust, and enhance overall resilience. In this paper, we assess over 50 local climate risk assessments from cities and communities worldwide, encompassing diverse geographical regions and societal contexts. The evaluation criteria, derived from current literature, encompasses assessment credibility, scientific and technical credibility, and the legitimacy of the assessment. These criteria are broken down into specific indicators, such as societal value domains, relevant risk sources, scenarios and timeframes, geospatial analysis, risk science foundations, adaptive management, uncertainty awareness, transparency, stakeholder engagement, and equity considerations. Preliminary findings underscore the varying degrees of consideration given to different societal domains as well as the integration of contemporary risk science concepts and adaptive management strategies. The research identifies gaps in the integration of relevant hazards, temporal aspects, and spatial resolutions in the assessed risk scenarios and reinforces recent literary findings that adaptation planning worldwide is unlikely to be effective.

Keywords: Climate Risk; Geospatial; Adaptation Planning

Combining scientific accuracy and practical needs in NaTech risk assessment: the case of Seismic risk in the Chemical Process Industry

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Abstract: It is widely recognised that natural events can play a significant role in initiating dangerous scenarios in process installations, causing either direct and indirect damages to process equipment, to the environment or to people. Those scenarios are specifically named as Na-Tech (natural-technological) events, and despite their potential substantial impact, usually the regulation in force does not provide clear indications about how to deal with them. The most widely used approach adopted in the most recent literature, is based on standard quantitative risk analysis and assessment, but the integration of Na-Tech events in the framework of a general plant risk assessment require specific attention, not only because of their particular nature, but also because the generated scenarios can be different from those deriving from technological causes only. However, a thorough full quantitative methodology can rarely be applied to a real case because of the overwhelming number of scenarios to be analysed and of values of the characterizing parameters to be adopted. Consequently, more flexible and simpler semi-quantitative methodologies would be of great help in many cases, such as for large and complex systems or installations. This issue has probably not received enough attention as it would require. A semi-quantitative procedure for the characterization of the risk of seismic origin connected with the different equipment items in a process plant has been setup, to allow their relative ranking and thus the identification of the most critical ones. This would provide very useful indications on which equipment require immediate attention in terms of either a more accurate quantitative analysis or directly with the adoption of proper preventive or mitigative measures.

Keywords: NaTech risk; Chemical process safety

Uncovering the dynamics of systemic risks and cascading impacts of hydrological extreme events: A methods overview

Schweizer P.[1], Madruga de Brito M.[2], Sodoge J.[2], Fekete A.[3], Hagenlocher M.[4], Koks E.[5], Kuhlicke C.[1], Messori G.[5], de Ruiter M.[6], Ward P[6].

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Abstract: In today's interconnected world, assessing the risks and impacts of floods and droughts has become increasingly complex as these events often have far-reaching consequences that spread throughout various sectors and systems, leading to compound and cascading impacts. Natural and social systems are deeply intertwined, and the adverse outcomes of hydrological extremes heavily depend on how the elements of the affected systems interact with each other. In this presentation, we propose key approaches for investigating compound and cascading impacts dynamics within the context of climate change and an increasingly connected world. In the presentation, we provide an overview and synthesis of existing methods for investigating compound and cascading impacts. We first highlight persisting challenges, such as the lack of multi-sector and longitudinal impact data. Then we present a range of knowledge-driven, data-driven, and mixed methods that can be used to analyze compound and cascading impacts dynamics, drawing on case study examples. Based on these, we end with six recommendations to advance this field of research. While the set of methods discussed in this presentation is not exhaustive, it provides an integrated view of how to tackle compound and cascading impacts and serves as a starting point for researchers studying the systemic risks and impacts of droughts and floods on coupled social, technological, and natural systems. The presentation is based on de Brito, M. M., Sodoge, J., Fekete, A., Hagenlocher, M., Koks, E., Kuhlicke, C., et al. (2024). Uncovering the dynamics of multi-sector impacts of hydrological extremes: A methods overview. Earth's Future, 12, e2023EF003906. https://doi.org/10.1029/2023EF003906

Keywords: Systemic risk; Cascading impacts; Methods

Session Title:
Mapping hazard, exposure, vulnerability and adaptive capacity I

◆ Chaired by:
Delladetsimas P., Thoidou E.

Mapping the links between social impacts and social capacities to support flood risk planning and management

Guadalupe Ortiz G.[1], Aledo A.[1], Mañas-Navarro J.[1], Tur-Vives J.[1], Aznar-Crespo P.[1], Jimeno-Miranda I.[1]

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Abstract: Climate change's impact on the frequency and severity of flooding presents a growing challenge for vulnerable populations, necessitating a reevaluation of disaster risk planning and management strategies. International guidelines such as the Sendai Framework or the IPCC emphasize the need for deep consideration of the social consequences of disasters, as well as the development of capacity-building strategies in local communities. The AQUASOC project, supported by the Spanish Ministry of Science and Innovation, addresses this challenge by integrating these two commonly separated social research areas: the assessment of flood-related social impacts and the advances on community capacity building. The project acknowledges the dependency of the final materalization of the social impact on the existence/non-existence or performance of the social capacities to prevent, confront or adapt such impacts. This presentation outlines the project's advancements in systematically identifying, categorizing, and connecting the social impacts of floods with the necessary community capacities for effective disaster preparedness and confrontation. The methodology employed extensive qualitative research, including in-depth interviews with over 115 key stakeholders in four different case studies. The results have been processed with Social Network Analysis, supported with Gephi software, to create a comprehensive network of social impacts and capacities. This network is instrumental in identifying key areas for capacity building and action prioritization, which is crucial for strategic social planning in flood risk management. These results are aimed at the development of the SCABA (Social Capacity Building Appraisal) online tool, a digital resource targeted at local disaster risk managers to facilitate more informed and effective decision-making.

Keywords: Impacts; Floods; Disasters; Capacities; Resilience

Feeling hot is being hot? Comparing the mapping and the surveying paradigm for urban heat vulnerability in Vienna

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Abstract: With rising global temperatures, cities increasingly need to identify populations or areas that are vulnerable to urban heat waves; however, vulnerability assessments may run into ecological fallacy if data from different scales are misconstrued as equivalent. We assess the heat vulnerability of 1,983 residents in Vienna by measuring heat impacts, exposure, sensitivity and adaptive capacity with mirrored indicators in the mapping paradigm (i.e. census data referring to geographic regions) and the surveying paradigm (i.e. survey data referring to individual households). Results obtained in both paradigms diverge substantially: meteorological indicators of hot days and tropical nights are virtually unrelated to self-reported heat strain. Meteorological indicators are explained by mapping indicators (R^2 of 15–40%), but mostly not by surveying indicators. Vice versa, experienced heat stress and subjective heat burden are mostly unassociated with mapping indicators but are partially explained by surveying indicators (R^2 of 2–4%). The results suggest that the two paradigms do not capture the same components of vulnerability; this challenges whether studies conducted in the respective paradigms can complement and cross-validate each other. Policy interventions should first define which heat vulnerability outcome they target and then apply the paradigm that best captures the specific drivers of this outcome.

Keywords: Vulnerability; Operationalisation; Heat; Justice; Survey

Assessing organisational resilience in micro, small scale enterprises: in search of the right resilience indicators.

Okoli J.[1]

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Abstract: Deeply rooted in the risk management discipline, the construct of organisational resilience continues to gain traction amongst scholars and practitioners alike. Organisational resilience, which is construed as a multidimensional phenomenon, typically explores how businesses manage uncertainty and disruptions, how they absorb and bounce back from environmental shocks, and how they adapt their operations and bounce-forward from crises. Whilst all organisations are expected to develop an appropriate level of resilience regardless of size or industry, there is overwhelming evidence suggesting that micro and small-scale enterprises (MSSEs) are often the hardest hit by exogenous shocks, owing to their limited resources and insufficient amount of social, human and financial capital when compared to larger firms. These inherent limitations therefore imply that MSSEs become more vulnerable to external pressures, necessitating the crafting of a suitable scale to measure the key resilience indicators specifically befitting for MSSEs. Unfortunately, most of the existing resilience indicators and resilience measuring scales have shown considerable misalignment with the affordances of MSSEs. These scales are either incongruent with the demands and challenges facing MSSEs in resource constrained environments, or contain indicators that are not fully and exclusively targeted at MSSEs. To address this important gap, this paper reports on the first phase of a current survey study aimed at measuring the resilience capacity of MSSEs in the Nigerian service sector. In this first phase, a range of existing resilience scales were reviewed and evaluated using pre-defined attributes that better represent the Nigerian business landscape where MSSEs operate. A content analysis of existing resilience scales was conducted, with multiple resilience indicators generated, evaluated and synthesised, leading to the emergence of a five-dimensional resilience scale — namely adaptiveness, planning and anticipation, problem solving and improvisation, slack, and perceived likelihood of crisis (PLC). The features that distinguish the newly established resilience scale from other existing scales are outlined and discussed. Finally, the presentation will introduce the next phase of the project and present initial results from the survey study involving 150 MSSEs in Nigeria, showing how the five-dimensional resilience scale was utilised. The implications of the findings are discussed within the context of risk management and adaptive capacity.

Keywords: Organisational resilience; Resilience indicators

Socio-demographic Determinants of Earthquake Coping Capacity: the case of the Corinthiakos Gulf, in Greece

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Abstract: Coping capacity has been widely recognized as an essential factor in shaping immediate behavioral responses of individuals and communities during the experience of extreme catastrophic events. It refers to the immediate responses to hazards and concerns mainly the ability of people to address, manage, and overcome adverse conditions in the short term. Its importance derives out mostly due to its intrinsic relationship with demographic and socio-economic parameters of individuals and communities affected by such events. Despite the growing number of studies in the international literature regarding coping capacity of natural hazards, in the case of Greece, interest on the matter has been limited. The aim of this study was to elaborate on the demographic and socio-economic determinants of earthquake coping capacity of populations living in an extremely earthquake-prone environment. For this purpose, a population-based survey was conducted in municipalities in the Corinthiakos Gulf in Central West Greece. The sample (230 men and 276 women) was randomly selected from three coastal municipalities of the Gulf, Aigialeia, Nafpaktia and Corinth. Multi-adjusted linear regression analysis was performed to reveal the determinants of the participants' coping capacity regarding earthquake risk. Mean earthquake coping capacity was significantly low in both men and women and notably lower for men at the age group 65+ years old and for the participants living in the municipality of Nafpaktia, as compared to the participants of the other two study areas (all p's<0.05). Earthquake coping capacity varied significantly according to age, sex, education, household structure and savings (all p's<0.05).Younger strata, especially men, tend to correlate to lower earthquake coping capacity. Moreover, individuals with increased educational level presented increased earthquake coping capacity levels (p<0.05). Also, single-parent households and individuals with moderate and low savings were associated with increased coping capacity (all p's<0.05). Issues like income, building earthquake insurance, building construction period(of assets resided or used by the participants),trust in civil protection authorities and earthquake safety information provided by local civil protection authorities, were not associated with coping capacity. From a policy design point of view, this study revealed the vital importance of employing earthquake education in schools and promoting safety and people's awareness. This study provided also useful enlightenment for local communities and civil protection authorities allowing to identify population groups with low earthquake coping capacity and to provide noteworthy insights to design targeted interventions and policies for population.

Keywords: Earthquakes; Coping capacity; Corinthiakos-Gulf

Table-top exercise for identifying communication-related vulnerabilities in disasters

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Abstract: Uncontrolled and often false information has become a hampering problem for crisis communicators. Accurate information is particularly important during emergencies, when the protection of human life, health and property depends on rapid decisions based on accurate information. Crisis vulnerability does not only cover predetermined groups, but late literature has rather explained vulnerability as intersectional, a trait depending on the specific circumstances where an individual might find themselves. A subset of those circumstances is communication-related vulnerability which explains how existing hazards can be amplified by miscommunication, especially by false information that could harm the population and impede normal crisis management. A part of crisis communication challenges during emergencies is tackling people's problems with accessing (e.g., difficult or no access to relevant crisis information), understanding (e.g., difficulties in differentiating and understanding truthful messages and false information), and reacting to crisis-related information (e.g., neglecting protective measures based on false information). Several studies have addressed false information tackling strategies in times of crisis, however, existing research has not addressed nor tested vulnerability to false information within a tabletop exercise – a format commonly used to train crisis management practitioners. table-top exercises combined with scenario-based frameworks can be modified to accommodate elements from all sorts of scenarios – including the intricate and multi-dimensional problems with communication during emergencies. To explore how disaster management table-top exercises can be used to identify communication-related vulnerability factors related to false information, we presented 25 participants from Estonian emergency management, neighbouring institutions and stakeholders (e.g., local governments, local NGOs) a crisis scenario. We found that stakeholders mostly focused on problems of accessing information as the source of communicative vulnerability and only a handful brought up problems with understanding and reacting. This might indicate that stakeholders overfocus on the populations' problems with accessing information, and thus not put too much emphasis on making their messages understandable, tailoring them to different audiences, or thoroughly thinking of how those messages might make people react. Drawing on the actual exercise results, we present policy and strategy recommendations.

Keywords: Disasters; Communication; Vulnerability; Training; Exercises

Session Title:
Mapping hazard, exposure, vulnerability and adaptive capacity II

◆ Chaired by:
Kundak S., Balzekiene A.

A comparative study of residential trajectories of migrants under different housing regimes: Evidence from three Nordic capital cities

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[3]Nord University; Linköping University

Abstract: There is a growing interest in nuanced longitudinal studies that focus on the interdependencies between housing and neighbourhood mobility in order to better understand immigrant residential integration pathways in host societies. Newly arrived immigrants tend to be over-represented in low-income neighbourhoods and the rental sector upon arrival to the new homeland, while the host populations tend to be over-represented in high-income neighbourhoods and among homeowners. This inequality is a huge risk for the society. Hence, the subsequent residential integration of migrant's hinges both on moving to higher-income neighbourhoods and into home-ownership. In this paper we seek to understand whether moving to more affluent neighbourhoods and becoming a homeowner are related and, if not, what comes first, neighbourhood change or tenure change. We will undertake a comparative longitudinal study in three Nordic capital cities of Helsinki, Oslo and Stockholm for understanding the residential mobility patterns of the newly arrived immigrants grouped into three groups based on the World Bank categorization 2010 and based on the EU membership. These three groups are (1) belonging to low, low-middle or upper-middle income category (excluding EU countries); (2) latest EU member states since 2004 (East-Europe) and (3) high income countries. The study period is 2011-2017, because of data availability and comparability in three countries. The data is statistically analysed using we apply multinomial logistic regression to compare first housing and/or neighbourhood mobility by origin group to see the transition from renting to owning housing and neighbourhood mobility movement from poorest neighbourhood to better (third to richest) quintile. The results reveal that different immigrant groups have different strategy in housing type and neighbourhood mobility and different countries.

Keywords: Housing; Neighbourhood career; Residential Segregation

From Risk to Resilience: Evaluating the Marmara Region Through the Resilience City Index

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Abstract: Resilience, the capacity of a system, community, or individual to absorb stress, recover critical functionality, and thrive in the face of external pressures, is increasingly recognized as a vital component of urban and regional planning. In the dynamic and often unpredictable process of urban development, resilience embodies the ability to withstand disasters and the foresight to adapt and evolve in anticipation of future challenges. This study thoroughly examines the urban resilience performance in the Marmara Region of Turkey, a critical area where the imperatives of resilience are urgent and complex. It specifically concentrates on the multiple aspects of resilience—ranging from infrastructure and environmental sustainability to social and economic adaptability—and the different risks encountered by cities that prioritize sustainability. The main objective is to assess the region's ability to withstand and recover from challenges through eleven provinces, analyze existing vulnerabilities, and develop proactive strategies for the future. Given its distinctive combination of ecological and economic vulnerabilities, high population density, sectoral dominance, and strategic geographical location connecting Asia and Europe, the Marmara Region is a reasonable case study for analyzing urban resilience. We used the Resilience City Index, created by The Economist Impact, to assess resilience performance. This evaluation uses a comprehensive approach, including 41 sub-indicators that cover four main aspects: critical infrastructure, environment, socio-institutional, and economic. The weights determined by experts and assigned to the index allow for a detailed examination of qualitative and quantitative data, making it achievable to compare provinces within the Marmara Region. We obtained data from the Turkish Statistical Institution for 41 indicators, calculated their performance score based on each indicator's weights, and estimated each province's total resilience score. Moreover, we used advanced visualization methods, such as ArcGIS, to generate four-dimensional maps that provide a comprehensive geographical study of resilience performance. The study's findings emphasize the strategic vulnerabilities at the provincial level and distinguish areas according to their ability to handle risks and unexpected events. The study thoroughly analyzes the reasons behind the inferior resilience performance in specific locations, utilizing data-driven insights to uncover the underlying problems. This research is groundbreaking in its area and significantly contributes to the scholarly discussion on urban resilience. Additionally, it provides essential results that are valuable for strategic planning and policy-making in Turkey's most critical region.

Keywords: Resilience City Index; Risk Management

People speak, but nobody listens. Participatory research in water-insecurity risk analysis to stimulate collaborative water and risk governance

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Abstract: People still live under water-insecurity conditions, and climate variability worsens them. MUISKA (MUltidimensional rISK Analysis) was created to grow into a practical tool to support water security by co-developing it with relevant parties in Cajibío, Colombia. We aimed to demonstrate how numbers and text can be integrated to show a more comprehensive risk assessment.MUISKA is a simplified approach to assessing and comparing multiple water-insecurity risks while keeping the universe of potential risks vast. It was co-developed in seven steps with relevant parties at Cajibío, a municipality in the upper Cauca River basin with high poverty, inequality, institutional weakness, and illicit economies. This document presents the integration of qualitative data collected from workshops held between June and July 2023. Participants classified and described water-related problems using four scales and five dimensions. We conducted a reflexive thematic analysis (RTA) to analyse the data. We also calculated current and future water demand and analysed the capacity of existing infrastructure in six water supply systems. Participants and the research team agreed on one water-insecurity problem for the risk assessment: water scarcity due to deforestation and urbanisation. Water scarcity can be understood according to four orders. We approached it by two orders of scarcity: physical availability and insufficient infrastructure. We identified 15 themes. "Interruptions of water service" and "Contamination or production of contaminated water" are the most frequent themes among participants, revealing that issues related to access to clean water are meaningful to them. Five of the six water supply systems present a deficit in their infrastructure. The most critical conditions are in the storage tanks. Their total storage capacity is insufficient to supply continuous water. This quantitative deficit (56 – 561 m3) reflects what participants expressed during the Step 2 workshops, for example: Group Citizens - Theme Poor quality of the water service: “High costs for the design and construction of the water supply system. Cajibío´s system needs to be redesigned and/or expanded because it was designed only to supply the urban area of the municipality. At the moment, there is a demand for the use of the aqueduct because of population expansion”. Qualitative data from research participants complement quantitative data on water demand and infrastructure capacity. These numbers now have the voice of the people directly affected by water scarcity. Ultimately, this study can stimulate water and risk governance among relevant parties.

Keywords: MUISKA; Participation; Risk; Governance; Water

Residential Building Exposure Development including Socioeconomic Dimensions in Saint Lucia. State of the art in methodology

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Abstract: Residential exposure is a key component of disaster risk management, yet it cannot be examined in isolation from its social aspects. It is socially shaped and developed as households with lower socioeconomic status tend to be spatially segregated in hazard-prone areas and they are more likely to live in older and poorer-quality housing when compared to the rest of the population. The socioeconomic status of households has great potential to modify the structural vulnerability of dwellings as it is linked to the maintenance/condition of dwellings, compliance with building design codes, private insurance and protection measures that are typically not considered in exposure assessments. The objective of the present study is to develop a residential building exposure to hurricane hazard incorporating both structural and socioeconomic aspects of vulnerability on Saint Lucia in the Caribbean, testing the hypothesis of whether the income-poor tend to reside in the most structurally vulnerable dwellings. However, data with socioeconomic characteristics of households and structural attributes of dwellings comes from separate surveys and have different spatial resolutions, and units of analysis (i.e., household, person). To address these challenges, we take advantage of spatial microsimulation methodologies. The SimLucia model created for this case study combines geographically aggregate-level data from the 2010 National Population and Household Survey and a-spatial microdata from the 2016 Living Conditions and Household Budget Survey to generate virtual household populations with their social and structural characteristics at a district level. The outcomes of the SimLucia model (residential exposure) revealed that the majority of poor households (52.4%) lives in the least hurricane-resistant structures, whereas the respective proportion of nonpoor households is only 26.5%, verifying the initial hypothesis. The robustness of the model is affirmed by external validation, and the outputs can be used with confidence by both policymakers and academics. Spatial microsimulation is a modeling tool that can boost the socioeconomic resilience of poorer households and facilitate the prioritization process. It allows policy interventions (e.g., budget allocation for disaster prevention, retrofit programs for structural vulnerability reduction, borrowing/saving products for economically vulnerable households, financial subsidies to affected households for recovery) to be guided by microsimulation outcomes and become more people-centered and targeted.

Keywords: Exposure; Poverty; Vulnerability; Spatial macrosimulation

Session Title:
New technologies for hazard and risk observation and monitoring

◆ Chaired by:
Laban M., Spyrou C.

Remote sensing methods application in vulnerability assessment of urban areas to hazards

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Abstract: The growing concentration of people and activities in urban centres and the increasing number and scale of cities can generate new patterns of disaster hazard, exposure and vulnerability. The illegal buildings, characterized by poor-quality design or construction, and heavily populated urban informal poor-built settlements - slums in suburban areas could be particularly vulnerable urban areas. Remote sensing method is effective and fast tool for identification and mapping the specific urban areas. The assessment is based on four principal building blocks to improve the understanding of urban risk: historical incidence of hazards, geospatial data, institutional mapping, and community participation.All types of informal settlements accommodate mainly the needs of the urban poor or low-income and other disadvantaged groups, and exacerbate their poverty. There are approximately 600,000 people living in about 750 settlements in Serbia and about 500 are illegal and unhygienic. The residential facilities in a slum / informal settlement in the border of larger urban area, located in the riverbed, were analysed in this study done in urban area of Novi Sad. The selected methods are: remote sensing and geostatistics, which can provide relatively quick and precise information in a suitable format. Most of the houses in informal poor-built settlements in Serbia were built from metal plates, cardboard or other non-building materials, like plywood or nylon bags. Tar paper or bitumen (asphalt) impregnated paper was, in the most cases, used as roof covering. The first method used is the digital terrain model with the aim of creating a polygon that defines the riverbed. Thus arose polygon can be brought into a spatial relationship with the grid surface zone of interest in the visible spectrum. Another method used is the method of remote detection, "Detection of target material." Tar paper was chosen as the target material (building material based on bitumen). The spatial context of vulnerability is defined after the application of remote sensing methods.

Keywords: Hazard; Vulnerability assessment; Remote sensing

Implementation of NASA-EMIT Satellite Mineralogy in METAL-WRF model and implications for dust aerosols in the Mediterranean

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Abstract: Mineral dust is one of the most important aerosol types in terms of mass and optical depth, as well as a significant climate regulator. Dust alters the atmospheric energy budget, cloud microphysics and precipitation processes, while having significant effects on land/ocean ecosystems and human health. The magnitude and severity of these phenomena is regulated by the mineralogical composition of dust particles, originating from different dust source areas around the world. Until now, the few existing models that handle this aspect of dust assume that dust mineralogical composition is related to the soil type, which is usually provided as a global dataset (e.g. GMINER30 and FERRUM30). This relation is based upon massive extrapolation due to limited sampling of soil mineralogy (especially over desert areas) and neglects mineral variations between regions of identical soil type. New insights, with the potential to fill the gap on mapping soil mineralogy over deserts, come from the utilization of advanced pattern recognition algorithms on sophisticated space-borne remote sensing observations. The first instrument in this direction is NASA`s EMIT sensor that is mounted onboard the International Space Station (ISS) since July 2022. EMIT uses an advanced imaging spectrometer to measure light in visible and infrared wavelengths and detect the unique spectral signatures indicating the mineral composition of the surface. In this work we present the implementation of the first complete EMIT mineralogical dataset in METAL-WRF model. METAL-WRF is a state-of-the-art numerical system which was developed as an extension of WRF-Chem 4.4.1, to simulate the atmospheric cycle of dust mineralogical components (emission, transport, dry and wet deposition). The model simulates ten mineralogical types (illite, kaolinite, smectite, calcite, quartz, feldspar, hematite, gypsum, phosphorus, iron). Simulation results of METAL-WRF including the observed EMIT mineralogy are compared with earlier versions of the model that were based on the GMINER30 and FERRUM30 geological databases. We discuss the relative abundance of the different types of dust in the Mediterranean and the regional climate change implications. The chemical composition of dust plays an important role in radiative transfer and cloud formation processes and therefore a more detailed representation of dust in METAL-WRF improves the accuracy of aerosol forcing computations in the atmosphere.

Abstract: METAL-WRF; Dust; Mineralogy; EMIT

How do people react during a disaster?: observations of concrete situations and experiments based on simulated situations

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Abstract: In the context of disasters, one of the major challenges to protect the populations is to understand the individual and collective behaviors, and the displacement dynamics. When a sudden, dramatic event occurs, the individuals have immediate reactions for their self-protection and self-evacuation, much before the arrival of rescue authorities. Understanding these reactions, at both individual and collective levels, is key to anticipate the forthcoming social behaviors when a next event occurs. This anticipation is of upmost importance because the actual impact of a given hazard is primarily controlled by the reactions of the population; those reactions can either reinforce or jeopardise the safety of the affected individuals, of their relatives, and of the collective population. This is especially true in case of a sudden, unpredicted event, such as a strong earthquake, a tsunami, a nuclear accident, or a terrorist attack. The work presented in this conference is one of the results of a transdisciplinary collaboration (Com2SiCa project: https://www.com2sica.cnrs.fr/) between geographers, psychologists, mathematicians, computer scientists, operational staff and stakeholders in risk management. We presented several methodologies for observing human reactions to collect data that allow us to collate the range of human reactions that occur for different types of events and affected areas, and to consider the behavioral sequences and movement trajectories associated with spontaneous evacuation decisions. We therefore analyzed more than 200 videos of major disasters throughout the world, conducted a focus group with institutional and operational actors, developed a virtual reality immersion exercise based on the scenario of a tsunami on the Cote d'Azur coast and also carried out innovative studies putting participants in the field (rather than in the laboratory): the city of Nice threatened by a tsunami, the city of Le Havre faced with a technological accident. Our results highlight the fact that, even for a same disaster scenario, people can behave in a wide variety of ways. Through this work, we will present a new typology of behaviors classifies behavioral responses into different categories: ranging from a state of alert to a state of panic or, on the contrary, control of the situation.

Keywords: Behavior; Disaster; Alert; Panic; Control

Optimization of sensor networks for detection of wildfires leading to natural and Na-Tech disasters

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Abstract: Natural hazards (such as earthquakes, floods and wildfires) can initiate events that may challenge the safety and operation of industrial facilities and critical infrastructures, lead to major damages and releases of hazardous substances, and result in potential health effects, environmental pollution and severe economic losses. The phases of wildfire management comprise Prevention, Preparation, Detection, Response, Mitigation and Recovery. This work focusses on the preparation phase to facilitate the detection of wildfires, and develops a methodology for the optimal design of cost-effective and efficient sensor networks. We propose a modeling pipeline involving the processing of geospatial data for a given area of interest, simulation of fire propagation / dispersion and multi-objective mathematical optimization. The employed fire propagation / dispersion model combines the Rothermel fire behavior model (for fire propagation) and Cellular automata (for fire dispersion) [1]. Given the location of an ignition point and the weather conditions, the model predicts various attributes, such as the time it takes for the fire to reach any point of interest, the fire front, the total burnt surface, the rate of fire spread, the flame length, the energy heat release, etc. The complete simulation results are fed to the optimizer to generate a set of optimal sensor networks. The design approach proposed here also considers the uncertainty of the possible weather conditions when a fire starts using historical weather data. The data include ground elevations, meteorological data, fuel data and forest geometry.Results are obtained for a well-documented fire in Spain, involving a wildland – urban interface (WUI). Note that, Spain has the largest average area burned by wildfires in EU during 2006-2022 (70991 hectares) and the second largest burnt area since August 2023. The same methodology can be used for wildland-industrial interface (WII) in the case of a wildfire approaching an industrial area with the potential of resulting in a Na-Tech accident.

Keywords: Wildfires; Na-Tech disasters

[1] Gómez-González, J. L., Cantizano, A., Caro-Carretero, R., & Castro, M. (2024). Leveraging national forestry data repositories to advocate wildfire modeling towards simulation-driven risk assessment. Ecological Indicators, 158, 111306.

TRACK 3:
(DISASTER) RISK MITIGATION, REGULATION AND MANAGEMENT

Session Title:
Climate Change mitigation
and adaptation

◆ Chaired by:
Filatova T., Tzatzaki V.

Does climate change risk perception influence people's intention to invest in solar farms vs. nuclear power plants?

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Abstract: In the hottest year so far, the COP28 ended with a global pact aiming at "transitioning away from fossil fuels" to tackle climate change. Such transition implies an energy sector's large-scale modernization, with particular interest in nuclear and renewable energies. Previous research has consistently found that nuclear energy is generally perceived as riskier than solar energy. However, people's support for large-scale installations to produce solar energy - solar farms - has been little investigated, but it is necessary to rigorously compare solar and nuclear energies. Further, we explored the role of climate change risk perception in this framework. We ran an online survey with a convenient Italian sample (752 participants, 39.3 ± 16.6 y.o., 57% females), implementing a three-between-subjects design using a separate (SE) vs. joint evaluation (JE; Hsee, 1996) of two energy sources: solar farms and nuclear power plants. Thus, depending on the condition, participants were given information about either solar farms, nuclear power plants, or both. Subsequently, they were asked about their energy risk perception, and their willingness to invest public funding (WTPF) in either energy source. Further, participants were asked to report their climate change risk perception. We found that people perceived solar farms as less risky than nuclear power plants, both in SE and JE. Furthermore, people were more WTPF in solar farms than in nuclear power plants, and it also depended on their energy perceived risk. Specifically, for both energy sources, the more people perceived them as risky and the less they were WTPF in them. Finally, exploratory analyses revealed that when comparing the two energy sources in the SE conditions, the interaction between condition and climate change risk perception predicts the energy perceived risk. Specifically, in the case of solar farms, the more risky people perceived climate change and the less risky they perceived the solar farms' energy. On the contrary, in the case of nuclear power plants, the more risky people perceived climate change and the more risky they perceived the nuclear energy produced by nuclear power plants. Similar results have been found also when people saw information about both energy sources (i.e., in JE). The present study contributes to understanding the psychological mechanism driving people's perception and decision to support different energy sources and therefore have a great impact on effective communication. These results will be valuable for researchers, behavioral scientists, and policymakers working on climate change.

Keywords: Climate Change; Risk Perception; Energy Communication; Energy Investment; Public Acceptance

Does climate change distress undermine environmental policy support? An examination of climate change anxiety, fatigue, scepticism and inefficacy in Korea

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Abstract: As climate change continues to pose significant risks to human beings and the natural systems on which they rely, its subsequent current and future harms have led to widespread societal and academic interests over how to cope with them at the collective level (environmental policy) and furthermore, how to encourage individuals to agree with and actively participate in the collective-level responses (environmental policy support). This study focused on the latter—i.e., individual-level support for environmental policy; but had a different research focus—i.e., the association between climate change distress and environmental policy support in Korea. Many existing studies, although addressing emotional psychological effects of climate change (mostly either climate change anxiety or scepticism) in Western countries, have insufficiently taken different types of climate change distress together into consideration. Drawing upon the literature, this study conceptualised climate change distress as negative emotional and psychological responses caused by climate change, and included four different types, that is, climate change anxiety, fatigue, scepticism and inefficacy. This study examined the effects of climate change distress on environmental policy support in Korea. Specifically, it analysed how two different types of environmental policy support (agreement and participation) are affected by four different types of climate change distress (anxiety, fatigue, scepticism and inefficacy), alongside risk perception factors (i.e., perceived risk, benefit, cost and knowledge), Theory of Planned Behaviour (TPB) factors (i.e., pro-environmental attitude and subjective norms), political factors (i.e., political orientation, political participation and political trust) and some socio-demographic factors. A web survey was carried out, and 1,571 successful samples were collected. The results of this study showed that climate change distress matters for individual-level support for environmental policy, and furthermore, that the significance and direction of the associations are dependent upon not only the types of climate change distress but also the ones of environment policy support. The findings imply that taking different approaches to different types of climate change distress is necessary to encourage individuals who suffer different types of climate change distress to agree with and even actively participate in the collective-level environmental responses.

Keywords: Climate change distress; Environmental policy

Towards a better understanding of household climate change adaptation decisions: insights from large-scale, multi-country, longitudinal survey data

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Abstract: Climate change and rapid urbanization, especially in coastal areas, have exacerbated climate-induced risks worldwide. This trend will continue under all climate mitigation scenarios. Adaptation, alongside mitigation, has become a necessity in dealing with the adverse impacts of climate change. In the face of this new reality, successful adaptation strategies rely on engagement from all levels of society, necessating both public government-led adaptation and private individual measures. While the importance of individual action is widely acknowledged, understanding socio-behavioral drivers and barriers of private adaptation decisions remains one of the key priorities in climate change adaptation research. For one, despite strong agreement in (mainly) qualitative research on the importance of culture as a mediating factor in adaptative behavior, empirical studies on individual adaptation in diverse environments and across countries have been limited. In addition, despite the Global South being disproportionately impacted by climate change, most empirical work has taken place in North America and Europe. This further stresses the need for a more robust understanding of individual adaptation behavior and the extent to which generalizations across contexts can be made. Secondly, surveys – the most common tool to study individual adaptation – are usually cross-sectional, and therefore fail to capture behavioral dynamics and causal inference. With data availability being a key bottleneck in understanding individual adaptation behavior, our team conducted longitudinal surveys on household adaptation intentions, risk perceptions and behavioral drivers in the context of the costliest climate-induced hazard worldwide – flooding. Over the course of 3 years (April 2020 – November 2023), we collected five waves of survey data (N=6242 original respondents) in coastal areas spread across five countries (China, Indonesia, the Netherlands, the United Kingdom and the United States) with diverse socio-economic, institutional, cultural and environmental contexts. Each of the survey waves included questions on 18 different adaptation measures, varying in effort and resources they require. This unique dataset has provided valuable insights into the factors driving individual adaptation, differences - and similarities - in their effects across countries, the influence of past adaptation actions on additional intended actions and the role of risk-uncertainty. At the conference, we will give a detailed overview of our findings so far, and discuss possible directions for future research.

Keywords: Adaptation; Flooding; Longitudinal survey data

Protected areas and climate change mitigation: Multilevel governance and policy reform in Greece

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Abstract: The vulnerability of protected areas globally, especially in modern times that they face pressures from human activities, overexploitation of natural resources, forest fires and climate change adaptation challenges, seems more existent than ever. Ecosystems and especially protected areas mitigate the effects of natural disasters, the risk from hazardous organisms, while at the same time they contribute significantly to climate regulation and therefore, to climate change adaptation. In Greece, protected areas host ranges of threatened species: 424 species are assessed as threatened in the Red List of the International Union for Conservation of Nature and present in the country. Approximately 1,000 km of its coastline are areas highly vulnerable to climate change and about 58 percent of the total coastline of the Aegean Sea consists of coasts of high vulnerability to the projected changes. In May 2020 the Greek legislator introduced a policy reform regarding the management of protected areas and climate change mitigation. The basis of this reform is a new system of multilevel governance, promotion of sustainable development and climate change adaptation. The legislation constitutes a novelty for the country, since it aims in the effective application of an integrated management tool, which illustrates the interdependence between healthy ecosystems and climate change mitigation, as well as the fostering of constructive public participation. The scope of this paper is to present the policy reform and to highlight that the effective management of protected areas contributes in climate change mitigation and adaptation. For methodological reasons the analysis will be divided in two parts: The first part presents the notion of multilevel governance of protected areas in Greece and climate change mitigation, while the second part focuses on the operation of the Natural Environment and Climate Change Agency, acting as the central institutional tool for sustainable development of protected areas and the mitigation of climate change, through active engagement of civil society. This policy reform constitutes a coherent nexus and a united regulatory structure for the governance of protected areas in Greece, aiming to halt biodiversity loss and mitigate the effects of climate change, contributing thus to sustainable development, improvement of the quality of life for the population and poverty eradication.

Keywords: Climate change; Multilevel governance; Ecosystems

The challenge of zero-carbon energy transition: the case of Western Macedonia

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Abstract: Moving to a zero-carbon economy represents a major challenge for localities and regions at sub-national and supra-national levels, as they demand substantial procedural transformations at technological, economic and social levels. This transition has a greater impact on the productive sector of regions that are highly dependent on fossil fuels and whose economies are linked to emission-intensive industries. In Greece, Western Macedonia faces particular challenges due to its importance as a region with significant socio-economic dependence on fossil fuels and thermal power plants which have been contributing to the country's energy needs for years by generating a large part of the country's total electricity power. With the central government political decision stipulating the lignite phase-out nation-wide by 2028, the region faces significant social, economic and environmental challenges. In an effort to meet these challenges the responsible government institutions announced a number of compensatory interventions and related support measures that are intended for implementation. This research focuses on the collection and analysis of information reflecting (a) the challenges and dynamics of the transition to climate neutrality as having been experienced in EU countries and (b) the mechanisms available to fund support actions targeted to regions and sectors most affected by the transition, with the EU's Just Transition Mechanism at the forefront. Besides, it is based on a systematic analysis of policy documents and data from recent studies referring to the problem of transition as being faced in Western Macedonia. This study offers a multidimensional and comprehensive case study of a Greek Region struggling for the zero-carbon energy transition (on behalf of a whole country), providing insight into the geographical specificities of Western Macedonia, the social exclusion and inequality challenges involved in the transition process and opportunities to address the challenges. The study is fueled by comparable experiences across Europe and sends out useful lessons and messages to regions facing similar transition challenges by highlighting the barriers and opportunities, benefits and losses arising from this transformation.

Keywords: Zero-carbon; Climate neutrality; Transition

Session Title:
Crisis management: Urgency and uncertainty

◆ Chaired by:
Xanthopoulos G., Quigley K.

Patterns in risk perception of natural hazards and their influence on behaviour in crisis situations

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Abstract: Risk and assessment in a changing world is an interdisciplinary, multi-dimensional topic and presents a challenge to researchers worldwide. The following study specialises in the particularity of a changing world by statistically analysing risk perception data from 2013 and examining individual case studies up to the year 2023. Amongst the crises the world faced within the last several years, natural hazards either served as the source of risk or play a major part in increasing vulnerability. Focussing on the insurance industry, this study examines the sources of risk communication and the link to risk perception of natural hazards in order to suggest measures for improvement so that ultimately resilience can be enhanced and costs lowered. Climate change has proven to be responsible for a considerable increase in severity, frequency and the amount of damage caused by extreme natural phenomena. In order to develop a culture of precautionary behaviour towards risk in a changing world the issue of trust in communicators, hence government, press or private actors, is analysed and negotiated. As methodological foundation serves a cross-cultural comparative study with survey data from 19 countries with 21.859 participants provided by Swiss RE. The approach is quantitative with qualitative case study elements. Looking at the two countries of Germany and Canada for example, natural threats are perceived similar while the issue of trust in institutions is fundamentally different. In Germany official authorities need to raise awareness to be treated fair in public on bank holidays, whereas Canadians celebrate the international Firefighters Day annually. In order to suggest precautionary-based management measures, it is crucial to examine what policies have already been implemented during the last ten years, how they have been communicated and ultimately how they affected risk perception in the target group. Altogether the study combines aspects of risk analysis, risk management, psychology and sociology as well as risk communication and is therefore interdisciplinary and multi-dimensional and at its best provides a guide of lessons learned in risk communication from different countries over the last decade.

Keywords: Perception; Natural Disasters; Communication; International

Working across Disciplines to Understand and Improve Mass Evacuations for People with Disabilities

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Abstract: Supporting people with disabilities in an emergency is not just about doing the right thing, it's the law. Advancements in accessibility and rights for people with disabilities have increased concern at all orders of government. Emergency evacuations caused by severe weather are becoming more common. More people in Canada have evacuated their communities since 1990 than the total in the previous 90-year period (1900 to 1989), with 3 times as many evacuations that cost 20 times more (Public Safety, 2023). Understanding how demographic changes and government policies are changing the context is important. For example, more people with disabilities and seniors are living at home; rates of disability increase as the population ages. To develop a shared understanding of evacuation risks, we partnered leading risk scholars with those responsible for mass evacuation and organizations that advance the concerns of people with disabilities. We partnered with over 25 organizations representing public, private, and non-profit sector agencies with responsibilities for emergency management, as well as academics and organizations representing people with disabilities. We surveyed 29 people with disabilities, some caregivers, and 8 emergency managers between October and December 2021 to understand key considerations from both perspectives. We also hosted two roundtables with 40 experts including academics, public agencies, emergency managers, non-profit organizations, and organizations that represent persons with disabilities. The first roundtable (June 2022) focussed on communication/Alert and transportation during an evacuation and the second roundtable (April 2023) featured a discussion about return and recovery following an evacuation. Top concerns with return to community relate to addressing damage and debris, alongside restoration of utilities and access to necessities. Respondents with disabilities and caregivers noted that managing repair work while also providing caregiving support is a concern. Respondents noted their reliance on insurance to replace lost or damaged property. It was also raised that people have varying degrees of insurance coverage and may not be able to pay out-of-pocket expenses (e.g., insurance deductibles). Emergency manager respondents identified that emergency personnel need to have knowledge of requirements to ensure a residence is accessible and operational (e.g., access to utilities, free of hazards, access to supplies and supports such as food, transportation, mental health services, support workers, necessities for service animals). This research is part of project funded by the Social Sciences and Humanities Research Council of Canada and Accessibility Standards Canada.

Keywords: Risk Governance; Mass Evacuation; Disabilities

Civic Coalition against Democratic Backsliding in Crisis Response: Following the 2022 Halloween Crowd Crush in Seoul

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Abstract: Context: On the night of October 29, 2022, a Halloween gathering in Itaewon, Seoul, South Korea, ended in a tragic mass calamity, claiming the lives of at least 159 people and injuring 197. Both the city and national governments were responsible for promptly responding and providing appropriate care to the victims and affected families. However, the government's response became highly politicized, with a lack of direct responsibility taken by the national and city governments, and instead, misinformation and disinformation were used to scapegoat first responders, frontline workers, and families of the victims. As a result of the government's inaction and backsliding, nonprofit organizations, civic associations, opposition parties, ordinary citizens with shared core beliefs about the role of government and the importance of fact-finding and fact-sharing formed a coalition. The coalition aimed to raise public awareness of the incident and create political pressure to urge the government to take responsible actions. Objective: This study explores the efforts of the coalition to combat misinformation and disinformation and improve public understanding of the mass calamity incident to garner public support and to urge the government's response to the current incident and prevention for similar incidents in the future. Theory: Our study adopts the Advocacy Coalition Framework (ACF) (Sabatier & Weible, 2007; Weible et al., 2009) to explore the efforts of the civic coalition in urging the government to take appropriate policy and administrative actions in response to the Itaewon disaster. This qualitative case study employs content analysis to examine a year-long record of public documents following the Itaewon disaster (October 2022-October 2023). Methods: The study conduct systematic content analyses of textual data collected from multiple sources, including government documents, press releases, and records on the activities of the two leading groups in the civic coalition: the People's Committee for the Itaewon Disaster of 29 October and the Affected Family's Council. Anticipated Findings: This research may reveal the multifaceted efforts and roles played by civic coalitions in combating misinformation and disinformation, as well as the subsequent government backsliding during crisis response. The study can inform policy changes and address the challenges that civic coalitions face in their efforts to address and respond to these issues.

Keywords: Civic Coalition; Democratic Backsliding; 2022 Halloween Crowd Crush; South Korea

Teaching an Old Dog New Tricks: Using Theory of Change for Dog Bite Risk Management

Owczarczak-Garstecka S.[1], Williams C.[1], Murray J.[1], Christley R.[1]

[1]Dogs Trust

Abstract: Dog ownership is associated with a range of health benefits to owners and positive dog welfare, however, dog bites are also common and a risk to human-dog relationships. Causes of dog bites are multifactorial and related to the bite victim, the dog owner, the environment, and the dog. Despite this, in the UK, the risk of bites is commonly encoded in the national-level policies and represented in reductive terms and at a level of a single actor, e.g. "a dangerous dog" or "irresponsible dog owner". The corresponding policies aimed at risk management are simplistic and rarely consider a system of interactions between different actors that precede a bite. Dog bite prevention needs to be reconceptualised to account for these factors. In this case study we describe how Dogs Trust, the UK's largest dog welfare charity, has used Theory of Change (ToC) model to develop a dog bite prevention strategy. ToC provides a structure for listing assumptions and outlining the required causal processes between events and actors needed for the desired change to occur. To draw on diverse perspectives, experts with experience in epidemiology, public health, human behaviour change, dog behaviour, education, work safety, and anthrozoology were recruited. Using backward mapping, the experts first defined an overall desired impact of change, i.e. a reduction in the frequency of bites and severity of consequences for people, dogs and other animals through improvements in human-dog communication. Short-, intermediate- and long-term changes leading to it were then proposed. Through this process, the efficacy of the existing dog bite prevention interventions was evaluated and gaps in areas of intervention provision were identified. Activities believed to cause the desired change and necessary resources were then identified. The external context of the desired change was also recorded-including assessing the plausible impact of the cost-of-living crisis and an increase in the dog population which followed the COVID-19 pandemic.Application of ToC to the risk of bites is a novel approach to structuring multi-level risk-management interventions that draw on knowledge of practitioners in this area and identification of causal links. ToC helped to identify changes needed to reduce the incidence of dog bites which are currently overlooked in the national policy, such as further regulation of dog breeding and dog behaviour support industry. ToC has helped Dogs Trust move away from the over-simplistic view of dog bite risk management toward a tangible approach.

Keywords: Dogs; Bites; Risk; Strategy; Governance

Symposium:
“Intuitive Risk Management” in the 21st Century – Bridging Different Perspectives

- Coordinator:
Bearth A.

Intuitive Toxicology in the 21st century – Perspectives of European risk assessors and the public

Bearth A.[1], Roth N.[2], Wilks M.[2], Siegrist M.[1]

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[2]University of Basel

Abstract: There is a widely acknowledged motivation to increasingly implement Next-Generation Risk Assessment (NGRA) as the standard approach to chemical risk assessment in Europe, but also worldwide. Scientific developments in our methods to predict adverse biological responses to chemical hazards using in vitro and in silico models has advanced steadily. However, significant scientific, regulatory, legal and psychological barriers remain. Early articles on the subjectivity in risk judgments (i.e., "Intuitive Toxicology") showed differences in the beliefs among the public and among experts about the validity of predicting a chemical's effects on human health based on in vivo studies. Beliefs about the predictivity of in vitro and in silico models and about the public's expectations regarding risk assessment might partly explain the slow and hesitant uptake of so-called New Approach Methods (NAMs) in regulatory risk assessment and management. In two separate online surveys involving European chemical risk assessors, and members of the German-speaking public in Switzerland, these beliefs were explored and compared. This presentation will focus on the differences in beliefs between the public and risk assessors, which has important implications for risk communication and consumer behaviour. Overall, our study highlights that, in addition to scientific and regulatory barriers (e.g., lack of validation and guidance), NAMs might be met with substantial psychological barriers and introduces the need to involve social scientists in the change management for NGRA.

Keywords: Toxicological risk assessment; Chemical risk

Romantic perception of nature results in biased perceptions

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Abstract: In Europe, the Romantic era had a major impact on our perception of nature. The literature and paintings of this era portrayed nature as mysterious and peaceful in contrast to cities and technology. The Romantic era was in stark contrast to the Enlightenment. We hypothesized that the Romantic perception of nature leads to a biased perception of natural hazards, and that the moral component of action is of particular importance above and beyond the mere efficacy of the action. We conducted a survey in Germany (N=531), a country where romanticism was very strong and still influences, for example, the perception of forests. The results suggest that romantic worldviews have a significant impact on people's perceptions of various hazards. Participants with a romantic view of nature perceived more risks related to climate change than people without such a romantic view. Furthermore, participants with a romantic view of nature would be in favor of measures aimed at reducing climate change risks, even if such measures would have no effect. Finally, we found that romantic views of nature were significantly positively correlated with risk perceptions of man-made hazards, but not natural hazards. The results of our survey suggest that ideas developed during the Romantic era still influence the perception of hazards in Germany. Overall, a romantic view of nature may lead to a biased perception of hazards.

Keywords: Risk perception; Nature; Climate change

Citizen's location preferences for mobile phone base stations: More than just a question of distance?

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Abstract: The mobile communications standard 5G has been implemented in Europe since 2019. This does not only lead to the upgrade of older base stations, but new base stations will also be installed. While laypeople usually prefer locations far outside a city for mobile phone base stations, reasoning that this will reduce their exposure to radiofrequency electromagnetic fields and thereby potential health risks, from a scientific point of view it makes sense to install base stations as close as possible to users, as this will result in lower overall exposure for most people. For the earlier mobile communications standard 2G, the public's base station location preferences have already been investigated. For instance, in Cousin and Siegrist (2010) from a set of potential locations, the one farthest away from the village was highly preferred. In another experiment, Cousin et al. (2011) showed that laypeople choose differently when being informed about how base stations and mobile phones interact. As a result, informed participants preferred a scenario with several base stations with limited power, spread across the village. As part of two studies investigating the perception of mobile communications, we aimed to find out which locations citizens prefer for 4G and 5G base stations. First, a qualitative study (N=35) including focus groups (N=6) was conducted in December 2022. Based on the results, a quantitative survey was conducted between September and December 2023 in ten European countries (N~10,000). In both studies, participants were asked to indicate their initial location preference by selecting one of six possible locations. Thereafter, they received information about the interaction pattern between base stations and mobile devices and had the opportunity to change their initial location preference. While in the qualitative study, both in the initial and informed location selection, the location on a factory at medium distance was preferred, preliminary analyses of the quantitative data showed that the most distant location is initially preferred (53.6%). "Distance" has the greatest influence on the initial preference of location (M=5.17), "appearance" has the least influence (M=3.79). After receiving information, 57.6% preferred another location, whereby the majority (32.6%) of those changing their location preference opted for the location on a factory. In general, locations close to the reference point were now more favourable. Due to the multi-country approach, the study was able to show that not only various aspects influence location preferences, but that there are also country-specific differences, which will also be discussed.

Keywords: RF-EMF; Base stations

Price increase vs. loss of purchasing power: How investment decisions are influenced by the way inflation is framed

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Abstract: In many European countries, in 2022 and 2023 inflation reached levels that had not been observed for decades. As inflation affects everyone, it is important to study how lay people perceive this phenomenon. The present study focuses on two distinct perspectives on inflation.: If prices rise in an economy, it automatically means that money loses purchasing power, and vice versa. When it comes to communication, these two perspectives can be seen as two different "frames". To the best of our knowledge, no research has been conducted on whether framing inflation as (1) a price increase (a typical framing in the retail sector) or (2) a loss of purchasing power (a typical framing in the banking sector) affects risk-taking in investment decisions. Building on prospect theory and loss aversion, we hypothesised that the framing of inflation as a loss of purchasing power leads to riskier decisions compared to framing it as a price increase. In an initial test of this hypothesis, an online experiment was conducted with a convenience sample of N = 252 participants. They were randomly presented with detailed explanations of the phenomenon of inflation in one of the two different frames. After reading this, subjects then had to decide between a safe and a risky investment strategy (both options with the same expected value). This procedure was based on a risky choice framing. There was a significant difference in investment decisions depending on the framing of inflation ($\chi^2 df = 1 = 11.57$, $p < .001$). As hypothesised, participants in the loss of purchasing power condition were more likely to choose the risky option (60.7%) than participants in the price increase condition (38.5%). Effect size was medium (Cramer's V = .21). Based on this initial study, a further study with a larger quota sample will be conducted in February and March 2024 to corroborate the findings and delineate the magnitude and relevance of this effect as well as potential moderator variables. The results of this larger study will be reported in the presentation, and their relevance in research and practice will be discussed.

Keywords: Framing; Decision; Inflation; Loss aversion

Session Title:
Risk-based Development and Spatial Planning I

◆ Chaired by:
Galderisi A., Mellisourgos Y.

How to improve cultural heritage protection policies at the European level: insights from field experiences

Ancona S.[1]

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Abstract: The presentation discusses the Protection of cultural heritage in different countries of Europe and the mission of the fire fighters in the way of considering following topics: A.What are the differences between the countries considering the laws? B.What can we learn from fire brigade experiences in three European countries, helping to increase cultural heritage risk prevention? The protection of cultural heritage is not a matter of course and is regulated differently in different countries. This is also linked to the federal or non-federal political leadership of the individual countries and their geographical division, such as the division into federal or not federal states, like in the federal Republic of Germany and the division into departments in the case of the Republic of France. With regard to the Grand-Duchy of Luxembourg, there is only one national level with an equal validity of the legal situation on a national level. Structure of the proposal: The countries Germany, France and Luxembourg. An insight into the legal situation of the institutions, an insight into the legal situation and the missions of the fire brigades, which are the actors involved in the event of an emergency and damage. Compared with: 1.Participating actors dealing with material cultural heritage protection. •What missions do the cultural institutions themselves have and what responsibility do they have in the event of damage to cultural property? •What is the role of the fire brigades? 2.How can the fundamental course be set in advance of a damage situation? How can cooperation between civil defence actors and the cultural institutions be improved? 3.What documents might need to be drawn up and how can they be used in the event of an emergency? What benefits can be derived from them? 4.How and by what means can the protection of cultural property be strengthened?

Keywords: Cultural heritage; Legal protection

Seafront planning in the era of climate change: challenges for risk prevention and beyond, through an integrated resilience approach

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Abstract: In recent times, as cities and metropolitan areas are confronted with multiple risks, the need for an integrated approach to risk prevention and management is becoming apparent. Climate change awareness has triggered the interest about disaster risk reduction and broadened the scope of involved policies. While challenges for natural hazard risk prevention are becoming urgent, challenges of different origins have already emerged, such as those for cities' competitiveness and socio-economic development as well as for improving the quality of life of citizens. This is especially the case of seafront areas that have undergone various transformations due to economic change and socio-economic and environmental crises. A variety of regeneration projects have taken place in seafront areas since the 1970s, their aim being to overcome development constraints, exploit physical assets and increase seafronts' attractiveness. Spatial planning has a key role in this, while at the same time it is questionable whether it is fully exploited as a coordinating framework of various actions and interventions on the ground. Then, the question arises as to how an integrated approach to risk should incorporate multiple risks and challenges for seafronts. This is also a question for spatial planning that need to renew its principles, methods, and tools in the era of climate change. This paper examines the above issues with the aim of exploring new trends in spatial planning and in particular seafront planning. It draws evidence from new generation seafront redevelopment/regeneration cases that consider the need for climate adaptation and disaster risk reduction, and endeavors to identify new potentialities for spatial planning that promote overall resilience of these territorial areas.

Keywords: Resilience; Climate change; Spatial planning

Developing Risk-Informed Sustainable Development Policies: Directions for Disaster Risk Management at National and Subnational Levels

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Abstract: Populations are increasingly vulnerable to natural hazards because of development patterns and climate change. This vulnerability is exacerbated in part because of a lack of comprehensive and systemic approaches to disaster risk management at national and subnational levels. Coupled with broader socioeconomic issues that are furthering vulnerability, disaster risk management is often pitted against development instead of as a part of development. International discourse and organizations have challenged this approach as antiquated, arguing that the lens through which disaster risk reduction and resilience are pursued must evolve to reflect a more holistic form of understanding around the concept of 'risk-informed sustainable development.' It is anticipated that future international agreements will likely be framed around this concept, which could have important implications for how disaster risk is viewed and managed by its members. This presentation will examine the conceptual boundaries of this paradigm shift in the context of disaster risk management and its potential impacts to policies and policy processes. Drawing from a Canadian case study, this presentation will discuss how national and subnational policies, processes, and governance arrangements can adapt and transform in support of 'risk-informed sustainable development.' This includes a look at legislation and regulations, strategic policy, programmatic policy, and policy instruments intended to support whole-of-society decision-making.

Keywords: Risk-Informed; Sustainable; Development

Social and Economic Adaptation and Resilience after Hurricane Otis in Acapulco, Guerrero

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Abstract: The State of Guerrero is consistently ranked among the top three states in Mexico regarding poverty, and social and economic vulnerability. Nevertheless, this does not apply to Acapulco municipality, which, due to its reliance on tourism, has not been among the poorest municipalities in the state. However, in November 2023, Hurricane Otis, classified as a Category-5 hurricane, struck Acapulco, resulting in widespread devastation across the municipality. As mentioned, tourism significantly contributes to Acapulco's economy, given its proximity to Mexico City, making it one of the country's most frequented beaches. During peak periods like holidays and festive breaks, both the beaches and the hotel zone in Acapulco reach full capacity. Tourism has also led to the expansion of urban sprawl around the port of Acapulco. Working-class neighborhoods on the outskirts of Acapulco attract individuals from various regions of the Mexican Republic, seeking employment opportunities. Despite the large number of tourism-related jobs, there has also been an increased demand for domestic work. This trend is linked to the rising sales of houses and apartments to higher social classes, who, in turn, require cleaning and maintenance staff for their residences. Following the cessation of the hurricane, there was a disturbance in the work dynamics. This prompted the population to incorporate social and economic adaptations into their daily routines. This research aims to identify potential social and economic solutions to enhance the population. This will be achieved by learning the social and economic adaptation and resilience strategies adopted by the population as they resume their daily lives after the hurricane.

Keywords: Adaptation; Vulnerability; Sustainability; Community

Assessment Criteria for Climate-Resilient Public Spaces: Perspectives from Istanbul

Ronael M.[1], Oruç Ertekin G.[1]

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Abstract: This research examines the ability of urban public spaces to withstand the influences of climate change, emphasizing the growing significance of urban resilience in addressing current environmental concerns. It primarily focuses on the resilience concept, especially addressing the question of "resilience to what?" in the context of the climate crisis. Our main goal is to define standards for evaluating the ability of public open spaces to endure and recover from challenges, aiming to promote the development of sustainable and resilient cities in the face of unknown future circumstances. In order to do this, we conducted an extensive examination of the literature on Scopus and analyzed 101 papers to identify urban resilience criteria relevant to different urban difficulties. However, we only concentrated on the "resilience for climate change" theme and constructed an assessment procedure using 25 methodically chosen criteria. In addition, the criteria were used to evaluate three categories of public open spaces: squares, streets, and parks. Accordingly, to ensure that the evaluation accurately reflects the relevance of each category in enhancing climate resilience, an a priori weighting of the criteria was deemed necessary. A focus group including experts in various fields, including but not limited to architecture, urban planning, landscape architecture, and engineering, assessed the criteria. Each criterion was assigned a weight on a scale of 0-10, indicating its precedence for climate-resilient public spaces, regardless of location. Moreover, we employed this evaluation methodology through three interlinked and globally acclaimed public spaces at the core of Istanbul—Taksim Square, Istiklal Street, and Gezi Park—not only are these areas physically contiguous, forming a cohesive urban environment, but they also share a deep, perceptual connection in the minds of citizens and visitors alike, symbolizing the cultural and social epicenter of the city. In this process, the focus group evaluated these areas as a second round, awarding ratings from 1 (weak) to 5 (excellent), which enabled calculating cumulative values and comparing their resilience performance. The significant achievement of this study is establishing a comprehensive set of standards and creating an evaluation framework to measure the ability of urban public spaces to resist the effects of climate change. Results indicate that certain variables are more crucial than others, differing based on each location's characteristics and circumstances. This study also provides a methodical method for assessing urban resilience and lays the basis for improving these standards through expert input and empirical data.

Keywords: Resilience; Climate Change; Evaluation Criteria

Session Title:
Risk-based Development and Spatial Planning II

◆ Chaired by:
Kostarelli V., Greiving S.

Marine Spatial Planning and Socio-Natural Disasters

Ioannidi D.[1]

[1]Harokopio University of Athens

Abstract: With the increasing frequency and intensity of socio-natural disasters, there is a growing need to examine the interconnection between Marine Spatial Planning (MSP) and risk management and governance, especially in coastal zones particularly susceptible to hazards, risks and disasters. The research delves into the critical nexus between already adopted Marine Spatial Plans and risk management strategies in sea zones and coastal areas. The study reviews MSP practices and assesses their efficacy in addressing the challenges posed by natural disasters and accidents, such as coastal floods, coastal erosion, accidents in offshore oil industry installations etc. By examining existing MSP frameworks, it is possible to identify potential limitations in integrating risk mitigation and disaster preparedness components. The development of comprehensive strategies that not only optimize marine resources use, but also enhance protection and resilience against unforeseen events is considered as crucial, given the gap identified in international literature. Furthermore, there is a need to investigate the feasibility of incorporating emergency plans within MSP frameworks to facilitate a swift and effective response in times of crisis. The methodology involves qualitative data analysis through the examination of case studies and existing plans.

Keywords: Marine Spatial Planning, Risk Management

Maritime Spatial Planning and natural and technological disasters: A future research agenda based on a literature review

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Abstract: Concern about disasters caused by either natural phenomena or technological accidents has increased significantly in recent years and apart from land, the coastal and marine space is also very susceptible to both natural and technological hazards. Hazards of both categories that are more relevant in oceans and coasts include: coastal erosion, tsunamis, oil spill risk, toxic waste and coastal flooding from storm tides/wave overtopping/sea-level rise. In addition, climate change, being also the result of constant human pressures to the environment, implicates a higher risk of those phenomena occurring. Over the years, countries have focused on prevention and management for such events and spatial planning is one of the procedures used for this. However, even though risk analysis/management has, over the last decades, been more systematically integrated into spatial planning, it is still not consistent. Through a literature review this discussion aims on unveiling the integration of prevention and management of natural/technological disasters in spatial planning, with a particular focus on maritime spatial planning (MSP). The methodology included extensive search in scientific search engines with relevant key words searched in combinations for more targeted results. The bibliometric analysis shows the start of the integration of disaster prevention and management in spatial planning in the mid-1990's, the major research themes (e.g. flooding and urban planning) as well as the key knowledge gaps. A central finding is the lack of literature that refers to maritime spatial planning. This particular gap, taking into consideration the dynamics of the marine and coastal environment as well as the necessity for MSP on a global context, could stimulate future research that focuses on the way that MSP: a. incorporates risk analysis and management for natural and technological disasters and b. deals with land-sea interactions (LSI) of disasters' effects especially in coastal residential areas.

Keywords: MSP; Disasters; Natural; Technological; Risk

Unraveling the Continuing Influence: Climate Change and the Changing Credit Risk in Coastal Real Estate Markets

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Abstract: In recent years climate change and its consequences on ecosystems, societies and the economy have become more apparent. Climate change and environmental degradation are sources of structural change that affect economic activity and, subsequently, the financial system. Generally, the financial risks associated with climate change fall into two broad categories: The first category concerns the natural risk, which arises as a result of the extreme weather phenomena manifested by climate change. This category includes ad hoc events, such as floods and fires, but also chronic phenomena such as sea level rise. The second category concerns transition risk, where delayed or abrupt implementation of climate policies to reduce carbon dioxide (CO2) emissions could have a negative impact on certain industries that are more dependent on energy and coal; such as mining, the cement industry or the steel industry. Financial institutions face a broad range of risks occurring from a rapidly changing, chaotic global environment. Their clients are exposed both to physical hazards, as well as transition risks. These threats can have significant credit, market and operational consequences. A financial institution that functions efficiently would be able to explore risks that arise due to climate change and develop strategies in order to safeguard itself from potential negative consequences. A resilient and successful financial organization's fundaments are an adequate decision making process and an efficient planning process. Taking into account the aforementioned aspects, a field research is proposed, aiming at proposing a framework for the incorporation of the implications of climate change and sea level rise to the credit risk estimation in coastal real estate markets. In other words, the potential impact of the aforementioned environmental threat to credit risk is going to be assessed, forming the basis of a credit risk estimation model. The main research objective is to propose a credit risk model that would take into account the threat of sea level rise and would be applicable to real estate investments in coastal areas. The contribution of the proposed research is to (a) identify the credit risk that emerges as a result of the climate change in coastal areas real estate markets and (b) provide a framework for the incorporation of the aforementioned risk to the risk estimation models of financial institutions in order to safeguard them from this threat.

Keywords: Climate change; Sea level rise; Credit risk; Coastal real estate markets

Perceiving risk and planning ahead? Linking risk perception and disaster preparedness behavior in Bucharest, Romania

Armas I.[1], Dobre D.[1], Albulescu A.[1]

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Abstract: In this study, we aim to explore the effects of Risk Perception on Disaster Preparedness Behavior toward earthquakes based on a survey of 393 inhabitants of Bucharest, Romania (Ng, 2022, adapted). Our research is routed in the Theory of Planned Behavior (TPB, Ajzen 1991, 2002) because behavior is still poorly understood in disaster preparedness. Three kinds of considerations guide behavior: 1) behavioral beliefs (about the consequences of one's behavior), 2) normative beliefs (about the normative expectations of others – that is, the perceived social pressure), and control beliefs (about the presence of factors that may facilitate or not the behavior beliefs). Control beliefs give rise to perceived behavioral control or self-efficacy. Our intention was to document that risk perception and intention of preparedness are predictors of disaster preparedness behavior. From the literature, we know that humans adopt preparedness measures and behaviors only when they perceive that a disaster threatens them. Data were analyzed using the structural equation modeling (Kenny, 2014, 2020; Byrne, 2012; Suhr, 2006). Results revealed that risk perception is also a significant predictor of the three constructs of the theory of planned behavior (it is correlated with subjective norm, attitude, and perceived behavior control). Risk perception and subjective norms are shaped by society, building a strong link to intention and disaster preparedness behavior.

Keywords: Risk Perception; Disaster Preparedness Behavior

The Role of Social Capacities in Local Flood Risk Management Planning

Guadalupe Ortiz G.[1], Aledo A.[1], Aznar-Crespo P.[1], Saraceno S.[1], Tur-Vives J.[1], Mañas-Navarro J.[1]

[1]University of Alicante

Abstract: Climate change is leading to a significant increase in the frequency and severity of extreme weather events, including potentially catastrophic floods. The Intergovernmental Panel on Climate Change (IPCC) has stressed the importance of analyzing social vulnerability to flooding, as well as strengthening social capacities to prepare for and respond to such disasters. In this context, the AQUASOC project aims to examine how local governments in Spain are incorporating social training into their Local Flood Risk Management Plans (PAMRIs, in Spanish). Within this project, eighteen PAMRIs in the Vega Baja case study (Alicante, Spain) were systematically analyzed. The Vega Baja region (Southeast of Spain) suffered a catastrophic flood event in September 2019. The content analysis was aimed at two main tasks: 1) Identification and categorization of the social capacitation actions included in these management documents. 2) Evaluation of these actions based on various criteria such as operability, precision, context-relatedness, responsibility assignment, and resource allocation. The findings indicate that PAMRIs tend to be highly reactive, prioritizing the planning of institutional emergency responses over medium-to-long-term social capacitation actions. Furthermore, a significant amount of the effort directed towards social capacity-building is delegated to external volunteering associations, displaying a high level of indeterminacy and superficiality.

Keywords: Floods; Capacitation; Resilience; Governance; Vulnerability

Symposium:
Planning for the worst:
European experiences of relocation in the context of flood risk

◆ Coordinator:
Calliari E.

Planning for the worst: Responding to flood risk through preventive relocation in Northern Italy

Calliari E.[1]

[1]International Institute for Applied Systems Analysis

Abstract: Planned relocation (PR) is a radical and potentially transformative adaptation measure where people and assets are resettled under governments' leadership to avoid climate risk. In Europe, PR remains largely framed as a reactive response in post-disaster settings and has been implemented on a case-by-case basis. As climate impacts intensify, the need to move people and assets away from at-risk areas is likely to increase as protecting them might become too costly or ineffective in the long run. This will require the implementation of anticipatory and managed approaches to confront the scale of projected climate impacts and to avoid inequitable outcomes. However, the types and scale of institutional and governance innovations required for shifting from PR as an ad hoc reactive solution to an anticipatory and managed adaptation measure are still poorly understood. The presentation will share preliminary results from the EU-funded ITHACA (planned relocatIon as adapTation in a cHAnging ClimAte) project, which specifically aims at uncovering and theorising the distinct institutional and governance challenges in the preventive and strategic employment of PR in a changing climate. It will focus on the case of Piedmont in Northern Italy, which is the only region in the country to have devised a policy for the preventive relocation of residential buildings at high risk of riverine flooding and has already supported the relocation of 51 households. Building on a multi-method approach, including field research, interviews with regional and local policymakers, experts and relocated households, and document analysis, the presentation will outline how the PR policy in Piedmont came into place, how is being implemented -including challenges and lessons learnt-, and prospects for a scaled-up employment as a form of adaptation to climate change. The project is implemented in close partnership with the Piemonte Region, and its result are expected to inform the update of the regional relocation policy. Through a focus on policy formation and implementation, the presentation seeks to fill critical gaps in our understanding of how PR should be governed, managed and regulated at the interface between disaster risk reduction and climate change adaptation. Moreover, it seeks to energise academic attention on PR as a form of human mobility in the context of climate change and stimulate discussion around its strategic employment in Europe.

Keywords: Planned relocation; Flood risk; Adaptation

It aint over til its over: Long-term implementation and coping processes in a voluntary relocation scheme in Austria

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Abstract: After the 2013 Danube flood, residential and agricultural buildings in the Eferding basin in Upper Austria were subjected to a voluntary relocation scheme. Those who left and tore down their homes were compensated for 80% of the building value. Those who stayed received no flood protection and the entire relocation zone was placed under a construction ban. As of now, 72 out of 148 households have accepted the relocation offer, and 63 already moved away. Transdisciplinary research tracked affected households and involved decision-makers in longitudinal semi-structured interviews from the scheme's announcement in 2015 until today. The paper discusses the long-term gradual adjustments in the administration of the scheme and in the household reactions as the implementation process unfolded (and continues to unfold) over almost a decade. The relocation scheme was designed based on experiences from earlier schemes in downstream regions, but was amended to accommodate protest from citizen groups and municipal governments, for instance by introducing exceptions for agricultural buildings. However, the initial ruleset remained largely unchanged during its administration, apart from relaxing deadlines or audit requirements. Compensation payments fixed to 2015 values within a slow relocation process put households under financial pressure in the light of a restricted local housing market and increases in construction costs, inflation and credit interest rates. Most households coped fairly well with the relocation process and entered resilience or recovery trajectories of life satisfaction. However, households remained in chronic distress if the relocation coincided with another existential crisis. Policy instruments besides the relocation scheme incurred backfire reactions in building reconstruction. For instance, pre-flood building permits could not be revoked and allowed circumventing the construction ban; or standards for new buildings did not counter or even encouraged oversized floor areas. These backfire reactions were exacerbated by the households' short time horizon when anticipating their future housing needs. The Austrian relocation scheme offers a range of learnings for voluntary schemes in other countries. Personalized counselling may support residents in deciding on and managing their relocation process. Flexible and customized relocation conditions could buffer disproportionate impacts on vulnerable groups. Both counselling and flexible conditions should endure beyond the relocation decision itself, since household coping processes take years to unfold. Foremost, the scheme lacked a resilience pathways perspective for horizontal integration between the climate change adaptation and mitigation policy domains. Aligning instruments for flood risk reduction and energy efficiency in housing could accelerate the transformation to sustainability.

Keywords: Floods; Coping; Relocation; Policy; Adaptation

Non-homogeneous communities and implications for planned relocations. The case of Pedrinhas and Cedovém, in Portugal.

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Abstract: As climate change increases the frequency and intensity of extreme and slow-onset events, academics and policymakers become more and more interested in processes of relocation of entire communities out of harm`s way. In the case of Portugal, when other solutions prove ineffective or infeasible, relocation of people and infrastructures can be deemed the most suitable solution to address the risk of coastal flooding and erosion. While most conversations about planned relocation typically address the movement of an entire community, sometimes it is unclear what constitutes a community. Areas at risk may be occupied by a variety of actors such as permanent residents, second-home owners or other stakeholders with economic interests. This paper presents results from qualitative methods, including document analysis, field observation, and interviews with various stakeholders, such as government officials, permanent residents, second-home owners, restaurant owners, and fishermen in Pedrinhas and Cedovém, located in the Braga District in Portugal. The research is centred on a planned relocation project currently being developed in the area. The study delves into how different actors involved in the community make sense of coastal risk, exploring their attachment to the place, perceived necessity for relocation, the arguments they employ to support their diverse perspectives and interests, and the implications for local authorities tasked with managing the relocation process.

Keywords: Planned relocation; Portugal; Coastal risk

Session Title:
Enhancing personal, community, institutional, urban resilience

◆ Chaired by:
Georgiadou P., Galderisi A.

Exploring the negative externalities of building resilience to drought risk in insular Social-Hydrological Systems (SHSs)

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Abstract: Due to the scarce nature of water resources, water users and water management institutions in insular areas are facing increased exposure and vulnerability to drought risk. The most popular response is to seek additional water resources through technical solutions, such as desalination facilities, dam reservoirs, boreholes, or water transfers from remote river basins, in order to meet their needs. However, water users and management institutions opting such solutions may be faced then with increased water and energy costs, deteriorating water quality and always lowering local aquifers, ultimately threatening their survivability. More importantly, the benefits and costs of such adaptation options are not evenly distributed among the social groups and across spatiotemporal scales. Resilience to drought risk has been associated with the ability of systems to adapt to conditions of water scarcity successfully. Water users and water management institutions interact with each other, with the hydrological as well as the hydraulic and energy technical works systems in order to become resilient. Through this nexus of interactions, these four systems coevolve and formulate wider Social-Hydrological Systems (SHSs), a special case of Social Ecological Systems. The process of adaptation however, initiated by a specific social group or water management institution may produce externalities that negatively influence the resilience of other subsystems, within the same SHS, or nested in other SHSs. These externalities may derive from policy options and adaptation interventions or choices on behalf of the water management institutions or the water users and may show up either concurrently or in the future. The present work uses a fit-for-purpose methodology to identify the adaptation potential of agencies within wider SHSs and deliberates on the externalities found in the case studies that focused in two Greek islands: the agricultural community of Messara plain in Crete and the tourism community in the island of Patmos in the Dodecanese group. The author followed an approach of four steps: a) identification of the processes of resilience building for each subsystem within the same SHS; b) search for the negative repercussions of resilience building and their distribution in time and space and between the subsystems and the wider SHS; c) analysis of the role of water management authorities in managing the negative externalities associated with drought resilience building and d) addressing the possibility of potential reproduction of drought risk, resulting from the negative externalities of adaptation behaviours.

Keywords: Resilience; Social-hydrological systems; Drought

The resilient subject: a visual analysis of Swedish preparedness campaigns

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Abstract: During the last decade Swedish risk and crisis communication has come to shift focus away from communicating risks towards promoting the need for individual preparedness. At the heart of current preparedness campaigns stands the resilient subject (Chandler 2013): a citizen capable, responsible and active enough to face and manage the threats and dangers of the 21th century. This turn from risk towards resilience illustrates what other researchers (see Bankoff 2019; Bergström 2018; Chandler 2013) have pointed out before us: resilience, meaning citizens' and communities' abilities to adapt to risk, crisis and disasters, is the morale imperative of current security policies and politics. In this paper we turn our focus to Swedish crisis preparedness campaigns to explore how the resilient subject is portrayed in both text and visual material. Guided by visual methodology (Rose 2022, Bell 2013, Wall 2016), our analysis indicate that Swedish crisis preparedness campaigns emphasize the material attributes needed to make "us" resilient. In doing so, the campaign material portrays the resilient subject as a consumer rather than a citizen – and preparedness as a matter of the ability to consume appropriate preparedness attributes.

Keywords: Risk communication; Resilience; Visual analysis

Challenges for strengthening regional resilience against multi-hazards – Research data

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Abstract: The purpose of this paper is to highlight the challenges and action priorities in today's conditions for protecting occupational and public safety and health, protecting the environment and strengthening regional resilience against multi-hazards. Relevant research data from studies that have been carried out in Greece, are presented. The research data are based on quantitative research through online surveys, on data from conducting interviews with different stakeholders, and on literature review. Natural and technological disasters, new risks and uncertainties, epidemics such as the Covid-19 pandemic, the ever-increasing interaction between multiple sources of risk (a typical example is the NATECH disasters), the evolution of technology, existing land uses, symbiosis of urban environment with hazardous industries, forest environment etc., underline the need to strengthen the regional resilience by taking into account today's challenges. The paper presents through research data in Greece, the possibilities of utilizing the institutions and procedures for the assessment and prevention of occupational risk to strengthen regional resilience against multi-hazards. Procedures for occupational safety and health (OSH) in every workplace, regardless of size and sector, can contribute significantly for conducting comprehensive risk assessments for specific regions by taking into consideration multiple risks. In particular, OSH procedures can contribute to the prevention of natural disasters consequences, to the prevention of major accidents related to hazardous materials and especially NATECH and domino accidents, to safer land use planning. They can also contribute to the development of comprehensive emergency plans in areas where workplaces and especially high-risk industries are adjacent to residences and other activities. A special aspect is the need to strengthen training and procedures for the protection of health and safety for the civil protection personnel. Gaps and shortcomings, good practices and future challenges are highlighted. The research data highlight the challenges of overcoming existing weaknesses in enhancing regional disaster resilience. For example, the lack of information and training of the population, the lack of methodological tools for comprehensive risk assessments, the lack of methodological tools for natech disasters, gaps in the implementation of the institutional framework of civil protection and especially issues related to the coordination of different agencies, the lack of land-use planning criteria etc. Proposals for improving the deficiencies identified by the research are presented. For example: strengthening training for different population groups, scientific research priorities, enriching and monitoring the implementation of the institutional framework, etc.

Keywords: Resilience; OSH; NATECH; Multi-hazards

Community resilience in highly urbanized volcanic areas: the case study of Campi Flegrei in Southern Italy

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Abstract: The area of Campi Flegrei, the largest volcanic caldera in Europe, has undergone a century-long urban growth, now hosting around 500 thousand inhabitants and a rich historical, archaeological, and natural heritage. While the last volcanic eruption occurred in 1537, the area has experienced several bradyseismic crises in recent years: 1970-72, 1982-84, 2005-ongoing. During bradyseismic crises, the lifting of the ground induces frequent shallow earthquakes of short duration and low intensity, which arouse citizens' concern and the attention of the involved authorities. Despite the existing risks, limited prevention actions have been so far implemented, often without an overall vision of territorial development and sometimes harbinger of further problems. Due to the peculiarity of the bradyseism, and in general of volcanic hazard, communities' resilience, as the ability of a community to cope, adapt, and recover from a hazardous event, takes on relevance. This contribution aims at understanding the resilience of communities as a dynamic process based on continuous learning (Cutter et al. 2008), by analysing: first, the evolution of strategies, plans, and actions undertaken from 1970 to the present, to show how the involved authorities have been struggling to pursue a coherent and integrated approach leading to reducing risk and enhancing resilience; second, if and how awareness and preparedness of local communities has changed, following the last and still ongoing bradyseismic crisis intensified in 2022. In detail, a comparative timeline of bradyseism-DRM cycle-population response will be discussed to identify the shortcomings and results achieved so far in DRM, showing how strategies have often followed instead of anticipating phenomena. Also, the spatial planning tools at different levels will be presented, focusing on their contribution to reduce exposure and vulnerability in the area. The last section will show the results of a survey carried out by the Authors in 2023 and a comparison with a previous survey carried out by Ricci et al. (2013) aimed at understanding how risk perception and awareness, as well as the knowledge of Disaster Risk Management (DRM) system, has changed after 10 years following the intensification of bradyseismic events.

Keywords: Risk perception; Communication and governance

Cutter, S.L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. Global Environmental Change 18 (2008) 598–606

Ricci, T., Barberi, F., Davis, M.S., Isaia, R., Nave, R. (2013). Volcanic risk perception in the Campi Flegrei area. Journal of Volcanology and Geothermal Research 254 (2013) 118-130

Session Title:
Novel approaches to compounding disaster management

◆ Chaired by:
Atun F., Paidakaki A.

An Analyses of Flood Risk Management Strategies: A Case Study of Rize Türkiye

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Abstracts: In recent years, increasing flood events, driven by human and climate change activities, have caused significant loss of life and property around the globe. Consequently, effective flood risk management strategies have become crucial in response to rising flood risks. This study investigates the strengths and weaknesses of current flood risk management strategies in Rize, Türkiye, and provides recommendations to enhance flood resilience, decision-making processes, and community impact. By applying an elite interviewing qualitative research design, 51 senior civil servants, appointees, experts, and managers involved in flood risk management in Rize, Türkiye, were interviewed. The findings recognise the crucial components of effective flood risk management strategies include infrastructure, land use planning, early warning systems, and community participation. Particularly, the findings emphasise the vulnerability of rural areas as a result of unauthorised construction and inadequate planning and, in turn, the necessity of comprehensive risk mitigation strategies. The identified strengths and weaknesses provide an outline for enhancing strategies, encouraging collaboration, and building a community more resilient to the growing risks caused by climate change. The insights gained from this study will help to create a framework that paves the way towards greater adaptability, sustainability, and effectiveness in protecting people, property, and the environment by incorporating them into modern practice. Furthermore, our findings of this study will help inform the decision-making process in the context of flood risk management not only in Türkiye but also globally, where the intensity and frequency of flood events are expected to increase.

Keywords: Floods; Risk Management; Resilience; Interview

Promoting disaster preparedness and resilience by co-developing stakeholder support tools for managing systemic risks of compounding disasters: PARATUS project

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Abstract: Currently, there are no publicly available tools for developing and quantifying impact chains for compounding multi-hazard events and their cascading impacts. The available loss assessment tools are often not within reach of first and second responders and local authorities, and their data requirements may be overly complicated for the stakeholders to obtain within the time they have to make decisions. One of the main challenges is understanding how the working process of stakeholders can be integrated into a service that is both generic enough to be usable in different settings and flexible enough to be applied to a specific situation. In this framework, the overall objective is the co-development of a web-based simulation and information service for first and second responders and other stakeholders to evaluate the impact chains of multi-hazard events with particular emphasis on cross-border and cascading impacts. This presentation provides an overview of the project and the platform. A central theme in the PARATUS project is the co-development of the tools with stakeholders. The stakeholders within the four applications case studies (Istanbul, Bucharest, Brenner Corridor and Caribbean) are therefore full project partners and they are directly involved in the development of the platform. The PARATUS Platform will have two major blocks: an information service that provides static information (regularly updated) and simulation service, which is a dynamic component where stakeholders can interactively work with the tools in the platform. The information service is expected to contain several components: a terminology WIKI and links to other platforms developed by EU Horizon Europe projects with similar objectives; an impact chain WIKI which contains the standardized impact chains for a number of historical disasters, and which can be queried by users on several aspects; a module linking to hazard and exposure datasets and modelling results; a tool guiding users to various resources on risk reduction measures, and climate adaptations, and a tool to link to relevant datasets of the case study sites. The simulation service contains a series of tools that the users can use to develop new hazard and risk information for their own area and develop future scenarios and risk reduction alternatives. The final structure of the platform will be determined iteratively by the stakeholders involved in the PARATUS project as partners (DSU in Romania, ASFINAG in Austria, IMM in Istanbul and NRC in the Caribbean), and stakeholder requirements of the ones outside of the consortium.

Keywords: Codevelopment; Systemic risk, Compounding disasters

Uncovering the dialectics of disaster risk reduction, displacement and restoration of sustainable livelihoods: the case of 'Merapi Coffee' in Indonesia

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Abstract: This paper studies the momentum of the rise of Merapi coffee agricultural products, as well as the social innovations of coffee farmers in dealing with eco-political and economic pressures following the 2010 Merapi eruption in Indonesia. The paper aims to explore the notion of displacement ecologies through an in-depth analysis of the 'Merapi Coffee' case study by examining the interplay between disaster risk reduction (DRR), displacement, mining activities, and the restoration of sustainable livelihoods. After the 2010 Merapi eruption, a group of coffee farmers living in a hazard area were forced to leave their land in the name of a disaster risk reduction (DRR) policy and a post-Merapi-eruption newly-designed spatial plan in 2010 indicating their disputed area as part of the “hazard-prone areas III” (KRB III) which were declared as "no man's land". At the same time, coffee farmers have tried to revive economically through the sand mining business and revitalize the Merapi volcanic coffee farming business. However, they realized that the sand mining business is not ecologically sustainable. This paper casts light on the policy of eviction, the economic potential and environmental damage as well as the consequences of mining, as well as on the ways by which coffee farmers have responded to these challenges by finding their post-disaster source of livelihood. To examine the bottom-up initiatives of the Merapi coffee farming community in finding alternative ways to overcome socio-political and ecological problems in Merapi, the paper develops a hybrid framework of (post-structuralist) political ecology and social innovation theory. By looking at the challenges the coffee farmers faced before and after the 2010 Merapi eruption and examining their responses – including discourse development and collaboration-making with fellow farmers, coffee entrepreneurs, ecologists, community members and the government – the paper argues that Merapi coffee, an agricultural commodity grown on volcanic soil, has socio-ecological and political ramifications. Coffee production in the study area is inextricably linked to ecological dynamics such as the dangers of volcanic eruptions and lahars, DRR policy, and market mechanisms. Moreover, the emergence of an alternative economic momentum for coffee created an opportunity for the Merapi coffee community to work together to overcome long-lived obstacles and meet their needs. Finally, the coffee farmers took political positions because of the impact of exclusion from the DRR policy and offered alternative approaches to DRR and their livelihood which are more inclusive and sustainable.

Keywords: Disaster risk reduction; Social innovation

Navigating Long-Term Recovery Pathways to Ongoing Volcanism at Mt. Taranaki

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Abstract: Volcanic eruptions are considered one of the most damaging, dangerous, and disruptive natural hazards known to humans. Despite the known hazardous potential of such environments, profits often outweigh fear, leading to an increased concentration of human settlements around volcanoes. Besides the immediate direct hazards, volcanic eruptions frequently trigger indirect impacts stemming from complex and intertwined natural, human, and physical networks and their dynamics. Recent studies indicate that Mt. Taranaki is likely to generate national-scale consequences for New Zealand in the near future, with volcanic activity potentially lasting for years, decades, or even centuries. Recognizing the limitations of linear approaches, this ongoing study adopts a participatory System Dynamics methodology. Through mediated modeling workshops, stakeholders representing various sectors and industries—including the Ministry for Primary Industries, the Tech sector, the Dairy sector, Transportation, Civil Defense, Local Government, and the Private Sector—collaboratively construct a model of the Taranaki socio-economic system based on their sector-specific viewpoints. The research embraces a systemic risk perspective, recognizing the interconnectedness, interdependence, and interrelatedness of various factors that contribute to the overall risk landscape. By employing systems science principles and holistic thinking, the study aims to uncover drivers of systemic risks arising from the interaction of multiple sectors and industries, rather than focusing solely on the volcanic hazard. Furthermore, the study seeks to understand how various sectors and stakeholders affected by the disruption may navigate the long-term recovery phase under ongoing exposure to volcanic activity. Ultimately, the study aims to simulate the potential outcomes of different policy interventions before implementation and serve as a decision-aiding tool, enabling more informed decisions and avoiding unintended consequences. By developing a holistic approach that considers systemic risk and compound risk, the research aims to enhance regional resilience in the face of potential volcanic disruptions.

Keywords: Adaptation; Ongoing recovery; Systems science

The needs and actual development of public-private initiatives to support Risk Informed Decision Making for end users as beneficiaries

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Abstract: As recommended by the Sendai Framework for Action (2015 – 2030) and reiterated by its Mid Term Review (2023), there is a general need to master progressively methods and tools for Risk Informed Decision Making. This is expressed at all levels, mostly for a development nearly from scratch and sometimes for an improvement, in order to help all categories of end users. An illustration of the ethical dimension of the overall need for action and the gaps to be fulfilled everywhere in the world is the recent call by the UN General Secretary that everyone exposed to risk gets access to early warning systems adapted to its situation and location. Initiatives to help answering these needs are mainly taken by public authorities (national, regional and municipal levels), sometimes supported by international organisations (UNDRR, European Commission services…), as well as academic organisations, civil society organisations and their networks or private players (Insurers, Constructors, etc). This session proposes an analysis of the risk management as well as the cultural inclusion objectives, as well as of their ethical dimension, one may consider among other:-Their rich historical background, far in the past (solidarity / responsibility balance in front of catastrophes),-The international agreements such as the Sendai Framework, the Aarhus Convention, and relevant ones…, not always legally binding but calling for action,-National legislations enforcing an obligation for the citizens to act (Information de l'Acquéreur et du Locataire law in France and its webservice GEORISQUES),-Catalysing Role played by Civil Society Organisations (CSOs) or expected from,-Organisational and the many applied research initiatives, such as the Initiative by AFPCNT and IDRIM Society. The objectives and schedule of the session contributor are :-To dig into the history and other background aspects of the issue-To try to categorise: othe various needs / beneficiaries according to the functionalities to be fulfilledothe various suppliers, public and private, in relation to the preferences/priorities of their offer-To propose an attempt of evaluation (method) of the level of needs/supply adequation in some countries around the world, referring to attempts already made around, -To describe and possibly develop one or two concrete examples that might be relevant to the topic (IAL and related Initiative, including an invitation to the participants to the attend the relevant Symposium in this Conference.

Keywords: Ethics; Risk Informed; Decision Making

Session Title:
Engineering and non-engineering safety regulations

◆ Chaired by:
Laban M., Stene L.

Non-cognitive factors and methodological choice in regulatory science

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Abstract: In this contribution we analyze the role of non-cognitive (non-epistemic) factors in regulatory science. A common assumption underlying the regulation of science and technology (like, for instance, risk assessment of chemical substances, genetically modified organisms, pharmaceuticals, or health claims on foods) is that the "best scientific methods" will deliver "optimal" scientific data for evidence-based regulatory decision making. We question this premise. On the basis of several case studies of regulatory processes, we argue that there does not exist any single best scientific method for generating decision-relevant data. In fact, we show that in regulatory science the most suitable methodologies often differ from what is considered "best practice" in academic science. What goes by the most adequate scientific method can and will –justifiably and rationally– vary significantly according to context and use. Furthermore, our analysis shows that cognitive (epistemic) factors do not play the principal role in the selection of methods, neither in risk assessment nor in benefit assessment. Rather, it is the non-cognitive factors, particularly the objectives of a particular regulatory process, which determine what counts as the most appropriate scientific method. The non-cognitive objectives, in turn, depend on the objectives of the particular regulation, as well as the needs and preferences of the relevant stakeholders (consumers, industry, non-governmental organizations, etc.). We conclude that in regulation close engagement of the regulators with the stakeholders is paramount in order to minimize possible conflicts between regulators' methodological choices and stakeholders' non-cognitive objectives. Our research is based on a qualitative analysis of legislative and regulatory documents relevant to the regulation of chemical substances, pharmaceuticals, as well as health claims in Europe, with a particular focus on the regulators' interpretation of the regulatory objectives, and their choices of scientific methodologies for data generation. The results of our study contribute to a better understanding of the underlying factors that drive methodological choices in risk assessment and benefit assessment. The relevance of our research lies in questioning the common notion that optimal regulatory decisions depend on high-precision data from the most demanding scientific methodologies. In contrast, we show that decisions in regulation are often grounded in data from scientific methods that are considered the most appropriate ones for each particular case, even if they are not the most exacting ones.

Keywords: Risk assessment; Methodological choice; Decisions

Risk in Critical Infrastructure Protection approach adopted in Poland

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Abstract: Critical infrastructure (CI) is sometimes called a backbone of modern societies. It provides the most essential services to the society such as food, water, energy, transportation, health, financial services. The functioning of the country and society heavily depends on CI and therefore its security constitutes the key issue in national and international security policy. The adopted national CI strategies provide the basic for the designed and implemented security measures by CI operators. In the case of Poland, it has adopted a protection- oriented approach to CI, focusing on prevention measures and putting a strong emphasis on a risk assessment, which should provide the basis in determining standards of CI protection and priorities for action. The scope of risk defined as a function of three elements, namely: threat, vulnerability and consequences was however considerably limited due to understanding of CI in terms of autonomous objects, assets. Moreover, the adopted risk assessment matrix included solely the potential direct consequences of the adverse event and the probability of its occurrence based on its frequency in the past. The risk management strategies based on prepared threat scenarios with risk-averse approach aiming at asset hardening, physical resistance of CI to endure the identified threats and recovery to pre-shock state, seem to be no longer effective. Taking into account the growing complexity, connectedness of CI and the fast changing threat landscape, the protection- based approach requires revision. The recent legislation of the European Union, following the United States example, adopted the Directive on the resilience of critical entities, which indicates an urgent need to implement by Member States a new, resilience-oriented approach to CI security. Even though the concept of resilience still remains vague and its operationalization requires further research, based on a literature review it can be assumed that it implies the inability to prevent all threats from happening and instead it focuses on ability to ensure functioning of the CI under any circumstances and to adapt to new conditions. The resilience-based approach requires not only a paradigm shift in understanding CI as a complex system, but also in the approach to risk assessment and management. Namely, a change from the approach characterised by static, isolated threats events with physical vulnerabilities, direct consequences and focused on crisis prevention, towards an approach emphasising situational awareness, multidimensional nature of vulnerability, indirect, cascading effects and highlighting the abilities of critical entities to cope with and respond to disruption.

Keywords: Critical Infrastructure; Risk; Protection; Resilience

Challenging the risk regulating models. The Security Act and the Ocean Industry Authority (Havtil)

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Abstract: In 2023 Ocean Industry Authority (Havtil), Norway, became subordinated the Norwegian Ministry of Oil and Energy. Until then, Havtil had been under the ministry of Labour and Social affairs. The backcloth was the gas explosion in the Nord Stream pipelines and the Ukrainian war. At the same time a new Security Act was given increasing influence in the sector. The extended influence of the Security Act challenges traditional regulatory forms familiar to the Norwegian petroleum industry. These largely rely on mutual trust and a common interest in promoting regulatory goals, and that conflicts of interest will be solved without threatening negotiated agreements and trust between the parties. In the paper, we explore how Havtil has adjusted its practice according to the increasing focus on security following the Ukrainian war. Based on official documentation, the paper examines how the security act has been articulated in the interaction between the regulator and regulated, and what factors that enable or inhibit the practical enforcement and refinement of the law. Accordingly, our ambitions at a later stage are to explore how the Security Act challenges existing logics of risk regulation in general. The Petroleum regulations are characterized by multifaceted interactions among government, operators/suppliers, and labour unions in the Norwegian tripartite system (Engen et al 2023). A regulatory consequence of the Security Act is the introduction of different levels of information control and new interests and arguments into decision-making processes. Extensive security clearance, information control and new security procedures can inflict consequences for the legitimacy of regulatory norms, organisational knowledge flow, trust relations, bi-partite and tri-partite cooperation. In addition, important questions about security and practice arise when some companies are subjected to the Security Act whereas others are not (Hansen and Antonsen 2024). An extensive hypothesis is therefore that increasing dominance of the Security Act may undermine the close and intimate relationships between authorities, companies, and the government i.e., the dynamics of the Nordic model.

Keywords: Safety, Security, Regulation, Security Act

Avoiding unintentional poisonings with household chemicals: Comparing the appeal to children from the perspectives of children, caregivers and experts

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Abstract: Prevention of unintentional poisonings in preschool children is primarily in the hands of adults, whether it is caregivers safeguarding their households and appropriately storing chemicals or experts regulating and authorizing child-safe products. This study aims to investigate whether caregivers and experts are able to identify household chemicals that appeal to children and, if not, to explore potential factors that could explain these differences. For this purpose, we invited N = 89 children and their caregivers to a laboratory study. Within that laboratory study both, children and their caregivers, had to independently rank 16 different household chemicals available on the Swiss market from the least to the most child-appealing product. In addition to the laboratory study, we sent an online adaption of this sorting task to N = 46 experts, involved in the monitoring and authorization of chemicals. Results showed that many caregivers struggle to identify household chemicals that appeal to their own children. Furthermore, these difficulties could not be explained by the child's or caregivers' demographics or temperament. However, when data was aggregated to analyze general similarities between children, caregivers and experts, results showed that caregivers and experts were able to reliably identify products that appeal or do not appeal to children. Finally, results showed that although caregivers and experts could mostly identify products that appeal to children, they over- or underestimated the appeal of products with or without child-appealing product characteristics. To conclude, these findings provide first evidence that caregivers and even experts are able to identify household chemicals that generally appeal to children. Nevertheless, it is important to be aware that although adults can generally recognize child-appealing products, these assessments do not necessarily correspond to the actual situation at an individual level.

Keywords: Unintentional poisoning; Prevention; Children; Chemicals

TRACK 4:
RISK PERCEPTION, COMMUNICATION AND GOVERNANCE

Session Title:
(Disaster) Risk perception and impacts: Different regions, cultures and eras

◆ Chaired by:
Árvai J., Hanoch Y.

Silver Spoons and Toxic Soups: The Impact of Wealth on Health Risk Perceptions Near a California Hot Lab

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Abstract: America's earliest ambitions for space travel began at the Santa Susana Field Laboratory (SSFL), an approximately 2,850-acre rocket engine and nuclear research facility located in Ventura County, California. From 1947 to 2006 the lab was active, introducing metal and chemical contamination into the soil and groundwater of neighboring areas. Consequently, extensive health studies identified clusters of people with rare cancers and chronic health problems who live near the site. It is for these reasons that the SSFL has been classified as a Superfund Site by the United States Environmental Protection Agency (EPA). Enacted in 1980, the Superfund program empowers the EPA to remediate the U.S.'s most polluted sites, mandating responsible parties to undertake cleanups or reimburse the government for EPA-led efforts. Risk studies often focus on low-income individuals disproportionately affected by the risks and costs of living near Superfund sites; approximately 73 million people—predominantly low-income, indigenous, and people of color— live within 5 kilometers of a Superfund site, and face higher burdens of environmental stressors like poor air quality and lead paint compared to the general population. The population living near the SSFL, however, is predominantly affluent, which offers a unique examination of how wealthy individuals perceive and manage environment-related health risks. Therefore, alongside other common predictors of risk perceptions, we investigate whether the key components of Protection Motivation Theory—namely, coping appraisal and threat appraisal—predict risk-protective behavior in affluent communities as reliably as it does in more marginalized communities. We examine risk perceptions and health issues among populations near the SSFL using representative sampling within 25 miles and targeted sampling within 5 miles of the site, and employ multiple regression analysis to explore the relationships between risk perceptions and various predictors.

Keywords: Contamination; Environment; Health risk; Wealth

Worker Perceptions of Disaster Risk Management in Saudi Arabian Hospitals

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Abstract: In the wake of global health crises, effective Disaster Risk Management (DRM) in healthcare has become more crucial than ever to ensure the continuity of medical services during disasters. In this context, the role of Healthcare Workers (HCWs), including doctors, nurses, and administrators, is pivotal across all DRM phases: mitigation, preparedness, response, and recovery. Their experiences and knowledge can provide meaningful insights into the effectiveness of current practices and identify the pathway for future improvements. We conducted two studies that assessed HCWs' perceptions regarding the effectiveness of DRM in Saudi Arabian public hospitals. The first study identified that perceptions of DRM efficacy varied among HCWs, with approximately 42% perceiving it as ineffective. Perceptions significantly differed across DRM phases: 36.5% found it ineffective in mitigation, 45.6% in preparedness, 40.2% in response, and 45.5% in recovery. Notably, there were significant regional variations, with the Central region perceived as the most effective, the Eastern and Western regions, and the Southern region as the least effective. These findings highlighted the need for a deeper understanding of the reasons behind these variations. To build upon the insights gained from our first study, we aimed to identify the factors that might influence HCWs' perceptions of DRM. According to the literature, a positive organisational culture with strong leadership, transparent communication, and efficient information flow might enhance HCWs' disaster response effectiveness. Moreover, HCWs' previous disaster experiences and comprehensive training can improve their preparedness and response capabilities. However, concerns over personal safety and mental health issues, such as anxiety or depression, can negatively impact their participation in DRM. Furthermore, geographical and environmental contexts can be crucial, especially for hospitals in disaster-prone or conflict-affected areas. Despite these insights from the literature, a significant research gap remains in understanding how these factors might influence HCWs' perceptions across the four DRM phases in Saudi Arabia's diverse regional contexts. Our second study addresses this gap by exploring these influencing factors through 24 in-depth semi-structured interviews across four public hospitals in the Eastern, Western, Southern, and Central regions of Saudi Arabia. The results of this study will be used to strengthen HCWs' resilience and guide policy formulation so that resource distribution can be optimised and a culture of preparedness tailored to Saudi Arabia's unique healthcare landscape can be developed. Hence, our findings can be crucial in ensuring that Saudi Arabia's hospital DRM strategies are comprehensive, multifaceted, and region-specific.

Keywords: Risk Management; Healthcare Workers Perception

Is 5G everywhere? Citizen's situational exposure perceptions of EMF from mobile communication technology – a ten-country study.

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Abstract: Laypeople usually have an intuition when it comes to assessing risks, but this does not always coincide with experts' assessment (Kraus et al., 1992). This is also the case for potential health risks associated with radiofrequency electromagnetic fields (RF-EMF), which are used in mobile communications. Exposure perception plays an important role here (Freudenstein et al., 2015), but in contrast to risk perception (e.g., Frey, 2021) it has not yet been investigated specifically for 5G. In the past, researchers have investigated what laypeople think about different exposure characteristics and their influence on potential health effects. Freudenstein et al. (2015) found that laypeople have a rather adequate view about exposure characteristics, e.g., by assuming that the duration of exposure has the strongest influence. However, other studies found that laypeople's conceptions about EMF exposure are not adequate (Claassen et al., 2017; Cousin & Siegrist, 2010). A widespread misconception found is, e.g., that mobile phone base stations generally contribute more to personal exposure than mobile phones. To find out more about how citizens weight different exposure characteristics related to 5G, we decided to use an innovative picture-based approach in which participants were shown different situations. In each situation, the person pictured was surrounded by mobile phone base station(s) or mobile phone(s). For each picture participants indicated their exposure perception on a scale from 1-10. Factors varied were network type, quantity, proximity, data transfer, and the RF-EMF source. In contrast to the previously mentioned studies, the focus was on subjective perception, not on objective knowledge assessment. Data have been collected between September and December 2023 in ten European countries (N~10,000). In general, preliminary analyses show that the highest exposure was associated with the phone call situation, with the phone close to the ear (M=7.09), while respondents assumed that they would be least exposed from one other person's phone ("bystander", M=3.72). Participants hardly differentiated between up-/download, while network type, proximity and quantity had a relevant influence on exposure perception. Methods and results of the study will be presented as an international comparison. Our results contribute to the current state of research and close research gaps, as they allow a comparison of different groups, e.g., between countries, age groups and genders. Further, our approach ensures that the respondents perceive the situations of interest in a similar way due to the visual representation, which increases the comparability of the data between individuals.

Keywords: RF-EMF; Exposure perception

Can you spot the fraudulent ticket: The role of critical thinking, impulsivity and risk preference

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Abstract: Fraud is now considered the most common crime in the world, with a conservative estimate suggesting that 1 out of 10 individuals have been a victim of fraud. Moreover, fraud inflicts serious financial and psychological damages. One area of fraud that has attracted attention is ticket fraud (e.g., concerts, football, etc.), with several reports indicating that ticket fraud has grown dramatically in recent years. Yet, there is a grave paucity of experimental work on people's ability to detect ticket fraud and what can be done to aid individuals in identifying real vs. fraudulent tickets. The present study was designed to address this important issue. Method202 (F=100) UK residents completed the study (Age=19-77 years old, Myears = 42.94, SDyears = 13.86) (N = 100, 49.5%). In the study, participants were presented with a series of screenshots representing both real and fake tickets for different events. After viewing each ticket, participants were instructed to rate the likelihood that they would buy the ticket, whether the ticket is Real (0) or Fake (1), and to rate their confidence in their judgment. Next, participants completed a host of measures, such as analytical reasoning, risk preference, impulsivity and, finally, demographic information. ResultsOverall, our data shows that Females demonstrated higher discriminability scores compared to males, while no significant age differences were found. Furthermore, while the inclination to buy a fake ticket was positively correlated with improved discrimination, confidence in judging a ticket as fake was associated with poorer discrimination. In contrast, no significant associations were found between the likelihood of purchasing a real ticket or the confidence in identifying a ticket as real with discrimination. Importantly, our data shows that impulsivity was associated with worse discriminability, but that risk preferences and analytical reasoning did not. ConclusionOverall, our work indicates that individuals' ability to detect fraudulent tickets is limited, with close to 70% of individuals failing to detect fraudulent tickets at times. Participants' ability to detect real vs. fake tickets is driven, particularly, by the type of fraudulent ticket (typo vs. fake information, such as seats) and impulsivity. As with many other types of fraud, our work suggests that taking the time and carefully reviewing the tickets can help reduce falling prey to fraud.

Keywords: Fraud; Risk; Impulsivity; Critical thinking

Mapping Urban Insecurity: Analyzing the Spatial Dynamics of Safety Perception

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Abstract: One of the important components of urban life quality is to have safe and secure public spaces. While the existence of crime and fear of crime affects the urban and public space attractiveness negatively, it also causes behavioral changes in the citizens' way of using the urban space. Urban crime related theories had addressed the relationship between the structure of built environment and crime and fear of crime, and with the beginning of the new century, crime prevention through environmental planning and design has been considered as a priority in the planning agenda of the developed countries. This study analyses the complex relationship between urban mobility patterns, perceptions of safety and the spatial dynamics of Istanbul. Through in-depth interviews conducted with inhabitants, we investigated the places where individuals feel safe and, conversely, identified specific districts that evoke feelings of insecurity. The obtained data allow us to analyze the relationship between safety perceptions and the urban pattern of these identified areas. Perception of the participants provides valuable information about the factors contributing to feelings of safety or uneasiness. These interpretations were influenced not only by the physical characteristics of the environment, but also by dynamic movements within the city.

Keywords: Fear of crime; Urban; Istanbul

Session Title:
Risk Communication and Governance in different regions

◆ Chaired by:
Schweizer P., Boehmert C.

Communicating precaution regarding electromagnetic fields in mobile communications: Does personal relevance make a difference?

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Abstract: While there is currently no scientific evidence for adverse health-effects from radiofrequency electromagnetic fields (RF-EMF) used for mobile communication (MC) if internationally defined maximum levels are considered, some scientific uncertainties remain, e.g., regarding long-term risks for heavy users. Therefore, many national health-organisations inform about precautionary measures which reduce personal exposure to RF-EMF when using mobile devices (e.g., use headsets). However, previous research shows that precautionary information can lead to an increased risk perception and a decreased trust in health-protection (see review by Boehmert et al., 2020). In other studies, such effects were not found or associated with individual difference variables like trait anxiety and gender (e.g., Boehmert et al., 2016, 2017). It is likely that in their everyday lives, mostly people for whom the topic "RF-EMF and health" is personally relevant come across precautionary information, e.g., when searching the internet. Furthermore, precautionary information could have differential effects depending on personal relevance. Specifically, lower personal relevance could increase effects on risk perception and trust because those people likely had low risk perception/engagement in precaution initially and might feel momentarily threatened (Zwick, 2005) when realising that there are uncertainties/that precautionary measures even exist. However, in their everyday lives, these people are unlikely to encounter precautionary information. Therefore we conduct an experimental study to investigate if personal relevance moderates the effect of precautionary information on risk perception and trust. To capture personal relevance, participants are asked how likely they would read an article on the topic "mobile phone radiation and health" and indicate how often they think about the topic in their everyday lives. Experimental and control group then receive basic information about RF-EMF in MC, only the EG receives additional information about precautionary measures. We measure risk perception and trust in state institutions of radiation protection, asking conditional questions (assuming that no/regular precautionary measures are taken) whenever useful (Boehmert et al., 2016). The study is conducted with N=700 participants (based on a power analysis for multiple regression, assuming α=0.05, β=0.8, small effect sizes) in each Germany and Greece. Country comparisons are of interest because according to the Eurobarometer (2010) the percentage of citizens concerned about EMF was much higher in Southern Europe (e.g., Greece: 81%) than middle and Northern Europe (e.g., Germany: 24%). Multiple regression analyses are performed, with personal relevance, gender, and condition as predictors, and comparisons between countries investigated. Results will be presented and discussed at the conference.

Keywords: Risk perception; Precaution; Electromagnetic fields

Understanding the communication ecosystem of climate adaptation professionals

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Abstract: Effectively communicating climate adaptation goes beyond information dissemination with the public; it hinges on the quality of communication and collaboration dynamics among professionals. While prevailing analyses of climate adaptation communication often centre communities as passive recipients of complex risk information, there exists a notable gap in understanding the communication dynamics within the broader 'ecosystem' of climate adaptation planning. This gap pertains to the interactions among professionals before information reaches local communities. The collaborative efforts of professionals within climate adaptation are pivotal in shaping the messages and discourse intended for communities further downstream. Moreover, a lack of cohesion among these professionals amplifies the complexity of an already uncertain and nuanced topic, further complicating the development of effective adaptation strategies. This research seeks to delve into the communication intricacies within the professional realm of climate adaptation, recognising its significance in influencing the discourse that eventually reaches and impacts local communities. Using a panel study design, I will survey various professionals working in field of climate adaptation three times over a period of 12 months to analyse evolving communication patterns and dynamics. By delving into the nuances of interactions between different experts working in climate adaptation, the study seeks to provide valuable insights for enhancing effective climate adaptation strategies through a communication-centric approach.

Keywords: Climate Adaptation Communication; Professional Collaboration

Communicating and governing emerging risks in North and Sub-Saharan Africa

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Abstract: The concept of risk has undergone a dynamic evolution over time, given the issues of technological advancement, globalisation, geopolitics, and new threats such as terrorism, cybercrime, pandemics, and climate change. The threats mentioned are transboundary and have introduced additional dimensions of risk. In order to effectively address the ever-changing nature of threats, it is necessary to adopt a more flexible and adaptive approach to how we communicate and manage risk. Observations in the global North indicate a shift in the approach to addressing risk problems. Traditional risk management is being replaced by a more comprehensive risk governance strategy in which communication and collaboration play a vital role. This shift leads to a diversified socio-political landscape where a multitude of actors and their perceptions influence processes of risk communication and risk decision-making. In regions like Africa, the occurrence of new threats is increasing, necessitating a cooperative approach to risk management. Nevertheless, there is a dearth of understanding regarding how the emerging threats are shifting risk communication and management approaches. This research will utilise review analysis to investigate the regional differences between North and Sub-Saharan Africa in terms of the evolution of hazards and threats. We will additionally investigate the impact of emerging threats on the transformation of risk communication and risk decision-making. Understanding these threats and regional disparities in communication and management will be crucial for collaborative risk governance.

Keywords: Risk communication; Collaboration; Africa

Assessing deliberative and participatory techniques for risk governance – Results from the Horizon 2020 REAL DEAL project

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Abstract: The European Green Deal (EGD) is the European Union's general policy strategy to lead the way on climate action and shape the green transition for the benefit of citizens and industries. The EGD outlines the ambitions and goals of the European Union (EU) for reaching zero net emissions of greenhouse gases by 2050 and decoupling economic growth from resource use. The EGD identifies eight focus areas, e.g., energy, mobility and agriculture. Not only are these goals ambitious, but they are also supposed to be delivered by means of a just transition that leaves no one behind. Against this backdrop, the Horizon 2020 project REAL DEAL set out to analyse existing formats and processes for participatory and deliberative processes at the EU level and in EU Member States to identify shortcomings and good practices of deliberative and participatory risk governance. The ambition of REAL DEAL is to propose innovative tools, formats and processes that support decision-making processes under high risk and uncertainty while facilitating the transition towards sustainability in the EU, based on principles of democracy, gender equality and citizen engagement. This contribution presents results from a comprehensive review of scientific and grey literature and an assessment of existing policy frameworks, tools, formats and processes for engaging citizens in decision-making and governance processes through participatory and deliberative instruments conducted as part of the REAL DEAL project. The review identifies the conceptual foundations and structural properties of each of the models and formats for deliberation and explicates their merits, but also their contradictions, where these exist. The assessment pays attention to the strengths and weaknesses of both conceptual approaches as well as recent practice examples of citizen participation and deliberation applied at the EU level, such as the Conference on the Future of Europe, and at the national level, such as the Irish Citizen Assembly on Climate Change. The presentation will conclude with an evidence-informed selection of formats and techniques for citizen participation and deliberation for operationalisation and testing in subsequent tasks of the ongoing REAL DEAL project, focussing on modular and iterative design approaches. The REAL DEAL project (https://www.realdeal.eu/) receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037071.

Keywords: Citizen and stakeholder engagement; Deliberation

Specifying the Role of Knowledge, Misinformation, Confidence in Climate Change Attitude and Action

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Abstract: Climate change has become an important global human agenda. Each country and each individual needs to be proactive in doing the response actions combating climate change. More proactive attitudes and active actions toward climate change are key to addressing climate change. The purpose of this study is to analyze the role of knowledge, misinformation, and confidence in these attitudes and actions. Knowledge refers to belief in objective and correct facts, while misinformation refers to belief in biased and incorrect facts. Confidence refers to the strength of belief in these two facts. This study examined how knowledge, misinformation, and confidence play a role in climate change attitudes and actions. To test this assumption, we executed the analysis based on social survey data. This study identifies the role of knowledge, misinformation, and confidence in climate change communication. In doing so, we get the strategic implications that can contribute to public communication about climate change.

Keywords: Climate change; Knowledge; Misinformation

Session Title:
Systemic risk Communication and Governance

◆ Chaired by:
Ylönen M., Paidakaki A.

From Play to Preparedness: Evaluating the Impact of Serious Gaming on Natech Risk Communication

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Abstract: Raising awareness regarding natural hazard-triggered technological accidents involving the release of hazardous materials (Natech) is imperative for community engagement in risk management and disaster preparedness enhancement. This study explores how to assess the impact of serious gaming in Natech risk communication through the trial application of EGNARIA: an innovative, educational, role-playing board game incorporating earthquake and tsunami scenarios potentially leading to subsequent chemical accidents. EGNARIA prompts players to undertake disaster preparedness measures and respond appropriately to natural and chemical hazards, aiming to heighten community awareness of Natech accidents and foster stakeholder discussion on risk management strategies, chemical information disclosure, and risk-informed decision-making.Given the absence of standardised evaluation criteria for serious games in Disaster Risk Management (DRM), the study explores existing conceptual models to establish a research framework. Emphasising risk communication and information disclosure, the evaluation methodology is structured based on dimensions derived from the interpretative framework of the Situational Theory of Problem Solving (STOPS) (Kim & Grunig, 2011). Key factors include individuals' perception of the problematic situation, involvement recognition, constraint recognition, subjective knowledge, experiences, and expectations, which collectively influence situational motivation for engaging in problem-solving communication. Communicative actions such as information acquisition, selection, and transmission are categorised into active and passive components to outline individual communicative behaviour.The study proposes integrating STOPS into evaluation methods for DRM-related serious games to measure changes in players' behaviour regarding risk communication about Natech accidents. Impact assessment of EGNARIA was conducted via a quasi-experiment with a pre- and post-workshop questionnaire survey along with a focus group discussion among university affiliates. Preliminary findings suggest a positive reception of EGNARIA among players as an engaging, educational tool for introducing and discussing Natech accident risks within communities. Participants acknowledged heightened awareness of Natech accidents, emphasised the importance of community involvement and chemical information disclosure, and expressed intentions to actively seek and share information about Natech risk. In conclusion, the study underscores the potential of serious gaming in Natech risk communication and discusses implications for Natech risk management and DRM-related serious game evaluation.

Keywords: NaTech; Situational Theory; Serious gaming

Risk evaluation regarding potential retrieval of nuclear waste. A case study with a group of German citizens.

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Abstract: The disposal of nuclear waste poses significant challenges beyond the realm of technical expertise. This study focuses on the risk evaluation associated with the potential retrieval of nuclear waste in Germany, employing a case study approach involving a group of citizens, and their perspectives on retrieval processes. The central subject of this study revolves around risk assessment, trade-offs, and uncertainties associated with retrievability and monitoring. In a series of workshops with a group of citizens (lay people concerning the issue) as an "extended peer group" over four years, we addressed uncertainties inherent in the retrieval process. These uncertainties relate to monitoring, geological considerations, retrieval procedures and operations, and societal decision-making. In particular, the societal decision-making processes introduce further uncertainties and present challenges in reaching consensus on the best course of action. The exchange was observed and analyzed by social scientists through participant observation, feedback surveys and interviews. The workshops identified trade-offs that form an integral part of the risk evaluation, focusing on the balance between potential benefits and drawbacks. The citizens raised many pertinent issues. For example, our collaboration addressed the inherent risks associated with retrieval, such as the need for secondary storage, excavation requirements, and the length of the retrieval process. The well-known safety trade-offs in monitoring practices add another layer of complexity and raise questions about the proper interpretation of data generated by monitoring devices. This aspect is particularly significant, as it requires consideration not only by experts, but also by the general public, as they play a crucial role in shaping the decision-making landscape. Our research shows: while laypersons may initially overlook certain aspects, a more profound engagement with the subject allows them to contribute meaningfully to the discussion. The study highlights the benefits of bridging the gaps in knowledge and awareness between the public and researchers, dealing with issues such as mutual trust, acceptance of a repository option and transparency of the processes. Uncertainty about responsibilities and decision-making authority adds further complexity. The study sheds light on the ambiguity surrounding the roles and responsibilities of various stakeholders, particularly from the perspective of laypersons. Clarity of decision-making authority is critical to fostering informed public participation and ensuring a transparent decision-making process. In conclusion, this case study highlights the multifaceted nature of risk assessment in the context of potential nuclear waste retrieval, and underscores the importance of incorporating citizen perspectives into decision-making.

Keywords: Transdisciplinarity; Retrievability; Uncertainties

The impact of fear appeals on individuals' climate change attitudes, intentions, and behaviors: A meta-analysis

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Abstract: Fear appeals have had a long legacy in risk communication, intending to encourage individuals to use protective behaviors. Prior work has focused on examining their effectiveness in health communication, with various meta-analyses suggesting that fear appeals can enhance protective behaviors, especially when coupled with efficacy information. However, it is unclear if fear appeals can be helpful in the climate communication context or if their effectiveness depends on other moderators. Given that climate change is a global threat and various organizations such as the United Nations strongly urge emissions reductions, it is critical to understand the effectiveness of fear appeals in changing individuals' attitudes, intentions, and behaviors to curtail this global threat collectively. Utilizing 107 unique effect sizes from 25 papers that experimentally manipulate fear, this meta-analysis examines the impact of fear appeals on individuals' climate change attitudes, intentions, and behaviors. Using a random-effects model, we find that fear appeals have minimal influence across outcomes ($d = 0.07$, $p < 0.09$, CI [-0.01, 0.15]) and that the effects are not statistically significant. Additionally, we will test if moderators such as efficacy, type of media (video, text, photos), and culture influence the effectiveness of fear appeals in climate communication. The insights from this work could aid the field of risk communication as it could provide clarity on the effectiveness of fear appeals and potentially contextualize when and for whom fear appeals could help assist in climate mitigation efforts.

Keywords: Climate Risk Communication; Meta-Analysis

Turning eco-anxiety into pro-environmental behaviour: Risk perception as mediator

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Abstract: The aim of this research was to explore the potential link between eco-anxiety and the promotion of pro-environmental actions. Drawing on the concept of "risk as affect," which emphasizes the influence of emotions on risk perceptions and decisions, our objective was to investigate whether the perception of environmental risks mediates the relationship between eco-anxiety and pro-environmental behavior. This hypothesis was examined across three distinct studies. In Study 1, involving 66 participants and utilizing a mixed-methods approach, findings revealed that contemplating emotions, thoughts, and actions related to the environment correlated with increased donations to environmental non-governmental organizations (NGOs).Study 2, which involved 511 participants and employed a cross-sectional design, directly assessed the associations among eco-anxiety, risk perception, and self-reported pro-environmental behaviors. Results indicated that eco-anxiety was linked to a higher frequency of self-reported pro-environmental behavior indirectly through heightened risk perception. Conversely, an alternative model, where risk perception was the independent variable and eco-anxiety the mediator, showed no significant indirect effect of eco-anxiety. Study 3 expanded on these findings with 1325 participants by inducing eco-anxiety experimentally and measuring both eco-anxiety state and risk perception. The results of sequential mediation analyses demonstrated the combined indirect effect of eco-anxiety state and risk perception on the relationship between the experimental conditions (control, lower eco-anxiety, higher eco-anxiety) and donations to environmental NGOs. Taken together, these studies suggest that eco-anxiety may stimulate pro-environmental behavior by prompting individuals to contemplate the risks posed by environmental challenges.

Keywords: Eco-anxiety; Risk perception; Behaviour

Comparative Analysis of End-Users' Perceptions of Recycled Radioactive Building Materials

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Abstract: The cement industry is the world's third-largest CO2 emitter. Utilising secondary raw materials in cement production offers a viable path for reducing emissions, in line with circular economy principles. However, some industrial by-products, notably from aluminium and copper production, exhibit increased radioactivity levels, leading to environmental and health concerns due to their accumulation in landfills. While the technical and environmental benefits of incorporating these materials in cement have been explored, their radiological impact and social acceptance remain underexamined. In our study, we aim to understand end-users' perceptions of the use of alternative cement made with by-products with enhanced level of radioactivity in the construction of their dwelling. We target individuals who have built or renovated their house in the last 10 years. Employing CAWI (Computer Assisted Web Interviewing) in Belgium (N=400), the Czech Republic (N=400) and Slovenia (N=400) in February 2024 we investigate the factors affecting their perception and intention to use alternative cement through investigating their perceived risk and benefits related to health, financial, performance and environmental aspects. We use psychometric characteristics to further describe end-users' perceived health risk regarding the use of this alternative cement. We expect country-specific differences related to the country's prior experiences with hazardous materials in construction. This study pioneers a comparative examination of end-users' acceptance of naturally occurring radioactive materials in building materials stemming from circular economy practices. These novel insights offer guidance on communication and policy strategies designed to meet the unique concerns of end-users in each country, aiming to decarbonise the cement and concrete sector.

Keywords: Radioactivity; CO2; Cement; Risk Perception

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Session Title:
Risk culture and acceptable risk I

- Chaired by:
Luis S., Wardman J.

Effect of information provision and visualization on user's confidence, comprehension, and decision-making for long-range energy projections

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Abstract: Long-range energy projections typically display either results from deterministic models with limited information about uncertainties, or narratives that offer overly extensive details, potentially leading to overconfidence about their realism. While probabilistic energy projections or energy projections with uncertainty ranges would offer alternative approaches, they include more information and more complex visualizations. There is a need therefore for empirical research to explore how the amount and visualization of information impact the users' interpretation and subsequent actions drawn from energy projections. In this study, we measured the effects of information amount and visualization on the users' decision, comprehension of energy projections and, confidence and perceived easiness for decision making. Using an experimental between-groups design on Swiss solar electricity projections, we contrasted deterministic projections against broad uncertainty ranges, and probabilistic projections, and we measured the user's reactions before and after introducing information that previous projections failed to capture in the real-world transition. We used an online survey in Switzerland with the general population as lay users of projections (N= 527) and with Master students as novice expert users (N=266). In addition, we controlled by users' demographics, familiarity with the Swiss electricity production, solar electricity preferences, numeracy, and graph literacy. We found that reading comprehension is higher for deterministic projections for both general population and Master students, whereas probabilistic projections, although more challenging to interpret, foster a significantly higher confidence in students' decision-making. When confronted with previously failed projections, Master students, that were given deterministic graphs showed a significant decrease in decision-making confidence, despite a significant increase in perceived decision easiness compared to the groups in other experimental conditions. Confidence in the decisions was observed to significantly increase when uncertainties were shown without probabilities, and when real-world outcomes fell inside projected ranges. In the same case, when confronted with previously failed projections, the general population showed a decrease in confidence in decision and projections, but an increase in perceived easiness to decide, regardless of the level of information. These results highlight the importance of empirically measuring the effects of providing different amounts of information and designing visuals for energy projections, as these differences come with tradeoffs on the users' decision-making process, comprehension, and confidence, especially if real-world outcomes end up deviating from projections.

Keywords: Risk communication; Uncertainty; Projections; Decision

Social media, climate doom, and support for radical action related to climate change

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Abstract: Researchers are tracking a rising sense of climate anxiety, particularly among young people. Yet the relationship between social media use and feelings of climate despair is understudied. Through exposure to climate rhetoric on social media that emphasizes the urgency of the climate crisis, social media users may develop climate doom beliefs that may be associated with their support for radical or authoritarian climate actions, which may reshape climate politics in unexpected ways. Based on survey data collected from 1,400 American adults through YouGov in January 2024, this research identifies significant relationships between social media usage and climate doom beliefs, climate efficacy beliefs, and support for radical action related to climate change. In particular, users of different social media sites demonstrate unique patterns in their climate doom and climate efficacy beliefs, which are associated with support for support for radical action. Methodologically, this research validates a short survey instrument to gauge climate doom, which is conceptually distinct from climate distress/anxiety. Findings from this study have both theoretical and practical implications for communication about climate risk.

Keywords: Climate doom; Social media

Bioplastics: risk factors for industry and consumer acceptance

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Abstract: Introduction: Bioplastics, fully or partially produced from biological/organic renewable sources (e.g., plants, bacteria, food waste), are emerging as an alternative to petrochemical plastics. These promise a more sustainable alternative that promotes the circular economy, while reducing the dependency on fossil resources and the negative environmental impacts of petrochemical plastics. Nevertheless, the success of bioplastics largely depends on industry and consumers acceptance, and on overcoming risk factors that can threaten such acceptance. Method: With the goal of identifying and summarizing potential risk factors for industry and consumer acceptance of bioplastics we employed a two-fold approach by conducting two separate literature reviews. In that regard, a systematic literature review on supply-side barriers for commercialization of new biopolymer production technologies enabled the identification of risk factors for industry acceptance, while an umbrella review on barriers and recommendations to consumer demand for bioplastics enabled the identification of consumer perceptions that can threaten consumer acceptance. Results: The main risk factors for industry acceptance identified were related with technological and knowledge aspects (e.g., limited properties of biopolymers; lack of collaboration and multidisciplinary approaches), economic aspects (e.g., high production costs; limited access to financial capital for research development and commercialization), regulatory aspects (e.g., inconsistent policies; unique regulatory landscapes), supply-stability aspects (e.g., limited raw material availability; resource management challenges), behavioural aspects (e.g., resistance to change; market uncertainty), and consumer-side aspects (e.g., limited public awareness; low knowledge; marked feedstock preferences; lack of trustworthy information; high expectations about technical and environmental performance). The main risk factors for consumer acceptance identified were related with risk perceptions (e.g., safety and origin of feedstock and final products; production technologies and processes; cross-contamination), greenwashing perceptions (e.g., uncertainty about ecological benefits; mismatch between perceived environmental properties and environmental performance), cost-benefit perceptions (e.g., high perceived cost for perceived durability and performance), ambivalent and negative perceptions (e.g., indifference towards bioplastics; unpleasantness and disgust about particular feedstocks), and misconceptions (e.g., confounds between biobased and biodegradable properties).Conclusion: Results highlight a set of risk factors that can threaten industry and consumer acceptance of bioplastics, hindering business development and consumer demand. Knowing and understanding these risks can enable the implementation of integrated strategies that promote industry and consumer acceptance of bioplastics, providing the needed resources to boost market acceptance. Implications for research and practice will be discussed, together with recommendations and best practices for stakeholders, providing tools to overcome identified risk factors and promote industry and consumer engagement.

Keywords: Bioplastics; Risk Factors; Acceptance; Perception

Cooperation in Adolescence: The Role of Risk Aversion, Scarcity of Resources and Perceived Peer Social Support

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Abstract: Adolescence is a period of increased risk-taking behaviors, a rise in the emotional salience given to peer relationships. During adolescence, significant neurobiological changes take place and different social goals are being set, potentially shaping youths' engagement in cooperative behaviors. Despite the existing link between risk preferences and cooperative behavior in adulthood, very few studies have examined the association between adolescents' risk aversion and cooperative behavior. In addition, the perception of resource scarcity may impact the likelihood of cooperation, yet there is limited consensus on the specific direction of this influence during adolescence. In the present study, we aim to assess to what extent: 1) risk preferences in adolescence are determined by experiences of resource scarcity and perceived peer social support; and 2) cooperation in adolescence determined by experiences of resource scarcity and risk preferences. To answer these questions, 983 adolescents (Mage = 15.97, SDage = 1,48; 73.71% girls) were recruited from Northern-Italy high schools. Cooperation was assessed via contribution in a Public Good Game (PGG). Risk aversion was assessed with 20 questions used in standard behavioral economics approaches. In addition, scarcity perception of resources and perceived social support were assessed via self-report. Preliminary results showed that risk aversion favors cooperative ($b = 0.02$, $SE = 0.01$, $p < .01$), suggesting that risk averse individuals may favor cooperation with their partners because cooperation could minimize the uncertainty. Cooperation is also positively linked with scarcity perception ($b = 0.09$, $SE = 0.04$, $p < .05$): individuals who perceive resources as scarce invest a higher contribution in the PGG, expecting a higher return. Our results showed that perceived scarcity was also linked with an increased risk aversion ($b = 0.35$, $SE = 0.17$, $p < .05$). Moreover, the link between risk aversion and perceived scarcity was moderated by perceived peer social support ($b = 0.06$, $SE = 0.02$, $p < .05$), unveiling a protective mechanism: peer social support appears to mitigate the impact of perceived scarcity, leading to a reduced inclination towards risk-taking and, thus, an increased cooperation. Overall, this research not only shapes theoretical perspectives for cooperation but also offers practical implications. Given the role of risk aversion and perceived peer social support in relation of resource scarcity, interventions within the school context can be oriented in the direction of fostering positive social interactions and decision-making skills among adolescents, contributing to global efforts for enhanced youth well-being and societal cohesion.

Keywords: Risk; Scarcity; Cooperation; Social support

Engaging tangata whenua: Understanding the social and cultural impacts of cascading risks for Māori communities in Aotearoa New Zealand

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[2]Resilient Organisations

Abstract: How do cascading risks arising from climate change impact Māori (Indigenous people from Aotearoa New Zealand) communities socially and culturally? Initial studies have indicated that cascading impacts may substantially exacerbate the risks compared to consideration of direct risks alone. This shift will potentially influence adaptation planning and prioritisation. Tangata whenua (people of the land) face increased risks to their cultural practices, identities, and connections to land, among other difficulties. To explore these impacts, we are working within an interdisciplinary team to comprehend the cascading risks of climate change and to identify priority adaptation for communities. This involves first understanding cascading risks from the natural and built domains onto the social and cultural aspects of Māori communities. However, this is not a solely quantitative process and requires engaging with mana whenua as research partners in a collaborative process through decolonising methodologies of ethnographic enquiry. We will work with members of Māori communities on Te Wai Pounamu (the South Island) using methods of participant observation on marae (meeting grounds) and semi-structured interviews to create an understanding of climate risk perceptions and how these are linked to space and place through the interconnecting environment, infrastructure, and human spheres. This research will support the creation of a framework for more equitable climate risk assessments that incorporate mātauranga Māori (Māori knowledge) and tikanga (system of values and practices). The progress and outcomes of our research are to be entirely shaped by Māori; therefore, location-specific approaches will be emphasised according to the kawa (protocol) of each hapū (kinship group/subtribe).

Keywords: Climate risk; Cascading impacts; Adaptation

Session Title:
Risk culture and acceptable risk II

◆ Chaired by:
Bearth A., Siegrist M.

8 Billion and Counting: A Cross-Cultural Assessment of the Perceived Risk of Global Population Growth

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Abstract: The global human population reached 8 billion on 15th November 2022, and is projected to reach 10 billion by 2058. Evidence suggests that global population growth (GPG) increases the probability of many adverse outcomes, including climate change, species extinctions, resource shortages, zoonosis, habitat destruction, and violent conflicts. A small number of studies have found that the public are concerned about the effects of GPG, and these concerns are positively related to their willingness to engage in mitigative and preventative actions. However, research on the factors that influence GPG risk perceptions is limited. To help address this knowledge gap, at the end of November 2022, we conducted a study of the perceived risk of GPG among UK and US residents (N = 1,029).Our results confirm that GPG is perceived as a substantial risk and these perceptions have a strong positive relationship with the willingness to engage in and support risk management actions. Our participants' affective reactions to GPG were primarily negative and characterized by concerns about environmental degradation and resources shortages. The sample believed that the worst effects of GPG were yet to come and would mostly be geographically and socially remote, with the world's poorest people being worst affected. Despite their willingness to engage in risk management actions, our participants reported low self-efficacy and that governments, rather than individuals and communities, have the greatest capacity to influence GPG. The perceived risk of GPG was higher among UK residents than among US residents, indicating that GPG risk perceptions can vary between countries. Compared to their US counterparts, more UK residents reported directly observing more evidence of population growth in their community/country and believed that the worst impacts of GPG were more temporarily proximate. We found that worldviews were associated with much greater variance in overall perceived risk among the US (cf. UK) participants, with perceived risk being highest for US participants with egalitarian-communitarian worldviews and lowest for US participants with individualism-hierarchists worldviews. We also identified that our sample perceived the benefits of GPG as low and that their risk perceptions did not appear to be affected by media coverage of the eight billion milestone. Taken together, our findings provide new insights into the factors that influence public perceptions of GPG and how these perceptions can influence the willingness to engage in behaviors that could mitigate and/or prevent some of the potential adverse outcomes associated with GPG.

Keywords: Risk behavior; Risk perception; Worldviews

Biopolymer production: Market opportunities, challenges and consumer acceptance

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Abstract: This presentation focuses on the ongoing contributions of Work Package 6 (WP6) within the BioLaMer Project (EIC Pathfinder), which investigates market opportunities and challenges associated with a new technology. Plastics and escalating food waste contribute significantly to environmental degradation, prompting the need for innovative biopolymer production technologies to address the linear plastics challenge. Current methods of managing food waste, like composting and landfilling, are unsustainable due to substantial greenhouse gas emissions. The BioLaMer Project aims to tackle these challenges by demonstrating three proof-of-principle biorefinery concepts centered on cultivating black soldier fly larvae (Hermetia illucens). These larvae have the remarkable ability to metabolically process various types of waste, including plastics, with close to 100% yield. Utilized in industries such as animal feeds and cosmetics, these larvae offer a uniform biomass composition suitable for biopolymer production. Research within the project focuses on developing first-of-a-kind technologies for producing polyhydroxyalkanoate (PHA) and chitosan biopolymers from fly larvae, addressing complexities and reproducibility issues associated with current PHA production technologies. Additionally, the project aims to demonstrate locally deployable systems for converting food waste into fly larvae, ensuring circularity and sustainability. The project also explores the development of value-added bioplastic materials derived from PHAs and chitosan, such as packaging coatings and orthopedic implant scaffolds. This approach not only addresses the petrochemical plastics challenge but also offers a solution to the growing food waste management challenge, potentially leading to transformative impacts on waste management practices and societal well-being.WP6 analyzes market opportunities and challenges, particularly focusing on consumer acceptance, essential for the success of this new technology. This involves identifying and addressing supply- and demand-side barriers, evaluating business models, assessing risk management strategies, and determining market opportunities for novel products. Ultimately, the project aims to develop strategies to increase trust and consumer acceptance of these innovative biopolymer products, offering both economic and societal benefits.

Keywords: Biopolymer; Market; Consumer

The Role of Actively Open-Minded Thinking in Civic Engagement Toward Genome Editing in Switzerland and U.S.A

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Abstract: Emerging technologies are reshaping our world, offering transformative possibilities in areas such as healthcare, communication, and environmental sustainability. Nanotechnology aids in innovative cancer diagnosis and therapy, brain-computer interfaces facilitate nonverbal communication for individuals with disabilities, and advancements in urine diversion promise to enhance agricultural sustainability. However, the potential benefits of these technologies come with associated risks, both to human health and the environment, necessitating careful consideration of their governance and ethical implications. This paper focuses on public attitudes and civic engagement related to agricultural applications of genome editing, a technology utilizing tools like CRISPR/Cas9 to modify plant genes for improved traits. Genome editing, falling under the broad umbrella of gene technology, shares similarities with genetic modification (GM) but distinguishes itself by allowing targeted edits within a plant's existing genome. Despite potential benefits in addressing agricultural challenges, genome editing faces opposition similar to genetic modification. The study investigates how actively open-minded thinking (AOT) influences individuals' attitudes and civic engagement regarding genome-edited crops. AOT, characterized by a willingness to critically engage with evidence and change opinions based on it, is a valuable cognitive skill in navigating complex and polarizing issues such as genome editing. Existing literature has explored various factors shaping public responses to emerging technologies, but the role of AOT and critical thinking more broadly in this context remains notably limited. A cross-country survey was conducted in the United States and Switzerland to test the theorized relationship between AOT and civic actions related to genome editing. These countries were selected for their distinct regulations and public attitudes toward genome-edited foods, with the United States allowing them on store shelves and Switzerland imposing a ban. Leveraging these differences, the study examines the relationship between AOT and civic actions for and against genome editing. Additionally, the paper contributes to cross-country research by translating the Actively Open-Minded Thinking Scale into German, aiming to further understand individual differences in public engagement across cultures. The comparison of public opinions and regulatory contexts in the United States and Switzerland sheds light on how AOT influences civic actions related to genome editing. The study extends beyond attitudinal differences, exploring the interplay between AOT and willingness to engage in civic actions, offering insights for informed decision-making, policy development, and fostering constructive public engagement in the realm of emerging technologies.

Keywords: Risk; Emerging technology; Genome editing

Eliciting expert views on the successful implementation of new genetic technologies into the food system

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[2]University of Birmingham
[3]University of Aberystwyth
[4]Carnegie Mellon University

Abstract: Gene editing is a novel plant breeding method resulting in genetic changes equivalent to traditional plant breeding. However, it is more advanced than traditional breeding and genetic modification because the genetic changes are controlled and targeted. A genetic technology bill passed into law in England in 2023 for the use of biotechnology to improve environmental sustainability and stimulate innovation in plant breeding technologies. The law was followed by a recent consultation to collect views from stakeholders and interested parties on the proposals for regulation and impact of genetic technologies. Previous research suggests integrating the views of all relevant stakeholders (e.g., the public, businesses, government agencies) to implement novel food technologies successfully. Following our earlier study with UK citizens on their perceptions of gene editing, this study examined professional experts' opinions on implementing new genetic technologies into the food system, particularly their views on the risks and benefits of the technology, consumer awareness, transparency and building public trust, regulation, and labelling. We interviewed 22 UK experts from plant breeding, processing, retail, and policy making. The results showed strong support for the implementation of gene editing due to improved yield and storage, environmental benefits (e.g., lower carbon footprint) and positive impact on food insecurity. The perceived risks included concerns about consumer acceptance, export trade, and engagement of retailers. Our results suggest that the breeders and growers improve their communications with the public and government agencies make legal processes easy to understand for citizens and improve their efforts to maintain public trust. We discuss our findings in light of our previous research on UK citizens' perceptions of gene editing applied to the food system and the literature findings on risk perception and communication of novel technologies. We suggest further research to develop communications that help citizens regarding their knowledge gaps and perceived risks of new genetic technologies.

Keywords: Gene-editing; Trust; Transparency; Labelling

How can different risk perception between public and private sector affect security of critical maritime infrastructure against unknown threats?

Stene L.[1], Utne R.[1]

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[2]Norwegian Costal Administration

Abstract: After the sabotage of the gas pipelines Nord Stream 1 and 2 in the Baltic Sea, September 2022, Norwegian authorities were criticized for deficient prevention of Norwegian oil and gas facilities. Private sector experts argued how critical maritime infrastructure, vital to uphold societal security, were vulnerable to similar sabotage. Although the government emphasized that there was no direct security threat to Norway, it nevertheless decided to strengthen security measures to protect maritime critical infrastructure and land facilities. Overnight, the relationship between valuation of the maritime infrastructure for the production and transport of gas, associated threats, and the vulnerabilities to these, changed. The new risk picture addressed need for common understanding of risk between maritime transaction stakeholders; the private actors on the one hand, and the authorities' (regulators) understanding of risk and the responsibility for the population on the other. Safeguarding maritime infrastructure was not only a question of economic profit to private companies, but also responsibility to private sector to uphold societal security. However, risk does not consist of a universal approach. Risk is a flexible term, where psychology and cognitive bias play an important role in how we perceive and assess threats and opportunities in different ways. This challenges both the public and private sector to identify the best possible approach to communicate risk for protection of critical maritime infrastructure. So, how can different risk perceptions between the public and private sector affect the security of critical maritime infrastructure? By defining critical maritime infrastructure and using theoretical concepts as societal safety and security, risk management and risk perception, a document analysis was conducted. The challenge seemed to be how the actors should deal with the concept of "acceptable risk" in a world where terrorism, hybrid warfare, espionage and digitalization gradually dominate the risk and threat picture. One need to maintain a balance between risk and available resources to enable both mental, organizational, and physical preparedness over time, which presupposes trust between mutual depended actors in public and private sector. Further, to develop an appropriate risk communication and joint risk understanding, or at least a mutual understanding of different risk perspectives, and how and when they are used or appropriate.

Keywords: Risk perception; Societal security, Maritime infrastructure

Symposium:
Hazard and risk: how to communicate the difference between these two concepts across Europe?

- Coordinator:
  Zamariola G.

Hazard and risk: how to communicate the difference between these two concepts across Europe?

Zamariola G.[1], Vrbos D.[1]

[1]European Food Safety Authority (EFSA)

Abstract: Regulation (EU) 2019/1381 of the European Parliament and of the Council on the transparency and sustainability of the EU risk assessment in the food chain (so-called "Transparency Regulation") brought in important new provisions on risk communication. One critical new endeavour concerns reducing public ambiguity about the concepts of hazard and risk. While these two concepts are clearly defined and separated in the field of risk analysis, there appears to be ambiguity when using these terms in other contexts. The literature on the public perception of the difference between hazard and risk shows that the two terms are unclear and used interchangeably by both the general public and sometimes even by experts. One crucial aspect to consider is cultural differences, as the terminology is grounded in English and differs in other languages and cultural contexts. The aim of the symposium is threefold. First, we will provide an overview of research and findings on public and expert perception of hazard and risk and challenges that this ambiguity could represent for communication. Second, we will present the work of the European Food Safety Authority (EFSA) in the development and distribution across Europe of new communication materials explaining the concepts of hazard and risk in the format of brief video animations. We will also present the results of a targeted campaign pilot to examine the effectiveness of the new communication materials. Third, we will showcase the experience of the Hellenic Food Authority (EFET) in Greece to disseminate the materials and localise the content adapting it to the Greek context. Finally, we will hold a moderated discussion on ways forward in the efforts to communicate the difference between hazard and risk and measuring their efficacy.

Keywords: Hazard; Risk; Communication; Perception; Culture

Innovative methods for communicating the difference between hazard and risk to the European public

Zamariola G.[1], Sousa Lourenco J.[1], Vrbos D.[1], Smith A.[1], Harrington R.[1]

[1]European Food Safety Authority (EFSA)

Abstract: Hazard and risk are two different but inter-related concepts that are often confused by members of the public and interested parties. While risk assessment looks at levels of exposure to a hazard to determine the likelihood of it causing actual harm to consumers (the "risk"), public perceptions about risks have been shown to be linked to the notion of hazard and the characteristics of types of hazards. This means that perceived risks are sometimes higher than actual risks, which is a challenge for risk communication. In this presentation we will show recently developed new communication materials explaining the concepts of hazard and risk in the format of brief video animations, which have been made available in several EU languages. The content of the materials was informed by results from social research, carried out to localise and tailor the cultural specificities of different segments of the EU population (as well as Iceland and Norway) for increased clarity. Specifically, we organised focus groups in 27 Member States plus Iceland and Norway with marketing/PR/communication experts, including the European Food Safety Authority (EFSA)'s Communication Experts Network (CEN) members. Based on focus groups results, we selected ten storyboards, and each Member State chose the one citizens of that country could most relate with. In order to disseminate the materials, we organised a mini social media campaign in coordination with Member States, running from 20 September 2023 until 20 June 2024. Additionally, we implemented a targeted campaign pilot among individuals in one country to examine the effectiveness of the new communication materials in understanding (among other measures) the difference between hazard and risk concepts. Communication materials have been embedded within a survey experiment for the purposes of evaluation.The presentation will cover findings from both campaigns and will draw conclusions on the effectiveness of new methods for raising awareness about these two fundamental concepts of risk analysis.

Keywords: Hazard; Risk; Research; Communication; Culture

Misperception and miscommunication of hazard and risk

Jansen T.[1]

[1]National Institute for Public Health and the Environment (RIVM)

Abstract: Effective risk communication can help people to make informed decisions on dealing with hazards and risks from chemical substances. However, differences in perception between societal groups and miscommunication between these groups can easily occur. In this talk I aim to provide a brief overview of some of the contributing factors to these misperceptions and miscommunications. We will talk about the risk assessment processes of technical experts and citizens and we will see that, like scientists, citizens can distinguish between appraisal of hazards and risks, but that scientific information on severity often does not align with public perspectives on severity. Additionally we will discuss that words central to chemical risk communication such as risk, safe and harmful can have different meanings for individuals and thereby elicit different associations and appraisals. We will also discuss the challenges associated with communicating scientific uncertainty in risk assessment and see how ambiguous language, jargon and contextual information can affect the interpretation of the evidence base for hazards or risks. Examples will be drawn from research and practice. Recommendations for risk communication practice will be given.

Keywords: Risk communication; Hazard; Risk; Chemicals

Experiences and challenges in communicating hazard and risk in Greece

Mousia Z.[1], Avgeri A.[1], Marakis G.[1]

[1]Hellenic Food Authority (EFET)

Abstract: Hazard and risk are two different but related concepts that are often confused by interested people, making risk communication a challenging task. This may be attributed to a number of reasons, like different cultures, but in Greece specifically has to do also with the language. Inconsistent translations of “hazard” and “risk” appear also in the Greek versions of certain EU food regulations according to a recent study. Thus, it seemed imperative that the mini social media campaign about ‘risk’ and ‘hazard’ in coordination with CEN and the other members states was carried out in Greece. Firstly, the storyboard example of fire was chosen, as it is a common phenomenon in Greece and respondents can easily understand and relate with it. However, a broader range of examples preferable with common food-related hazards and risks was needed in order for the general public to be more familiarized with the core meaning of the difference between hazard and risk. The presentation will show our involvement in the mini social media campaign and will cover insights about the impact (views, engagement, etc.) of the material. In addition, the on-going campaign on food allergens that started last year will briefly be presented. While communicating the difference between hazard and risk in the case of chemical and microbiological hazards is relatively straightforward, there are more challenges in explaining such difference with nutritional risks (i.e. risk from high sodium intake, or from high intakes of other essential nutrients such as high intakes of some vitamins) since essential nutrients have a number of benefits to human health. The example of high sodium intake will be presented.

Keywords: Hazard, Risk, Risk Communication, Culture

Round-table:
Network of Networks for Risk Based Decision Making (N²RBDM) An International Initiative for a worldwide assessment of the SENDAI objectives

◆ Coordinator:
Nussbaum R., Atun F.

Roundtable Participants:
- Dr. Nussbaum R.
- Dr. Passas N. (Region of Attica)
- Representative from the Hellenic Association of Insurance Companies

[PHOTO]

TRACK 5:
MONITORING AND COPING WITH REAL RISK PROBLEMS

Session Title:
Climate Change hazards and risks: Temporal / spatial analysis and management

◆ Chaired by:
Moirasgentis S., Spence E.

Perspectives on CDRs from Malaysian Borneo

Spence E.[1], Payne M.[2], Lim R.[2], Cox E.[1], Pidgeon N.[1]

[1]Cardiff University
[2]South East Asia Rainforest Research Partnership

Abstract: Paris-compliant mitigation pathways often include scaling up carbon removal techniques in regions of the Global South, particularly tropical agriculture. However, research on public perceptions of CDR is notably lacking outside of Western nations. In practice, this means that mitigation pathways often include large amounts of CDR in regions where we know very little about how publics might respond. We report the results of five major in-depth, deliberative workshops on perceptions of carbon removal in Sabah, Malaysian Borneo. Sabah is a major tropical agriculture region, particularly producing palm oil for global export, and is also a biodiversity hotspot and a key site for forest conservation efforts. In this context, it becomes particularly important to interrogate the role of land-based CDR in future climate visions, including looking at this question from the perspective of local people and communities. Three workshops were conducted in the capital city of Kota Kinabalu, whilst a further two were conducted in a major palm oil growing region, including with local smallholders. We explored three CDR techniques with particular relevance for the Malaysian context – enhanced weathering, reforestation, and Bio-Energy with Carbon Capture and Storage following a discussion about climate change strategies in Malaysia. Reforestation is widely undertaken in Sabah and was a preferred CDR approach due to its familiarity and 'naturalness', as shown in work conducted in other countries. Enhanced weathering and BECCS were unfamiliar with participants perceiving these more negatively with many questions being elicited. BECCS was of concern to people due to possible air pollution and land availability with enhanced weathering highlighting concerns about mining and marine impacts. In the context of climate change, many felt other issues were of more concern to them however the majority wanted their voices heard and incorporated into the decision-making process as all felt the impacts of climate change. Within the context of Malaysia, as climate change is already impacting this region, policy is focused more on adaptation and other forms of mitigation but this research allows community perspectives to contribute towards policy decisions especially if CDR is considered a viable option and pursued in this region.

Keywords: Carbon dioxide removal; Public perceptions

Who influences risk perceptions and climate change adaptation intentions? Using cross-country survey data to identify archetypes of social influence

Wagenblast T.[1], Filatova T.[1], Warnier M.[1], Ghorbani A.[1]

[1]Delft University of Technology

Abstract: People's risk perception is crucial for climate change adaptation and can impact individual adaptation decisions or policy effectiveness. but could also trigger social tipping points. Testing different forms of social interaction, we previously found that network structure and interaction within it can significantly shape risk perceptions' effect on adaptation uptake and preparedness of communities. Nonetheless, so far little has been known about the nature of social influences on risk perception in the context of climate change adaptation. To gain insights into the impact of social influence on risk perception of individuals, we ran a survey involving 2000 households in coastal areas of the UK, the Netherlands, the US, and Indonesia in August 2023. This survey elicited individual interactions with peers about the topic of flood and sea-level rise risk perception and climate adaptation decisions. Questions included whom they talk to, what is discussed and how frequently, the characteristics of those involved, where and when they seek advice. Using cluster analysis on this data, we first identify different types of social interactions in the context of climate risks. Second, we identify characteristics of interacting households to define archetypes. A large part of the survey respondents indicate a lack of peer exchange on the topic of climate adaptation or flood risk: 30-50% report not discussing the topic with anyone, with up to 75% not having had a relevant conversation in the last year. For those engaging in discussions, the interactions vary in "strength" of influence (i.e., how prone to influence or influential a person is – weights can differ depending on the interaction direction). We find differences across countries regarding how people interact, especially regarding communication frequency and characteristics of people our respondents talked to. We are currently exploring the relationship between interaction frequency and social influence archetypes. These findings offer valuable insights into the social processes surrounding risk perception, its amplification, and the diffusion of climate change adaptation. They can be used to refine models for climate change adaptation by allowing to represent social interactions realistically. Eventually, these insights are important for designing policies and understanding social tipping processes, both of which can affect climate change adaptation.

Keywords: Social influence; Survey; Adaptation

How much precipitation has changed in Greece over the past century?

Dimitriadis P.[1], Koutsoyiannis D.[1], Iliopoulou T.[1], Tepetidis N.[1], Sargentis G.[1], Mamassis N.[1]

[1]National Technical University of Athens

Abstract: The observed change and variability of the precipitation process are analyzed through a large dataset comprising ground records as well as non-conventional data from reanalyses and satellite, which were compiled with the principal aim to construct the spatial intensity-duration-frequency curves (also known as ombrian curves) in Greece. Specifically, we apply classical and innovative stochastic tools (such as the K-moments and climacogram) to identify the marginal and second-order dependence structure characteristics of precipitation (such as heavy-tail and intermittency), as well as cluster periods of droughts and wet-years in both extreme left and right tails, which are indicative of a Long-Range Dependence (LRD) behaviour. Moreover, and since the established models in the literature cannot fully support the complex impacts of all the above characteristics in the precipitation process under LRD, Monte Carlo simulations are implemented through an innovative explicit and genuine stationary stochastic scheme (i.e., direct use of the process of interest without any transformation, and with a focus on the LRD) following the Hurst–Kolmogorov (HK) dynamics. Finally, various comparisons and theoretical expectations are shown for the selected records in Greece, and several questions regarding how much precipitation has changed in Greece over the past century and the implications of the results for future hydrological design scenarios, are discussed.

Keywords: Precipitation; Variability; Trends; Satellite; Reanalysis

Effects of air pollution and climate change on all-cause mortality: a case study in the Po Valley, Italy

Girardi P.[1], Prosdocimi I.[1], Gaetan C.[1]

[1]Ca' Foscari University

Abstract: Understanding the exogenous drivers of increased mortality risk is a key factor in the planning and management of health systems. There is therefore increasing interest in quantifying the potential impact of variations in air pollution levels and climatic factors on all-cause mortality measured at a given location. This is particularly relevant in areas with high levels of pollution and in light of the challenges associated with climate change and global warming. In this study, we therefore present a novel model using Functional Data Analysis (FDA), a statistical framework that departs from conventional scalar time series by treating continuous curves. This departure from traditional approaches allows for a more nuanced understanding of the dynamic interplay between air pollution and its effects on human health. We considered data from the main cities of the Lombardy region in Italy, a region located in the middle of the Po Valley, one of the most polluted areas in Europe and, due to its large spatial extent, differentially affected by air pollution and the potential effects of climate change. Information on total mortality by sex and age groups was provided by the National Institute of Statistics (ISTAT), while information on air pollution was obtained from the Regional Agency for the Protection of the Environment (ARPA) (ARPALData R package).We focus our analysis on the association between all-cause mortality and ozone concentration. Several studies have found that short- and long-term exposure to ozone is associated with an increased risk of several causes of mortality. In addition, ozone is particularly linked to climate change because of its positive association with temperature, an indicator that is increasing due to climate change and, in turn, an additional risk factor for mortality. We considered different models to explore the long and short term association: using the daily 8h maximum ozone concentration, we evaluated its influence on total mortality, while using an hourly resolution on the previous day, we evaluated which moment of the day is the most risky in the short term scenario. This improvement demonstrates the effectiveness of FDA-based models in capturing the complexity of the weather-health relationship. The results of this study underscore that flexible approaches can help us better understand intricate patterns and relationships that elude classical models. This study serves as a pioneering exploration into the field of FDA applications and offers a promising avenue for future public health research efforts.

Keywords: Air pollution; Public health

Session Title:
Geophysical hazards and risks: Temporal / spatial analysis and management

◆ Chaired by:
Kalligeris N., Kundak S.

Temporal and Spatial Seismic Risk Scenarios of Istanbul

Kundak S.[1], Goksu C.[1], Arslanli K.[1], Asici A.[1], Kalkanli D.[1], Yilmaz A.[1], Mert Sabah C[1], **Özden Pak E.** [1], **Ergun Konukçu B.**[1]

[1]Istanbul Tecnical University

Abstract: Istanbul, being a megacity prone to earthquakes, poses significant challenges due to its intricate spatial layout, sectoral interdependence, and systemic connectivity. To gain a thorough understanding, an impact chain approach has been employed in examining Istanbul's vulnerability, breaking down the causal components that are most likely to be affected by an earthquake. This approach incorporates spatial and temporal variables into the impact chain analysis, utilizing hypothetical scenarios that encompass the daily and seasonal mobility patterns of the city's inhabitants. The outcomes, derived from a collaborative stakeholders' workshop, reveal that the impact chain diagrams exhibit variations based on both temporal and spatial variables during the initial 72 hours following an earthquake. After the occurrence of the Kocaeli earthquake in 1999 and Kahramanmaraş earthquakes in February 2023, the seismic risk of Istanbul has become a focal point of discussion, particularly in relation to the anticipated earthquake's magnitude and intensity. This study adopts a scenario-based approach, shedding light on the significance of temporal and spatial dimensions in disaster management, logistics, and security. While structural failures emerge as primary concerns in risk management, the study emphasizes that understanding the temporal and spatial aspects is equally critical. For instance, one of the scenarios, characterized by a prevalence of residential areas, suggests that delineating immediate operational zones can be relatively straightforward through on-site damage evaluations. On the other hand, the scenario, where transportation and work zones take precedence, introduces complexities due to the mobility of inhabitants, leading to potential confusion in disaster response efforts. Furthermore, another scenario, which enfolds harsh meteorological conditions, highlights the amplification of challenges in daily traffic flow due to cascading effects of an earthquake.

Keywords: Seismicity; Cascading impacts; Future

Tsunami hazard and evacuation planning in Larnaca, Cyprus, within the framework of the CoastWAVE project

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Abstract: CoastWAVE is a project funded by EU DG ECHO and coordinated by IOC UNESCO which aims to strengthen the resilience of coastal communities in the North-Eastern Atlantic, Mediterranean (NEAM) region to the impact of tsunamis and other sea level-related coastal hazards. Its primary component is the adoption of the Global Tsunami Ready Standards by the participating coastal communities and to pilot the international Tsunami Ready Recognition Program (TRRP) within the Intergovernmental Coordination Group of the NEAM Tsunami Warning System (ICG/NEAMTWS). Larnaca, Cyprus, is one of the coastal communities applying the TRRP through the CoastWAVE project, and the aim of this work is to develop the local tsunami hazard and evacuation maps that fulfill some of the TRRP requirements.We are applying the Seismic Probabilistic Tsunami Hazard Assessment (S-PTHA) methodology at the local scale to assess tsunami hazard at different average return periods and levels of incorporated uncertainty. The outputs of the regional probabilistic tsunami hazard model NEAMTHM18 (Basili et al., 2021) near the study area were used to identify the seismic sources mostly contributing to the local tsunami hazard curves. The tsunami impact of each seismic scenario was assessed through hydrodynamic simulations going down to a spatial resolution of 5 m in the Municipality of Larnaca. The simulation output was used to generate local tsunami hazards curves, through which a tsunami inundation zone can be defined given the design average return period and level of incorporated uncertainty. The output of the local S-PTHA application was communicated to key local and national stakeholders via a participatory workshop organized in Larnaca, which facilitated the decision by the competent authorities on the selection of the design parameters of the tsunami inundation zone for emergency and evacuation planning. Following the local workshop, a well-informed decision was made by the competent authorities on the selection of the design parameters for the definition of the tsunami inundation zone. After assessing the tsunami evacuation plan, a second participatory workshop and a field visit with key stakeholders followed which were focused on the development of the local tsunami evacuation map. The inputs from the stakeholders were used to finalise the local tsunami evacuation map. We will present a multi-actor methodology for tsunami evacuation planning, its benefits, and the key outcomes of the application in Larnaca. Basili et al. (2021). Front. Earth Sci. 8:616594, doi: 10.3389/feart.2020.616594

Keywords: Tsunami; Hazard; Evacuation; Planning; PTHA

Enhancing housing resilience to earthquakes: Factors influencing private autonomous adaptation in urban regeneration planning

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Abstract: Background In the Pacific-Asia region, numerous rapidly growing urban areas face increased seismic risks, rendering them more vulnerable as they develop. In coping with these threats, many countries, including Taiwan, prioritize planned (anticipatory) adaptation, typically employing a top-down approach, and frequently combining with various urban governance policies to formulate adaptation strategies for reducing disaster risks. There is a growing trend among local agencies to integrate private adaptation elements and foster their participation in urban regeneration and land use planning. This shift aims to inspire bottom-up actions from community members to implement selected adaptation options. This study aims to increase our understanding of households' adaptation behavior concerning housing structure improvement in response to earthquakes and the determinants influencing such behavior. Our findings can provide insights for developing more effective approaches to improve residents' adaptive capacity, resilience, and reduce disaster risks. 2. MethodsThis study employs a resilience-based approach to explore how public measures influence private autonomous adaptation behavior through a transdisciplinary investigation into household adaptation behavior. Combining adaptation theory with risk communication, protection motivation theory, and literature review, we develop the Resilience Framework of Household Autonomous Adaptation to Seismic Risks (ROHASR) to examine the determinants of household adaptation and resilience to earthquakes. To illustrate our proposed methodology, a survey was conducted among households in New Taipei City, Taiwan. Additionally, we utilized focus group meetings and in-depth interviews to incorporate the knowledge and engagement of key stakeholders into the questionnaire design. The survey underwent pre-tested by trained interviewers and was administered through face-to-face interviews. Using stratified random sampling, the analysis included 471 respondents, yielding an effective response rate of 90%. The data analysis incorporated multivariate and Binary Logit Regression analyses.3. Results Despite the local agency's promotion of disaster-prevention-based urban regeneration plans, survey results show that respondents adopted less than 10% of low-level of adaptation behavior. Key factors that influence households' adaptation actions further include housing conditions, adaptation appraisal, trust in risk information, and the level of support from urban regeneration promoters and the government. Simply increasing public awareness of seismic risks is insufficient to encourage autonomous adaptation. The lack of robust risk and policy communication platforms, along with limited participation channels, erodes residents' confidence in planned adaptation strategies for improving housing structure and safety. Policy efforts could be more targeted toward strengthening risk communication, professional counseling, and community support in urban regeneration planning to enhance adaptive capacity and resilience.

Keywords: Adaptation; Resilience; Earthquake; Risk communication

Forensic investigations aftermath of Kahramanmaraş earthquake sequence, 6th February 2023

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Abstract: A series of consecutive earthquakes occurred on February 2023 in Türkiye, affecting 11 provinces with a population exceeding 14 million. These seismic events resulted in devastating consequences. The aftermath included more than 50,000 life losses, 100,000 injuries, and an estimated economic loss of 100 billion USD. This paper is dedicated to the forensic investigation of these events, with a primary focus on identifying systemic and structural root causes, risk drivers, and understanding multi-hazard impact chains. The forensic analysis is structured around hazard and impact analysis, pre-disaster conditions, recovery, and building resilience for future events. This comprehensive approach aims to provide both qualitative and quantitative insights, establishing a link between past experiences and future risk mitigation strategies. In the hazard and impact analysis, the study delves into the spatial and temporal dimensions of the seismic events, evaluating short-term impacts in the immediate aftermath and long-term consequences lasting for years or even decades. The examination of pre-disaster conditions seeks to answer the question 'why did it happen?' by exploring physical, environmental, socio-cultural, economic, and institutional dimensions. This includes a thorough analysis of factors such as lack of infrastructure, socio-cultural vulnerabilities, and economic challenges. The recovery section addresses 'what has happened in the recovery phase?' by analyzing the measures taken to restore services and rebuild communities following the earthquakes. Finally, the building resilience for future events section answers 'What has been done to reduce future risks and increase resilience?' This involves a comprehensive analysis of various dimensions, identifying measures to enhance preparedness, reduce vulnerabilities, and promote sustainable development. Throughout the analysis, factors in physical, environmental, socio-cultural, economic, and institutional dimensions are interpreted. This forensic perspective may provide insights for informing future disaster risk reduction strategies and fostering the development of resilient communities.

Keywords: Earthquake; Impact analysis; Turkiye

Estimating the Probable Maximum Loss of Public Buildings in Sumatra due to Tsunamis Generated from Sunda-Megathrust Segments

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Abstract: Sumatra is one of the main islands in Indonesia that is most vulnerable to tsunamis. Many public buildings are situated within the probable tsunami inundation area. In the last century, there were several important tsunamis occurred around the island. They are the 1907 Simeulue tsunami, the 2004 Indian Ocean Tsunami, the 2007 Bengkulu Tsunami, the 2010 Mentawai tsunami, and the 2018 Mount Anak Krakatau tsunami. However, up to the present, no research has been performed and published to estimate the losses due to future tsunamis for public buildings. This research was aimed at estimating the probable maximum losses (PML) to public buildings due to anticipated future tsunamis. A series of tsunami numerical simulations were performed using the Cornell Multi-grid Coupled Tsunami Model (COMCOT), where the tsunami sources were taken from the Sunda-Megathrust segments located at the west of the Sumatra island. The simulations also incorporated the targeted area's land use types to better represent the Manning roughness coefficients. Nonlinear shallow water equations were applied at the numerical simulations' innermost layer to generate more plausible tsunami inundation areas and tsunami flow depths. Three types of buildings were assessed in the coastal area of the island, namely government offices, public schools, and health facilities. All the identified public buildings in the area were classified into building types as recommended by Hazards United States (HAZUS). A series of tsunami fragility functions were used to calculate building damage ratios. Tsunami flow depth information was used to calculate the estimated damage ratio of the buildings. This research found that 1,615 government offices, 1,178 schools, and 243 health facilities in Sumatra are exposed to future tsunamis with varied damage ratio probabilities. At a tsunami return period of 1,000 years, the island could have to bear with tsunami probable maximum loss of about USD160 Million with an Average Annual Loss (AAL) of about USD1.26 Million. Many of the exposed facilities are located in four provinces on the island: Aceh, North Sumatra, West Sumatra, and Lampung. Considering the results, it is apparent that the government of Indonesia need to strengthen tsunami risk reduction efforts to reduce the estimated economic and life losses due to tsunamis.

Keywords: Tsunami; PML; Risk; Sumatra; Simulation

Session Title:
Technological and Na-tech risk assessment, mapping and management

◆ Chaired by:
Markoulaki E., Yang J.

Managing PFAS risk amid uncertainty: Personal relevance, conflicting information, and information behaviors

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Abstract: Heightening personal relevance to a risk is crucial for public engagement (Liu & Yang, 2023). As an emerging environmental risk, per- and polyfluoroalkyl substances (PFAS) are gaining public attention in the U.S. However, the scientific community is still working to understand this novel risk, and conflicting information may impede effective risk communication. As a result, it is important to understand how individuals cope with conflicting information when PFAS contamination is portrayed as personally relevant or not. In this study, we examined how personal relevance and conflicting information affect individuals' risk-mitigation behavioral intention. A 2*2 experiment (high vs. low personal relevance; consistent vs. conflicting message) was conducted with a sample of U.S. adults recruited online. Participants (N =1062) were randomly assigned to one of the four conditions. After granting informed consent, participants first reported demographics, then they were instructed to read one of the four experimental stimuli. Next, they responded to a set of questions assessing risk perception, information processing, perceived informational gathering capacity, and risk-mitigation behavioral intention.The results showed that high personal relevance condition led to higher risk perception and more systematic processing than the low personal relevance condition. Additionally, we found that risk perception and systematic processing mediated the relationship between personal relevance and behavioral intention in a serial manner. Lastly, perceived informational gathering capacity significantly moderated risk perception's mediation effect on the relationship between personal relevance and risk-mitigation behavioral intention. The findings provide evidence for the importance of personal relevance in risk communication surrounding PFAS. High personal relevance leads to higher risk perception and more systematic processing, which positively affects people's intention to adopt risk-mitigation behaviors. In addition, the moderating role of perceived informational gathering capacity suggests that increasing personal relevance leads to more systematic processing, particularly for those with low informational gathering capacity. This indicates that it is useful to motivate those with lower science literacy to engage in systematic processing by highlighting the direct impact of PFAS contamination on their lives. We did not observe any significant results for the conflict condition, possibly because when a risk is depicted as directly affecting individuals, they might not be able to notice the following conflict. Taken together, as many environmental risks are often viewed as impersonal (Kahlor et al., 2006), these findings suggest that emphasizing their health impacts could be effective in increasing individuals' risk perception, fostering more elaborated information processing, and consequently motivating risk-mitigation behaviors.

Keywords: PFAS; Personal relevance; Information processing

Data-Driven Risk Analysis and Emergency Management for Rail Hazmat Transportation

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Abstract: The transportation of hazardous materials (hazmat) is a pivotal aspect of industrial operations in many countries. Hazmat transportation by rail has seen a significant rise in North America, particularly driven by amplified crude oil production and movement. While rail transport has historically exhibited favorable safety records, events such as the Lac-Mégantic tragedy in Canada in 2013 underscore the potentially catastrophic risks, emphasizing the need for proactive risk management strategies. This incident investigation highlighted the imperative of pre-emptively identifying and managing potential risk factors to prevent or mitigate such calamities. Leveraging extensive historical rail traffic and hazmat incident data through advanced data analytics techniques, our research aims to identify pivotal risk factors contributing to potential future rail hazmat incidents. By employing sophisticated data extraction, classification, regression, and text mining tools, this study seeks to unravel hidden relationships within incident reports, extract pertinent insights, and predict incident risks. The aim is to create a data-driven risk analysis model that identifies key risk factors and crafts an aligned emergency management framework. This initiative could aid policymakers, railroad companies, and scholars in the domains of transportation, risk analysis, and emergency management. Up to this point, our research results indicate the useful role of data analytics in forecasting and classifying the risk associated with rail hazmat shipments. Ultimately, this project aims to harness data analytics to minimize rail hazmat incidents, bolstering public safety and contributing substantially to hazmat transportation literature. The study's methodologies and findings, applied to rail hazmat transport in Canada, hold potential applicability to global contexts in hazmat transportation. Leveraging data analytics on publicly available shipment and incident data could offer adaptable frameworks for similar rail networks worldwide. Tailoring the analysis and emergency management frameworks to suit different regions could aid in assessing and predicting risks in hazmat transportation, contributing globally to improving safety and emergency preparedness.

Keywords: Hazmat; Railways; Risk; Analytics; Emergency

Spot on! Preparedness & expectations of citizens during a long-term power black-out

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Abstract: Preparedness is generally emphasized as crucial for the successful management of crisis events. To be prepared on several scenario's local authorities are working on contingency plans. For crisis and disaster management to be citizen-oriented and enabling, those plans should start from the local vulnerability profiles and the existing help mentalities. In this area, knowledge in Belgium is rather limited. To help local authorities to understand the citizen's needs, we present in this paper the results of a fourfold citizen survey (2014 – 2016 – 2018 – 2022) held in the city of Ghent & Kortrijk (Belgium), asking people for their own preparedness & their expectations of the local authorities during a potential long-term power blackout. The case 'blackout' was chosen because Belgium had some energy problems in 2014 and the government predicted some possible blackouts. In 2016 the problem was solved and we wanted to compare the results of 2014 with a period without a certain awareness. In 2018 the city of Ghent was confronted with a blackout of more than 12 hours. We repeated the survey starting from the hypothesis that people are more prepared after an crisis event. In 2022, the Ukraine war and predicted energy stops, triggered us to redo the survey again. More or less the same questionnaire was used in the four releases of the survey. The mail goal was to analyze how prepared citizens are in the event of a blackout and if they are willing to help others. What do they expect from the government, and where do they see their own responsibilities? We study self-sufficiency over time and whether their preparedness varies on circumstances, such as a potential threat or a current event that has occurred. In addition, we investigate if various socio-demographic characteristics (household composition, age, health condition, employment status etc.) are related to the level of preparedness and willingness to help others. In this way, we aim to inform policymakers about the more 'vulnerable' groups, enabling targeted policymaking.

Keywords: Risk perceptions; Resilience; Prepardness; Citizens

The Impact of Political Factors on the Relationships between Releasing Fukushima Radioactive Water and the Acceptance of Nuclear Energy

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Abstract: The release of Fukushima's radioactive water into the sea began on August 2023. Concerns were raised by neighboring countries about the radioactively contaminated water. Considering that the acceptance of nuclear power has decreased since the 2011 Fukushima nuclear disaster, the release of treated radioactive water in Japan is expected to have a major impact on the acceptance of nuclear power. While the Fukushima nuclear disaster generated fear based on the fact that it happened, the Fukushima radioactive water release generates fear based on the expectation of uncertain future risks. The purpose of this study is to examine how risk perception of Fukushima radioactive water affects nuclear power acceptance. This study focuses on constructing a research model and testing the model based on survey data. The dependent variable is nuclear power acceptance, and the independent variables are perceived risk about radioactive water. In particular, this study focuses on three political attitudes and the role that political ideology, party support, and presidential support play in the relationship between risk perception and acceptance.

Keywords: Radioactive water; Acceptance of nuclear

Session Title:
Public health, epidemic and pandemic risks

◆ Chaired by:
Jansen T., Hanoch Y.

Delayed synergies are harder to be seen: an experimental investigation of factors influencing synergistic judgements of health risks

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Abstract: When certain hazards are combined, they produce synergies. In other words, they lead to risks that are greater than the sum of risks presented by each factor separately. Many examples of such synergistic risks can be found in the health domain, such as smoking and radon exposure that interact synergistically to increase future lung cancer risk. Without doubt, how people judge such risk combinations is important. If they underestimate how different factors interact, they may fail to take the actions needed to mitigate their health risks. Similarly, assuming synergies where there are none can be detrimental. Previous research showed mostly underestimation of synergistic risks, but the literature on this issue remains scarce and it is not yet clear under which conditions people are more or less likely to recognise synergies. In the current study, we aim to advance our understanding of these conditions. We examine three specific characteristics of adverse health outcomes that may impact people's likelihood of making a synergistic risk judgement. In particular, we test whether it depends on the temporal delay of the outcome, on whether the outcome is continuous or binary, and whether knowledge about the outcome plays a role. The main finding is that synergistic judgements are much more likely for immediate outcomes compared to the delayed ones. Thanks to the structure of our data, we are also able to shed light on the possible mechanism for this. In particular, our data suggests that this result is due to the difference in how much weight people give to the single risk factors for immediate vs delayed outcomes, not to how they evaluate the combined risks. These results have important implications for communications concerning synergistic risks. Notably, many confirmed synergistic risks concern non-communicable diseases, which do not happen immediately. Thus, people may struggle to perceive their synergistic nature and focus too much on individual risk factors. Our study furthermore tests for the effects of format of the task. We find that synergistic judgements are somewhat more likely if natural frequency and partitive probability formats are used, as opposed to single-case (non-partitive) probability format. This is another insight that can inform communications about synergistic health risks.

Keywords: Synergistic risk judgements; Delayed risks

Medical decision-making under risk and uncertainty: Anaesthetists' decision to attend an operation

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Abstract: There is a paucity of work examining anaesthetists' willingness to be attending anaesthetist in response to different medical conditions. Earlier studies offer only a partial and indirect explanation as to why variations in the decision to be an attending anaesthetist exist. Here, we evaluated whether several psychological variables—risk-taking tendencies, attitudes toward uncertainty and sense of regret—and demographics—experience or gender—could shed light on anaesthetist' variation in willingness to be an attending anaesthetist. Anaesthetists from two National Health Service Trusts in England completed an on-line questionnaire. The participants viewed, in random order, three different realistic scenarios (representing low, medium, and high-risk cases) and were asked to indicate how likely they were to agree to serve as the attending anaesthetist. Participants also answered questions evaluating their risk-taking tendencies, comfort with uncertainty, and regret sensitivity. Anaesthetists varied in their willingness to be an attending anaesthetist. Importantly, our data revealed that a sense of uncertainty and regret, but not risk attitude, could help explain variations in willingness to serve as an attending anaesthetist. Female anaesthetists were less likely to be an attending anaesthetist regardless of the of the level of risk or individual differences, but we found no relationship between levels of experience and willingness to serve as an attending anaesthetist. Examining anaesthetists' willingness to serve as an attending anaesthetist in isolation provides an important but only partial picture. Gaining a better understanding about the factors that drive decision-making is vital for improving both training and practice. In particular, given the high proportion of women in anaesthesia, the gender difference found in this study has significant implications for anaesthetic training and practice.

Keywords: Anaesthesia; Gender, Risk, Uncertaintity

Biotechnology: "Devil's Trick" or "God's Gift"? The case of mRNA preparations of SARS-CoV-2

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Abstract: Our research has led to documented material which show a broader view than the one the mass media present during the recent years. This study brings up less known to the general public data and documents which have not been widely presented. Since March 11th 2020, the official narrative in many countries worldwide mentions SARS-CoV-2 as a deadly danger and COVID-19 as a pandemic threat, which should be treated as the absolute enemy of the human species. The solution given by the government and the by law unprosecutable experts appointed by the government in Hellas and other countries is every individual to disregard the fundamental political and scientific rules as well as increase their exposure to hazards related to health and life safety. In this study we attempt to challenge the official narrative by setting questions. Is SARS-CoV-2 a natural hazard? How and who decides what emergency situation is? Has the management of COVID-19 been a Na-tech disaster? Is the excess mortality observed since 2021 in Hellas and a number of other countries a human induced disaster? Can mRNA preparations be considered vaccines? How and who decides when an emergency situation is over? Since the discussion on similar questions have practically been forbidden for a long time, we try to give an impetus to the realization of this dialogue. In this context, we examine the decisions of the competent institutions regarding COVID-19 and the response to it as a public health matter during the recent years. Using public documents, official data and relevant literature, we approach the issue of the use of biotechnology with the positives and negatives it can offer. The results indicate a clear lack of proportionality in measures which according to the official narrative are related to COVID-19. Fundamental rights in Hellas have been challenged to a point where Articles of the Constitution often lie at the discretion of the government. The political, health and life risks which the citizens had to take for safety reasons according to the official narrative, seem that have not yielded the so-called expected results. On the contrary, phenomena such as increased morbidity as well as excessive mortality cannot yet be explained by the competent institutions. In general, the results of our research demonstrate that human, social, institutional, and economic vulnerability regarding biotechnology has increased in Hellas as well as in other countries where the official narrative has prevailed over risk management.

Keywords: mRNA technology; Natech; Public health

Different Perceptions of Risk and Management of African Swine Fever: Results from a Social Research

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Abstract: African Swine Fever (ASF), a viral disease present in the European Union context since 2014, poses a risk to both animal health and the swine industry. Managing this epidemic disease in Italy and Europe involves various complexities, including virus resistance, different types of swine farming, wild boar control, and the involvement of different stakeholders (farmers, pig industry veterinarians, veterinary officers, wildlife managers, hunters) in handling the two susceptible animal populations (domestic pig and wild boar).The PSA-PRINCE project, funded by the Italian Ministry of Health, employs social research methodologies to gauge stakeholders' awareness of ASF. The project aims to facilitate discussions, plan information campaigns, and establish institutional communication to build a network capable of coordinated and effective disease management. The study focuses on the Friuli Venezia Giulia and Veneto regions in Italy, considering their varied pig farming practices and wild boar management. Key stakeholders from the swine industry and wildlife management and hunting sectors are actively involved.To collect data, given the complexity of the phenomenon, mixed methods were used, including: narrative interviews with 14 pig farmers and 20 hunters, two focus groups with field veterinarians and veterinary officers, one with wildlife managers, and a standardized questionnaire completed by 91 professional pig farmers. Data synthesis through content analysis and statistical analysis revealed significant aspects for effective disease management.Firstly, there is a widespread and high perception of risk associated with ASF across all stakeholder categories. However, the perceived risk from virus carriers and proposed measures to curb disease spread vary significantly based on stakeholders' roles and the epidemic evolution of ASF. Particularly, pig farmers, involved in both narrative interviews and later online surveys, expressed a shift from alarm about the wild boar role in the spread of infection, to concerns related to human behaviours (transportation and external operators). The information gathered from this research is currently undergoing further analysis, and the second phase of the project involves engaging selected stakeholders in participatory discussions and debates through methods such as consensus conferences.The results analyzed so far suggest that the diachronic involvement of different stakeholders is crucial to reconstruct perceptions and practices related to managing epidemic diseases like ASF. This approach, characterized by stakeholder engagement at various levels (institutional, industry, and hunting), could also be applied in other European countries, where relationships among stakeholders in the swine industry and hunting sector are even more diverse and heterogeneous.

Keywords: Risk perception; Mixed methods

Session Title:
Cyber security risk assessment for critical infrastructure

◆ Chaired by:
Rizomiliotis P., Bouder F.

Bridging the Gap: How Risk Research Can Help Us Account for Human Behavior in Cybersecurity

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Abstract: Cybersecurity research has made significant steps in understanding and addressing the role of human factors in cyberspace. However, despite this progress, a critical gap persists in understanding the human-induced uncertainties inherent in cyber threats. This work underscores the necessity of integrating risk research methodologies into cybersecurity frameworks, particularly emphasizing the pivotal role of human behavior as a driver of uncertainty. While cybersecurity research has made progress in exploring the influence of human behavior on digital security, there remains a lack of awareness regarding the distinction between aleatoric and epistemic uncertainties. Often, cybersecurity research focuses primarily on statistical analyses of "who" makes a mistake and "how frequent" they occur (aleatoric), neglecting the crucial "why" behind human actions (epistemic). Understanding the underlying motivations and cognitive processes driving human behavior is essential to mitigate epistemic uncertainties effectively. Risk research offers valuable insights into addressing epistemic uncertainty within cybersecurity contexts. One illustrative example is the concept of risk compensation, wherein individuals adjust their behavior in response to perceived changes in risk levels, potentially undermining the efficacy of security measures. Understanding the why behind this phenomenon allows us to reduce some of the epistemic uncertainty and better predict which security measures are likely to be fruitful. Various domains within risk research offer distinct approaches to address human-centric uncertainties in cybersecurity. For instance, insights from individual risk perception and behavior studies can inform the design of user-centric security protocols while accounting for mechanisms like risk compensation. Cognitive, emotional, and social perspectives on risk provide valuable frameworks for understanding the psychological underpinnings of cyber threat responses, emphasizing the role of affect in risk perception and decision-making. Furthermore, modeling decision-making under different and dynamic risk environments and effective risk communication strategies are essential for fostering resilience in the face of evolving cyber threats, acknowledging both rational and affective dimensions of risk perception and response. In conclusion, this work advocates for interdisciplinary collaboration between cybersecurity and risk research to enhance cyberdefense capabilities. By integrating risk research methodologies, cybersecurity researchers can develop more holistic approaches to address the complex interplay between human factors and different cyber threats and defenses. Emphasizing the importance of understanding and mitigating epistemic uncertainties, this work underscores the potential of risk research to enrich cybersecurity research and practice.

Keywords: Cybersecurity; Uncertainty; Behavior; Collaboration

AI algorithms in architecture, engineering, and construction: Navigating uncertainties

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Abstract: Within the architecture, engineering, and construction (AEC) sector, we see movements toward greater use of industrial robots, machine learning, algorithms, and other artificial intelligence (AI) tools. Yet, the AEC industry, despite being one of the largest fields on a global scale, is known for being the slowest to digitalize and innovate. Factors such as unrecognizing the value of digitalization by decision-makers and making safety-related decisions under high levels of uncertainty, appear to be critical in preventing successful large-scale digitalization. To explore how the expansion of AI, particularly AI algorithms, in the AEC sector impacts risks and uncertainties, we conducted 21 in-depth interviews with European AEC professionals. Our findings suggest a promising scope for wider AI adoption in AEC, contingent upon addressing multiple knowledge gaps. However, while AI holds the potential to mitigate some uncertainties, its increased usage seems to be introducing a whole new set of uncertainties.

Keywords: AI; Algorithms; Uncertainty; AEC

CATS: Development and preliminary results of a virtual reality cybersecurity awareness training simulator

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Abstract: Cyberattacks are a growing threat not only to organizations but also to individuals and society. The consequences of inadequate cybersecurity practices extend far beyond economic losses, and can have profound social (e.g., disruption of critical services; disruption of social cohesion) and psychological impacts (e.g., anxiety; fear; isolation). Recent studies on cybersecurity identify the human factor as one of the most significant risk factors. Seemingly innocuous actions, such as opening attachments and links from dissimulated emails, using virus-infected pen drives, or falling prey to several social engineering phishing techniques, can serve as gateways for cyberattacks, exposing critical systems to unauthorized access. Thus, preventing cyberattacks also requires awareness, knowledge, training, and implementation of protective behaviors by individuals. In that regard, we present the development of an innovative approach that capitalizes on virtual reality to create an immersive simulator for cybersecurity awareness and behavioral training. Our goal is to create an immersive and ecologically realistic simulator experience for training cybersecurity behaviors, incorporating essential feedback within real-world scenarios. We report preliminary results and challenges arising from the development and first application of this novel training simulator that offers a distinct advantage by closely mimicking real-life behaviors and scenarios. Methodological and practical challenges, implications, current limitations, and future applications of virtual reality scenarios for cybersecurity training and cyberthreat awareness will be discussed.

Keywords: Cyberthreats; Cybersecurity; Virtual Reality; Training

Session Title:
Food Security/Safety in Europe and beyond I

◆ Chaired by:
Anyshchenko A., Boulis A.

Exploring the Protective Role of Vegetables: A Bayesian Network Approach for Risk Assessment of Cancer Onset in a Balanced Diet

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Abstract: The relationship between diet and cancer has long been a subject of scientific research. Epidemiological studies have shown a correlation between the consumption of vegetables and a reduced risk of cancer onset. To further investigate this association, we propose the use of a Bayesian network approach to conduct a risk assessment of cancer onset in individuals with a balanced diet.This study aims to create a Bayesian network model that incorporates various factors influencing cancer development, including vegetable intake, to assess the protective role of vegetables against cancer. The model utilizes data from past studies, expert opinions, and specialized dietary databases to assign probabilities to different nodes in the network.The Bayesian network will allow us to analyze the complex interactions between different variables, quantify their influence, and identify key determinants of cancer onset. By considering multiple factors simultaneously, including lifestyle factors and genetic predisposition, this approach provides a comprehensive assessment of the overall risk of cancer associated with individual dietary choices.The results of this study will provide valuable insights into the contribution of vegetables to cancer prevention and guide the development of personalized dietary recommendations for individuals aiming to reduce their cancer risk. Additionally, the Bayesian network framework can be further expanded to incorporate additional variables and refined as more data becomes available.

Keywords: Bayesian network; Cancer; Risk assessment

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Traceability of genome editing in plants poses a challenge to risk regulation

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Abstract: Genome editing of plants raises policy, regulation and trade issues with respect to detecting, tracing and labelling. One of dominant sources of these issues is the distinctive European policy approach to genome editing. EU regulation of GMOs clearly distinguished conventional plant breeding techniques from recombinant DNA technology. Until recently, this distinction provided a functional system for controlling potential risks associated with new technologies. With the advent of precision mutagenesis, the scope of biotechnology was expanded by techniques altering DNA by means of genome editing that do not insert foreign genetic material. This created the problem of distinguishing between mutagenesis and genome editing. Precision mutagenesis through genome editing is unlikely to pose more significant hazard than that of many imprecise mutations generated by conventional mutagenesis. However, the latter is exempted from the scope of EU regulation on GMOs and the former is not. Although EU regulation of GMOs is not explicit about the status of genome editing, a product so obtained will be classified as a GMO by the EU because genome editing involves genetic engineering.In the process of genome editing, the difference between gene sequences induced by mutagenesis and site-directed nucleases may not be identified by analytical detection methods. This has serious consequences for risk assessment and management because mutagenesis is generally excluded from the scope of law on genetically modified organisms. The difference between targeted and random mutations introduced respectively by site-directed nucleases and mutagenesis brings about issues in regulating genome editing. This presentation addresses these issues and explores the prospect of implementing a legislative framework on genome editing that keeps pace with technological progress, ensures a high level of protection of health and the environment, enables innovation and contributes to frameworks for risk analysis.

Keywords: Genome editing; Traceability; Labelling; Safety

Analysis of food safety data and its importance in risk assessment

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Abstract: We are already at the third decade after the legislative radical changes that Reg. (EC) 178/2002 inserted in food safety sector in EU. Risk analysis and risk assessment were some of the most important elements that affected the way stakeholders of food sector ensure the safety of products. Risk assessment should be based on valid, reliable and credible data to be scientifically sound. This study uses data from official controls that competent authorities of European countries conducted. RASFF (Rapid Alert System for Food and Feed) is a significant database of food safety incidents that affect more than one country and a valuable source of data for this study, which covers a period from 1980 until today. MANCP (Multi Annual National Control Program) annual reports of EU countries are another source of data. According to Reg. (EU) 2019/723, these reports use a standard model and 2020 was the first year of this model implementation. At national level, Hellenic Food Safety Authority publishes in its website (www.efet.gr) data from official controls in Greece which cover a period from 2011 to 2022.The scope of this study is to analyze these data with a statistical tool to present the most important risks in food safety through time and space in EU. This analysis might be useful to member states for planning their national control programs and for giving priority to specific issues and risks. This might also be useful to food companies that plan their own control systems.

Keywords: Risk assessment; Food safety; RASFF

Session Title:
Food Security/Safety in Europe and beyond II

◆ Chaired by:
Hallman W., Tiozzo Pezzoli B.

Awareness, Understanding and Use of FDA/EPA Advice About Eating Seafood for Women Who Are/Might Become Pregnant.

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Abstract: Background: Current FDA/EPA advice, consistent with the U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025, is that "women who are pregnant or breastfeeding should consume between eight and twelve ounces of seafood per week from choices that are lower in mercury." This advice is intended to promote the consumption of adequate amounts seafood high in Omega 3 and other essential fatty acids, which promote the healthy development of a fetuses' brain and growth, while also reducing the risks of exposure to high levels of methylmercury during pregnancy. Such exposure poses risks to the healthy development of the nervous systems of fetuses and is associated with lower cognitive abilities and delayed developmental milestones of offspring. In this study, we examined the awareness, understanding, and use of this advice by the target audience. Methods: A representative sample of 732 women ages 18-49 were recruited from the YouGov survey panel. They completed an online survey to characterize their awareness, understanding and use of FDA/EPA Advice concerning seafood consumption among adult women of childbearing age. Results: Six-in-ten (61%) were slightly or not familiar with government recommendations for seafood consumption for women who are pregnant, might become pregnant, or are breastfeeding. Eight-in-ten (84%) reported making no changes in seafood consumption based on the advice. Only 7.8% knew that they should eat two-to-three 4oz servings of seafood per week and only 29.6% reported that they had consumed that amount in the previous week. Responding to open-ended questions, half (53.4%) did not know what nutrient(s) seafood contains that is healthy. Half (51.2%) did not know what seafood might contain that should be avoided, and only 36% mentioned "mercury." More than half (56.8%) did not know why women who are pregnant should avoid consuming seafood higher in mercury. Only one-third (32.5%) correctly identified one or more known effects of mercury, while 32.1% incorrectly endorsed effects not known to exist, including that it would "increase the risk that the baby will have autism." Conclusions: FDA/EPA advice to women of childbearing age about eating seafood is not reaching its target audience. New efforts to increase awareness, understanding, and use of this advice are required.

Keywords: Risk communication; Fish consumption; Pregnancy

Fridge storage for food safety: the role of psychosocial factors to improve food safety risk communication

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Abstract: Incorrect practices of food handling in the domestic environment could be easily reduced paying attention to some simple rules thanks to tailored communication campaigns. To be effective, such campaigns need to be conceived taking into account the role of cognitive factors that can intervene between intention and behaviour. An online survey (N=242, Italian consumers) was conducted to verify what psychosocial factors drive consumers' implementation of a chosen target behaviour, by applying the Theory of Planned Behaviour and its extensions. The proper disposal of food inside the domestic refrigerator served as behavioural goal: it represents a fundamental practice to prevent food risk at home, being the refrigerator a significant niche for the persistence and dissemination of pathogens. The main measures included: refrigerator management; consumer perceptions; attitude toward the behaviour; subjective norms; perceived behavioural control (PBC); desire; anticipated positive/negative emotions; behavioural intentions; and socio-demographic questions. Data returned a well-educated consumer with reference to food safety, with a high level of self-efficacy; however, food products – especially eggs - were generally not correctly disposed in the appliance. PBC was found to have a strong influence on the intention to implement the behaviour, together with the desire, which mediates the effect of attitudes, positive anticipated emotions, and PBC on intentions. Intentions are guided by attitude, PCB, and anticipated positive emotions. The impact of these variables occurs through desire that guides all reason to act and transforms them into a willingness to act. There only remains a direct impact of PBC on behavioural intentions. Messages aimed at enhancing the correct disposal of food in the refrigerator should leverage on PBC, desire and anticipated positive emotions. Results will be further discussed to inform communication initiatives to promote the target behaviour.

Keywords: Food risks communication; Consumers' behaviour

Immigrants' food security in Greece

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Abstract: Introduction: A number of studies have shown that immigrants often have lower rates of food security than the rest of the population, resulting in an increased risk of multiple chronic conditions. Purpose: The measurement of food security levels in a sample of immigrants in Greece. Methodology: This is a cross-sectional study on a sample of 422 Greeks (65,1%) and 226 immigrants (34,87%) of both sexes, aged >18 years. Food security was assessed with the Adult Food Security Survey Module-Gr (AFSSM-Gr), while all sociodemographic characteristics were self-reported. Results: The results showed that immigrants, compared to Greeks, had lower levels of food security ($p<0.001$). In particular, statistically significant differences were observed in 3 out of 4 subcategories of food security (high, low and very low). Furthermore, 64 (28.3%) immigrants had high food security, 53 (23.5%) had marginal food security, 66 (29.2%) had low food security and 43 (19%) had very low food security. Moreover, 67.1% of women were food secure, while the corresponding percentage for men was 43.5%. Between the two sexes there was a statistically significant difference in the levels of food security ($p<0.001$). With respect to the Human Development Index, immigrants originating from countries with a high human development index (Albania, Bulgaria, Ukraine, Moldova, Armenia, Egypt, Lebanon, Iran) were 63.2% food secure, while the food security rate of those originating from countries with a medium human development index (India, Philippines, Bangladesh, Syria, Cameroon, Ivory Coast) and countries with a low human development index (Pakistan, Afghanistan, Nigeria) were 50% and 36.8%, respectively. In terms of income, 48.5% of the immigrants with low income (<10,000 euros) reported being food secure, compared to 63.6% and 71.4% of the immigrants with medium (10,000-20,000) and high (>20,000) income, respectively. As far as diet quality, 59,6% and 17,43% of the food insecure immigrants reported higher levels in moderate and high adherence to MD categories respectively, than the food secure immigrants (57,26% and 12,82% respectively). Conclusion: Of the 226 immigrants in the study, 51.8% had high/marginal food security, with women reporting higher levels of food security than men. Immigrants from countries with a low human development index had lower levels of food security than those from countries with a medium and high human development index. Accordingly, those who reported low income had lower levels of food security than those who reported medium and high income. Finally, the food insecure immigrants had higher rates in the Moderate and High Adherence to MD categories, than the food secure immigrants did.

Keywords: Food security; Food insecurity; Immigrants

ABSTRACTS OF POSTERS
– Part C

Risk research practice in the 21st Century: Guiding Principles from the ACCESS Project

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Abstract: While many academic discussions centre around the creation and dissemination of new knowledge, less time is spent thinking about and reflecting upon the practices underlying research. For example, considering our research practices, to what extent are considerations such as environmental sustainability, knowledge co-production and equality, diversity and inclusion being made? This poster presents findings and reflections from ACCESS, a UK research network designed to champion social science in climate and environmental research & policy - a broad research area within which many academics attending SRA-E conferences would likely conduct their research. The poster presentation discusses the three guiding principles outlined above, examples of how they have considered in our research and practice, and examines the challenges and benefits of incorporating them into our work. Overall, the poster aims to create space for broader reflection and discussion about the way we do risk research: the extent to which we incorporate these principles, and others, into our work, the tensions that exist in incorporating them, and the potential benefits of doing so to more successfully tackle climate and environmental challenges.

Keywords: Research practice; Risk research; Reflexivity

Well-intended policy intervention, but for whom? Government actions and human security amid the pandemic in the United States

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Abstract: This study examines the effect of government actions to improve human security during the COVID-19 pandemic in the United States. Based on the United Nations human security framework and critical human security perspectives as well as acknowledging the disproportionate effect of COVID-19 on structurally or culturally marginalized groups of the population, we examine to what extent government actions improve human security among different racial groups. We conducted a quasi-experimental study with a comprehensive dataset collected in the context of the United States. By adopting the difference-in-differences model, we estimated the effect of specific government actions by comparing the health security outcomes of states that implemented actions with those of states without such actions, and we also examined the effect of these actions across different racial groups. The findings indicate the effectiveness of government actions in improving health outcomes but reveal significant gaps in these effects between different racial groups. The study findings provide insights into policy design and government intervention to translate good intentions into equitable security outcomes for different groups of the population.

Keywords: Policy; Security; Health; Pandemic; Disparity

Understanding food hygiene behaviours in food business kitchens

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Abstract: Dining out is a prevalent practice globally. Foodborne illnesses can be transmitted to consumers due to improper food hygiene and safety practices in food business operations (FBOs) such as restaurants, cafes, bars, take-away stores, and schools. However, the majority of research conducted in FBOs employed questionnaires and interviews to examine food hygiene behaviours, which have not provided a comprehensive understanding of risky behaviours in FBOs. A few observational studies have examined a limited number of specific behaviors, such as improper handwashing, glove changing, and temperature control. The aim of our study was to examine the most common risky behaviours that take place in food business kitchens in the United Kingdom and investigate the circumstances under which FBOs will exhibit a higher frequency of risky practices. A secondary data analysis was conducted using text mining and descriptive statistical analysis. The text data was transferred from video recordings of non-participatory observational experiments conducted in 31 food business kitchens located in England, Wales, and Northern Ireland between 2021 and 2023. The kitchens were observed and recorded for a duration of 5 days, of which 3 days were chosen at random for further transformation and examination. Our results suggest that licking fingers or touching one's face is the most common risky kitchen behaviour that may transmit foodborne pathogens to FBO employees and consumers, followed by improperly drying or wiping hands and washing kitchenware without a product. Food handlers demonstrated a higher frequency of risky food hygiene behaviours on weekends than weekdays, with the highest occurrence seen around 7 p.m. on Friday. In addition, the studies have revealed the specific categories, frequency, and proportion of risky conduct seen in catering kitchens, considering factors such as food, kitchen utensils, and surfaces. The results of our study have enhanced our comprehension of the nature of risky behaviours in food business kitchens and revealed poor food hygiene behaviours that were not reported in previous research. Overall, our research provides support to the UK Food Standard Agency to effectively assess and control risks related to food hygiene behaviours, as well as improve on-site supervision of FBOs, thereby decreasing the likelihood of foodborne infections.

Keywords: Food hygiene behaviours; Business kitchen

Tick-borne encephalitis (TBE) in Italy: investigating the behaviour and risk perception of citizens living in high-risk areas

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Abstract: Tick Borne Encephalitis (TBE) is the most important viral zoonosis transmitted by tick bites in Europe. It is currently considered endemic in the eastern Alpine arc. Outbreaks of TBE virus (TBEV) infection have been recorded in Europe, with associations to both tick bites and consumption of milk, especially goat's milk. In Italy, no information is available regarding the risk of TBEV transmission to humans through the consumption of raw milk or raw milk-based cheese. Starting from these assumptions, a research project funded by the Italian Ministry of Health was carried out in order to (1) gather information on the risk of TBEV transmission to humans through the consumption of raw milk; (2) collect seroprevalence data from goat farms; (3) investigate citizens' behaviour and perception regarding TBEV infections and the consumption of potentially risky food products. In line with this third aim, a survey was conducted in Italy. The questionnaire was designed based on the existing literature on the topic. Data were collected between August and September 2022 through the Computer Assisted Web Interviewing method. The questionnaire was administered to citizens living in six Italian provinces: Bolzano, Trento, Belluno, Pordenone, Udine, and Gorizia. These provinces of the eastern Alpine arc were identified as the most risky area due to the presence of ticks carrying pathogens transmissible to humans including TBEV.2,283 respondents were interviewed through the snowball sampling technique. Appropriate statistical analyzes were conducted to summarize the collected data.The 94.4% of respondents declared that they know TBE. The 48.6% stated that ticks are very present in the area in which they live, especially in the Belluno area (66.3%). Almost all respondents stated that they engage in outdoor activities, and among them, over 66% declared adopting protective behaviours against ticks. An index was built to measure respondents' risk perception regarding the severity of the tick bites and their potential health consequences. A relatively high level of risk perception was observed, with a mean score of 5.49 on a 1-7 Likert scale, especially in the province of Belluno (mean=5.70). 16.5% of respondents stated they consume raw-milk based products, especially raw cow's milk-based cheeses. Data collected through the project are essential for assessing the TBEV risk in the area of interest. The conducted survey revealed respondents' concern about tick bites, highlighting significant awareness regarding TBE. These findings will be employed to raise citizens' awareness on the issue and promote conscious behaviour.

Keywords: Tick-Borne Encephalitis; Risk perception

Assessing the tsunami hazard in Greece: A comprehensive study

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Abstract: Tsunamis are secondary natural hazards triggered mainly by submarine earthquakes, as well as coastal or undersea landslides and volcanic activity. They possess the capacity to impact diverse coastal areas due to their ability to propagate over vast distances across the open sea. Coastal areas situated along tectonic plate boundaries or major submarine fault zones are particularly prone to tsunamis. Greece's susceptibility to earthquake-triggered tsunamis is increased by its proximity to significant tectonic structures, including the Hellenic subduction zone, and an abundance of submarine crustal faults beneath the Greek seas. Although tsunamis in Greece are relatively rare compared to regions like the Pacific, documented historical events, caused by strong earthquakes, underscore the fact that tsunamis pose a significant threat. The objective of this study is to evaluate the tsunamigenic potential and assess the characteristics of the tsunamis on the coastal areas of Greece, associated with the known seismogenic sources within the surrounding seas. A comprehensive analysis of a series of distinct scenarios depicting possible earthquake-induced tsunami events was conducted, by utilizing the advanced tsunami simulation tool, Community Model Interface for Tsunami (ComMIT 1.8.3). Primary tsunamigenic sources and their parameters required in formulating the simulation models, including the focal mechanism of seismic events, epicentral location, depth, magnitude, slip, rupture length and width, were identified through an extensive literature review. The GEBCO's gridded bathymetric dataset, offering a bathymetry resolution of 450 meters, along with a high-resolution Digital Elevation Model (DEM) at 5 meters provided by the Hellenic Cadastre, were employed to integrate both the bathymetry and the coastal topography into the simulation models. Subsequently, simulation scenarios were developed to depict the complex dynamics and characteristics of tsunamis concerning the generation and propagation of the waves, as well as the coastal inundation. The applied methodology provides critical information on the tsunami wave arrival times, the dynamics of the inundation flows, and a detailed mapping of the potential inundation zone in selected study areas around Greece. The present study aims to present a diverse set of scenarios assessing the tsunami hazard in specific coastal areas along the Greek coasts, where their elements pose a high exposure to tsunami due to the country's touristic development and high population density. The insights derived from the simulation results indicate the necessity to enhance the coastal community preparedness and provide crucial information to shape policies related to tsunami disaster risk reduction.

Keywords: Tsunami hazard; Simulation; Inundation; Greece

Climate change disbelief, what do you disbelieve?

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Abstract: Recently, the term climate catastrophe has emerged, emphasizing the seriousness and urgency of climate change and demanding responses from individuals to governments. Countries, including Korea, are implementing various policies to respond to climate change, but they have not been able to come up with a complete climate solution. In the absence of effective climate solutions, climate change conspiracies and disbeliefs are spreading in the U.S., driven by disbelief in climate change. There are two main types of climate conspiracy theories: those that deny climate change or that climate science is unreliable or that climate solutions are ineffective. In the former category, those who deny climate change believe that global warming is a natural part of the ice age cycle, with increasingly extreme weather events. The latter argue that wind power, for example, will destroy forests, wildlife habitats, and plains, causing worse impacts than climate change scenarios. Despite CNN's conclusion that humans have caused the climate crisis and that it has led to widespread and drastic changes around the world, climate change conspiracy theorists and climate change deniers associate the issue with highly politicized topics. In recent years, political conspiracy theories and climate conspiracy theories have been combined to provide information to spread climate change disbelief. The purpose of this study is to explore the reasons why climate change disbelief is increasing in the face of widespread climate change alarmism. We explore various factors of climate change skepticism, including climate change itself and climate change effects. The influencing factors of climate change skepticism are categorized into scientific factors, social/political factors, and SMCRE factors. Using survey data from the Korean general population, we propose the following theoretical and practical implications. First, we can analyze the multidimensional factors of climate change disbelief and identify their relationships. Second, by identifying the factors of climate change disbelief, more effective climate change policies can be developed.

Keywords: Climate change; Disbelief; Skepticism

Motivation for Participation in Seoul's Climate Card Policy to Reduce Greenhouse Gas Emissions in S.Korea

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Abstract: The world has crises caused by climate change everywhere. The United Nations Office for Disaster Risk Reduction (UNDRR) has found that 75% of extreme weather is due to climate change caused by carbon emissions, and it predicts that by 2030, the world will face an average of 1.5 severe disasters per day. The Korean government is implementing renewable energy expansion, CCUS technology development, and industrial transformation at the national level to fulfill the Paris Climate Agreement and reduce greenhouse gas emissions. Furthermore, the Seoul Climate Companion Card is significant in that it is a personal participation in greenhouse gas reduction. Seoul's Climate Companion Card is a new policy introduced in 2024 to reduce greenhouse gas emissions. For about 50 USD per month, the card provides unlimited rides on Seoul's public transportation (subway, bus) and public bicycles. In Seoul, a city of 10 million people, a quarter of South Korea's population, the city estimates that 500,000 people will use the Climate Companion Card, which is expected to reduce greenhouse gas emissions by 32,000 tons per year. Especially considering that the transportation sector accounts for 17% of Seoul's greenhouse gas emissions, it is necessary for citizens to contribute to reducing greenhouse gas emissions through empathy and participation. This study explores the factors of participation in Seoul's Climate card, which started as a pilot project, and explores the intentions that lead to purchase. To conduct this study, we followed the following process. First, factors for policy acceptance are explored through prior research and factors applicable to the climate card are explored. Second, we conduct a survey of 1500 Korean citizens using the investigated factors. Third, we use regression analysis to explore participation factors with the intention to use the climate companion card as the dependent variable. Fourth, we explore and apply various environmental behavior theories (VBN, NAM, TPB, etc.) that can be applied to climate companion cards and compare them with other behaviors through path analysis. This is expected to help stabilize the pilot Climate Accompaniment Card policy. In particular, the promotion of policies at the individual level is the main means for individuals to make choices. It is expected that it will be possible to explore what aspects of citizens play a role in establishing public relations strategies.

Keywords: Greenhouse-gas; Climate Card Policy

How climate change emotions affect climate change action: a focus on self-efficacy

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Abstract: In July 2023, the United Nations warned that the era of global warming was over and the era of a boiling planet had begun. With more frequent extreme weather events and natural disasters becoming more severe with each passing year, people are feeling the effects of climate change. In 2022, the World Health Organization (WHO) coined the following new terms for climate change-related mental health: eco-anxiety, climate grief, solastalgia, and pre-traumatic stress disorder. Emotions surrounding climate change are spreading, especially in the United States and the United Kingdom. In particular, climate depression refers to negative psychological symptoms such as helplessness, sadness, anger, anxiety, and hopelessness due to worries about climate change and climate crisis. Negative emotional factors about climate change can lead to depression when thinking about future crises caused by climate change, and feelings of helplessness or guilt about what role we can play as individuals. Some researchers have found that the generation most likely to suffer from climate depression is the adolescent to young adult generation. The study is divided into four generations: Baby Boomers, Generation X, Millennials, and Generation Z. This study aims to explore the impact of various emotional factors such as climate change fear, depression, lethargy, and apathy on climate change action. In particular, factors from the psychometric paradigm (perceived risk, perceived benefit, experience, and knowledge) will be utilized together. We also utilize self-efficacy as a moderating variable to determine the direction of the relationship between climate change emotion and climate change action. Using survey data from the Korean general population, we propose the following theoretical and practical implications. First, we can compare the influence of climate change sentiment on climate change behavior across generations. Second, we identify the role of self-efficacy as a moderating variable for effective climate change policies.

Keywords: Climate change; Emotions; Self-efficacy

Factors influencing climate change response behavior: Focusing on emotional and rational sympathy

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Abstract: According to the Copernicus (C3S) report for 2023, 2023 was the hottest year in human history. Heat waves, heavy snowfall, and other extreme weather events are threatening the survival of humanity and natural ecosystems. Since the Paris Climate Agreement in 2015, countries around the world have proposed various climate change action strategies to reduce greenhouse gas emissions as much as possible. Korea has been promoting individual climate change action plans through various communication channels, but has not achieved significant results. In fact, the extent of individual-level efforts is still unclear. Climate change is not a problem that can be solved in the short term through individual efforts. In other words, climate change is a long-term problem that requires a collective response. Although individual efforts are important, it is necessary to examine the factors that can cause individuals to express responsive behavior. In this study, we focus on the keyword sympathy. Humans are aware of a problem and decide their behavior by seeing how others react to it. The purpose of this study is to explore the factors that influence climate change response behavior by focusing on sympathy. In particular, we distinguish between emotional and rational sympathy. The research model is based on the risk perception paradigm and the Theory of Planned Behavior, and the variables of emotional and rational sympathy are used. Furthermore, we examine the role of emotional and rational sympathy as moderating variables in actual climate change response. Using survey data from the Korean general population, we propose the following theoretical and practical implications. First, we examine the role of emotional and rational sympathy as moderators of climate change response behavior. Second, we propose a strategy for climate change response behavior based on emotional and rational sympathy.

Keywords: Emotional sympathy; Rational sympathy

How are Solar Energy Facilities Perceived by Residents?: Focusing on Local Acceptance of Solar Energy Facilities and Exploring Factors

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Abstract: The dangers of global warming and climate change are universally recognized. To get out of the crisis, we are aiming to reduce greenhouse gas emissions, and the energy transition from fossil fuels to renewable energy is crucial. In addition, the most important key to energy transition is the spread of solar power generation facilities. However, there are several differences between solar energy generation facilities and conventional energy generation facilities. First, while conventional power generation facilities are large-scale centralized supply facilities, solar power generation facilities are usually installed in small-scale local areas or living facilities. Second, the expansion of solar power facilities is done by individuals rather than by the state. Third, there is a difference in local dependence, and while thermal power plants are collectively supported and opposed, solar energy can be an individual conflict. For a successful solar expansion program to be implemented, it is important to increase the number of local solar facilities. In the literature, local perceptions of solar power facilities are divided into positive and negative. In particular, there are positive aspects such as local economy and job creation in terms of benefits. However, on the negative side, there are changes in the industrial structure due to changes in the existing land, opposition and conflict between neighbors, damage to the local landscape, and risks due to destruction of solar power facilities. The purpose of this study is to explore how solar energy is perceived in the region and to identify the influencing factors on positive and negative perceptions. To accomplish the following research objectives, the following research procedures are conducted. First, a survey of 1500 Korean citizens is conducted by applying the perception of local solar energy and the factors of acceptability perception found in the literature. Second, we conduct a regression analysis of influential factors with local solar perception as the dependent variable. In particular, we explore regional factors by identifying and applying regional variables other than risks, benefits, and knowledge traditionally used in acceptance studies. By exploring the differences in the regional factors that are important for the expansion of solar power facilities and their influence, this study will identify implications for solar expansion policies. The differences between the value of environmental protection and local factors (landscape, experience, identity) can help the government to recommend which projects to focus on for expansion.

Keywords: Local acceptance; Solar energy facilities

Acceptance of climate change policies (eco-friendly vehicle subsidy policies) according to urban and rural residential areas

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Abstract: Sustainable development and climate change response have become critical challenges in contemporary society. Specifically, owing to the environmental disparities between urban and rural residential areas, the acceptance of climate change policies is anticipated to differ. This study investigates variations in the acceptance of climate change policies, specifically the environmental vehicle subsidy policy, between urban and rural residential areas. It analyzes the impact of environmental distinctions between urban and rural areas on the acceptance of climate change policies. The primary variables chosen are charging infrastructure and awareness of environmentally friendly vehicles. The study examines the charging infrastructure and awareness levels of environmentally friendly vehicles in urban and rural areas, as these are expected to be pivotal factors for the effective implementation of environmental vehicle subsidy policies. Regression analysis and moderation analysis were selected as the analytical methods. The dependent variable is the acceptance of climate change (environmental vehicle subsidy), and independent variables include charging infrastructure, awareness of environmentally friendly vehicles, government perception, and economic factors. Through this analysis, we explore which variables significantly influence the acceptance of climate change policies and conduct moderation analysis to determine whether there are interaction effects based on residential areas (urban and rural). This allows us to understand how the relationship between different variables changes depending on the disparities between urban and rural areas. This analysis aims to investigate the acceptance of climate change policies in urban and rural areas, facilitating the development of flexible policies tailored to regional characteristics, and seeking effective solutions to environmental issues. Therefore, researching the acceptance of climate change policies in urban and rural areas is crucial for policy formulation and implementation. It aids in understanding the characteristics and demands of urban and rural areas, enabling the development of flexible policies that consider region-specific acceptance. Furthermore, comprehending the differences between urban and rural areas allows for the development of more effective environmental vehicle subsidy policies and the exploration of solutions to environmental issues.

Keywords: Urban, Rural Climate Policy Acceptance

Effect of treated water discharge on nuclear power acceptability: Focusing on the moderating effect of political bias (Anchor effect)

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Abstract: Recently, Japan's release of The Alps-Treated Water at the Fukushima has become a big issue around the world. In particular, Korea, a country adjacent to Japan, is reacting more sensitively to such discharges. There are conflicting opinions for and against whether The Alps-Treated Water at The Fukushima is safe, and the conflict of opinions among the public is intensifying. In addition, there are many cases raising questions about the Korean government's position, raising the need for discussion on this issue. The conflict of opinion continues with the discussion on radioactive waste that Korea currently faces, and furthermore, opinions on nuclear power plants are also being discussed. In Korea, unlike advanced countries in waste management such as Germany, the national policy on nuclear power generation has changed depending on the government. These differences ultimately lead to hindering the development of the country's ability to respond to nuclear energy-related problems compared to other developed countries. The operation of nuclear power plants naturally generates waste, and research and discussions related to nuclear power, including this, must continue regardless of government to effectively respond to the problem. If so, the question arises as to where the difference in the government's position on nuclear energy originates depending on the regime. In other words, the regime announces its position to gain public support, and it can be predicted that this confrontation between the ruling and opposition parties will have a significant political effect. Therefore, in this study, we will analyze the impact of the discharge of Fukushima treated water, a recent issue, on the acceptability of nuclear power plants, and how the political bias of the general public affects this relationship.

Keywords: Nuclear power plants; Radioactive waste; Political bias; Acceptability of nuclear power

The role of knowledge in the acceptance of high-level radioactive waste disposal sites: focusing on types of knowledge

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Abstract: In Korea, there is currently no legal basis for high-level radioactive waste generated from nuclear power generation. So it is being temporarily stored at the nuclear power plant headquarters. However, saturation of temporary storage facilities is predicted starting in 2031. Recently, in relation to this, there is a growing demand for the establishment of a legal basis for the disposal of high-level radioactive waste through the enactment of a special law on high-level radioactive waste. However, Korea's stance on nuclear power generation and related matters tends to vary depending on the government's policy stance. In other words, urgent issues such as nuclear power generation and radioactive waste are being used as political means. Recently, a special law on high-level radioactive waste, including radioactive waste disposal facilities, has been proposed and is being discussed in the National Assembly, but a smooth agreement has not been reached. Nuclear power generation and radioactive waste must be managed and disposed of very safely. To achieve this, management policies and government policies that are thoroughly based on scientific facts are needed. However, in Korea, the ruling party and the opposition party are currently unable to reach an agreement, each asserting their own logic. In addition, inaccurate information and fake news produced in political battles cause confusion in public decision-making. Countries that are so-called advanced countries in terms of radioactive waste disposal are making efforts to convey accurate knowledge about nuclear power generation and radioactive waste to their citizens. In this process, citizens overcome vague fears or rumors about nuclear energy and create a background for rational decision-making. In this study, we aim to analyze site selection for radioactive waste disposal plants, which is currently an issue in Korea. The analysis includes variables such as benefits, risks, trust, and emotions that affect public acceptance. We also want to control situations in which people may be exposed to inaccurate information or fake news, and verify the effectiveness of knowledge. Through this, we aim to derive the importance of accurate knowledge transfer.

Keywords: Knowledge; Radioactive waste site; Receptivity

Effect of information type on acceptance of nuclear power generation: Focusing on differences in effect by type of information

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Abstract: As we face huge risks such as global warming and abnormal climates, interest in responding to climate change and carbon neutrality has rapidly increased worldwide. There is a movement in many countries to reduce fossil fuel use. However, there are many opinions that it is impossible to reduce fossil fuels in an instant and that alternatives are needed. New energy and renewable energy are mentioned as alternatives. Some countries are leading the way in new and renewable energy, responding to climate change and achieving carbon neutrality. However, there are countries that cannot introduce new power generation sources due to their circumstances. Meanwhile, because the demand for electricity is increasing significantly every year, there are cases where new and renewable energy cannot meet the demand for electricity. There are some opinions that nuclear power generation may be the only alternative in this situation. Nuclear power generation generates very little waste compared to fossil fuels, but the risk is very high. Additionally, the special nature of radioactive waste is also one of the major issues in nuclear power generation. The EU classified nuclear power as an eco-friendly energy source. To be more specific, it is 'conditional eco-friendly energy'. In order for nuclear power to be classified as eco-friendly energy, it is a condition that a plan, budget, and site for safe disposal of radioactive waste must be prepared. In the case of Korea, the previous administration attempted a nuclear phase-out policy, but the current administration is adopting a pro-nuclear power policy stance. However, Korea has not yet prepared a disposal plan or site for spent nuclear fuel and radioactive waste. Efforts are being made to resolve this, such as proposing a special law, but the results are not yet known. The special law contains provisions such as site selection and compensation for the host area. However, the Korean people still have doubts and fears about the safety of nuclear power generation and radioactive waste. Therefore, in this study, we classify samples into two types and present information on safety and benefit, respectively, to compare the acceptance of nuclear power generation according to the type of information and to derive strategies to improve acceptance. In addition, based on this, we would like to present policy suggestions so that Korea's nuclear power generation can be classified as eco-friendly energy.

Keywords: Information; Safety; Benefit; Nuclear power; Acceptability

Public perceptions of bioplastic: insights from a sentiment analysis on Reddit

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[1]Lusófona University

Abstract: Bioplastics have been presented as an alternative technology to products derived from fossil sources. In response, the industry has come up with innovative products based on this type of material in several business areas (e.g., food, packaging, biomedical, and construction). Although there is a growing supply and improvement of bioplastic products, it can be a challenge for businesses to change and even a risk to integrate these products on their business models. This is because such products need to be adapted and introduced in market considering the needs, preferences, and expectations of consumers. The rejection of these products by consumers can endanger the path towards sustainability. Through an analysis of public perceptions, this work seeks to understand how products made from bioplastics may be perceived by the public. For that, a sample of 4,235 user-generated comments were collected from the Reddit platform, an online network of communities that promote open public debate between users. Data extraction was done using keywords related to bioplastics (e.g., sustainable plastic, renewable plastic). Comments were collected and analyzed using RStudio software. More specifically, a Sentiment Analysis was conducted using the RSentiment package. Using this computer-assisted analysis, comments were categorized as neutral, very positive, positive, negative, very negative or even as sarcasm depending on sentence construction. The preliminary results of this study suggest that public perceptions of bioplastics, from users of this online community, is mainly positive. However, we also identified negative evaluations, suggesting the existence of risk perceptions associated with bioplastics (e.g., associations with allergic reactions and cross-contamination). Moreover, we also identified perceptions of greenwashing, which may present a risk to companies trying to introduce their bioplastic products in the market. This study highlights the importance of a thorough understanding about public perceptions of bioplastic products. It sheds light into the impacts that such perceptions may have on business models and strategies, on the success of bioplastics, and ultimately in the transition to an environmentally friendly economy. In addition to clarifying consumer needs and concerns about bioplastic products in the market, the analysis of consumer perceptions also offers insights in how to increase the effectiveness of marketing and communication campaigns. Based on the comments analyzed, some recommendations were made in order to increase the effectiveness of campaigns aiming these products.

Keywords: Bioplastics; Public perception; Sentiment analysis

Micro-mobility risks for vulnerable road users

Good D.[1]

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Abstract: In recent years, there has been a proliferation of different forms of micro-mobility brought about by electrification and the use of sharing technologies. This micro-mobility includes e-scooters, bikes, e-bikes as well as less common forms such as carts, unicycles, and skateboards. Each form offers the potential to enhance access to opportunities for employment, education, wholesome food, and even possibly health care for disadvantaged people. While much has been done to improve the safety of vehicle occupants, relatively little has been accomplished for this group of vulnerable road users. At the same time, these methods of travel make people more vulnerable to crash risks. This research looks at the limitations and difficulties of gathering information on crashes associated with these modes as well as an examination of the data that is available. Among these is a systematic tendency to not count crashes that are not in traffic surveillance, NITS crashes, and do not involve autos. This systematically excludes crashes that are single micro-mobility devices only or devices that also involve pedestrians and suggests broadening the mandate of some Federal agencies. As micro-mobility devices become more prevalent, particularly in a post-COVID environment, assessing risks and having the tools to assess these types of risks becomes increasingly important. Using available exposure data from household surveys, and systematic crash data from U. S. reports, a risk matrix of micro-mobility device and person type and by environment type is developed. Person types include demographics, while environment type includes location, weather, and crash geometry. Together these suggest that different types of policies and education programs, targeted at different micro-mobility device types and user groups have the potential to be more effective. In the federal system in the US, most issues associated with traffic safety are determined at the state level. Policies have been slow to adapt to this rapidly emerging technology. This suggests several policy changes promoted through organizations like the Governors Highway Safety Association. In addition, some changes to federal policy such as expanding the scope of the National Highway and Traffic Safety Administration are suggested.

Keywords: Vulnerable road users; Micromobility

Socio-economic Adaptation to Ongoing Taranaki Volcanism

Wala M.[1]

[1]The University of Auckland

Abstract: With 12 active volcanoes, New Zealand has a persistently high level of volcanic hazard. Recent studies show that Mt. Taranaki is the most likely volcano to generate long-term, national-scale consequences for New Zealand in the near future (33% to 42% chance of at least one eruption in the next 50). Historical data indicates that once Taranaki volcano reawakens its activity will last for decades or even centuries causing significant disruptions to both regional and national well-being. Besides the immediate direct hazards, volcanic eruptions frequently trigger indirect impacts stemming from complex and intertwined natural, human, and physical networks and their dynamics. In modern times, New Zealand has not experienced an eruption that would resemble the Taranaki case, and therefore, contingency plans for such an eventuality had not been developed. Till now, New Zealand's response to hazard mitigation and risk management has been relying on the 4Rs approach (i.e., reduction, readiness, response, and recovery) that has been built on an assumption that the hazard is static, linear, regular and that individual events are finite in length. By contrast, an anticipated Taranaki volcanic event is predicted to be complex, its impacts will also be complex, nonlinear, and dynamic. Therefore, the implications of the Taranaki volcanic event, along with its large and unknown uncertainty, call for a significant reconsideration of the 4Rs approach and systemic planning. Recognizing the limitations of linear approaches, this ongoing study adopts a participatory System Dynamics methodology. Through mediated modeling workshops, stakeholders representing various sectors and industries collaboratively construct a model of the Taranaki socio-economic system based on their sector-specific viewpoints. The research embraces a systemic risk perspective, recognizing the interconnectedness, interdependence, and interrelatedness of various factors that contribute to the overall risk landscape. By employing systems science principles and holistic thinking, the study aims to uncover drivers of systemic risks arising from the interaction of multiple sectors and industries, rather than focusing solely on the volcanic hazard. Furthermore, the study seeks to understand how various sectors and stakeholders affected by the disruption may navigate the long-term recovery phase under ongoing exposure to volcanic activity. Ultimately, the study aims to simulate the potential outcomes of different policy interventions before implementation and serve as a decision-aiding tool, enabling more informed decisions and avoiding unintended consequences. By developing a holistic approach that considers systemic risk and compound risk, the research aims to enhance regional resilience in the face of potential volcanic disruptions.

Keywords: Systemic risk; Systems thinking; Network

Multi-Risk Instruments for Emergency Response

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Abstract: Natural-hazard-related disasters are on the rise and have a significant impact on both the public and private sector. This trend is also evident in the European Union and different mechanisms and instruments exist on the Pan-European level to deal with such events. One of such instruments is the so-called European Union Solidarity Fund (EUSF) which provides funding to governments after natural disaster events. Recently, the EUSF has expanded its scope to include public health emergencies and was merged with the Emergency Aid Reserve into the so-called Solidarity and Emergency Aid Reserve (SEAR). It therefore became a multi-hazard as well as multi-risk instrument to assist countries during the emergency phase of events. As different types of hazards as well as risks are drawing from the same fund there is the question how they affect the fund and what capitalization levels have to be assumed to make the fund sustainable or in other words how to sustainably fund assistance to affected countries. As a consequence, it is important to understand which hazards the fund is most exposed to and whether there are regional differences within Europe. To address these questions, we take a risk-based approach and estimate capitalization levels needed for major hazards as well as risks, including regional differences on the Pan-European level. In doing so, we discuss and suggest possible ways forward in meeting identified challenges especially in regard to risk reduction and public-private partnerships considerations that could enhance current and future resilient levels of both the fund itself as well as the countries it supports.

Keywords: Multi-Hazards; Multi-Risks Instrument

How does the reason for migration and the origin influence the willingness to accept immigrants?

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Abstract: The project addresses the intriguing and timely issue of People's Willingness to Accept immigrants (WTA). It aims to investigate the effect of immigrants' reasons for migration and origin on their acceptance. Further, the project delves into the psychological processes involved in WTA, considering immigrants' perceived threat and the moral imperative to acceptance. Several studies highlight how immigrants are often seen as threats to jobs, and cultural and religious identity (Lahav & Courtemanche 2012) leading to intolerance and rejection of immigrants (Martinez et al 2022). Consistently, the prominence effect (Tversky et al 1988) suggests that decision-makers often choose more defensible options when faced with quantitative assessments. Hence, if the importance of being able to justify and defend one's values underlies the prominence effect, a low perception that welcoming is a moral imperative and a negative attitude towards immigrants may be the easiest response to the perceived sense of threat associated with them. We run online studies using Italian samples. Participants, in two studies, were randomly presented with a scenario describing why immigrants were fleeing (Study 1: war, climate change, unspecified-control), and immigrants origin (Study 2: Ukraine, Afghanistan, North Africa-control). Participants were asked to report WTA, perceived threat, and moral imperative of welcoming immigrants (all on a 1-7 scale). Study 1 (N=442; 72.4 percent women; Mage=24.2) showed that migrants fleeing war were accepted more than those fleeing climate change (B=-.12, p<.001) and that WTA is predicted by moral rightness (B= .66, p<.001) and perceived threat (B= -.22, p<.001). Investigating the process, results indicated that moral imperative fully mediated the effect of condition on the WTA, whereas perceived threat only predicted this effect. Study 2 (N=1387; 57% female; Mage=30.3) showed that participants were more likely to welcome Ukrainian immigrants instead of Afghani or North Africans (ps<.001), and perceived threat (B=-.28, p<.001) and moral rightness (B=.61, p<.001) predicted WTA. Further, a double mediation showed that WTA is mediated by both the perceived threat and the moral imperative. This paper enhances the literature by exploring the impact of cause and origin on WTA and elucidating the underlying process. Knowing the role of perceived threat and moral imperative on attitudes toward immigrants can significantly impact daily communication. Shifting to less aggressive and threatening communication about immigrants could improve WTA toward them.

Keywords: Immigrants; Perceived threat; Moral imperative

Debris flows in Gizhgit valley (Caucasus): reassessment of hazard to a tailings site half a century later

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[3]Lomonosov MSU

Abstract: The Tyrnyauz Mining Plant (Caucasus, Elbrus Mountain neighborhood) created a large tailing dump at the mouth of the Gizhgit River in the 1960s. At that time, the river was considered non hazardous. In 2000, the plant went bankrupt, leaving the waist reservoir of a million m3 and the underground river-passing infrastructure unattended. Due to ongoing climate change and human-driven changes in the local ecosystem, the river became prone to debris flow, which had already occurred ten years ago. So far, no studies have been conducted on the level of natural hazards and technical state of the dump and river-passing infrastructure because they do not legally belong to anyone.Our study focuses on the debris flow hazard in the Gizhgit valley, including the mechanisms and the potential for downstream infrastructure damage. We found several facts that can confuse previous and modern decision-making. The valley's upper and middle sections experienced vibrant debris flow activity in the 20th century, but it has been decreasing in recent decades. Along with that, even the intensive debris flows from those areas are captured on place by the sediment traps formed by river bed topography; thus, the sediment can move downstream only with the ordinary mechanisms of entrained and suspended transport. However, the modern precipitation volume and intensity increased, and the flash floods are able to transport more sediment than previously. Additionally, the forest developed at the banks of the middle and downstream sections provides additional material, especially effective for formation of small dams. But despite all of the above, the key source of debris flow hazard is the small, shallow landslides just a few hundred meters above the river-passing infrastructure. Those are local talwegs with top soil moistened by ground water and hanging on a very steep slope just above the river bed, which looks like a canyon at this place. When waterlogged by rain, soil is able to slip down and to dam the river. The debris flow or flash flood coming after the dam collapse will immediately affect the river-passing infrastructure.With our presentation, we would like to highlight two points. First, the long-life infrastructure needs the reassessment of natural hazard conditions due to the natural and human-related evolution of the local environment. Second, ownerless sites can be more dangerous than they are historically considered due to a lack of risk reassessment.

Keywords: Debrisflow; Hazard; Evolution; Infrastructure

Systemic vulnerability modeling under an Impact Chain approach. Examining earthquakes, floods, and the COVID-19 pandemic

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Abstract: In this study, we aim to explore the effects of Risk Perception on Disaster Preparedness Behavior toward earthquakes based on a survey of 393 inhabitants of Bucharest, Romania (Ng, 2022, adapted). Our research is routed in the Theory of Planned Behavior (TPB, Ajzen 1991, 2002) because behavior is still poorly understood in disaster preparedness. Three kinds of considerations guide behavior: 1) behavioral beliefs (about the consequences of one's behavior), 2) normative beliefs (about the normative expectations of others – that is, the perceived social pressure), and control beliefs (about the presence of factors that may facilitate or not the behavior beliefs). Control beliefs give rise to perceived behavioral control or self-efficacy.Our intention was to document that risk perception and intention of preparedness are predictors of disaster preparedness behavior. From the literature, we know that humans adopt preparedness measures and behaviors only when they perceive that a disaster threatens them.Data were analyzed using the structural equation modeling (Kenny, 2014, 2020; Byrne, 2012; Suhr, 2006). Results revealed that risk perception is also a significant predictor of the three constructs of the theory of planned behavior (it is correlated with subjective norm, attitude, and perceived behavior control). Risk perception and subjective norms are shaped by society, building a strong link to intention and disaster preparedness behavior.

Keywords: Risk Perception; Disaster Preparedness Behavior

Crisis management presentation in media: floods case study

Pappa M.[1]

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Abstract: The duration of a crisis could be divided into five stages: (a) the creation of the crisis, where the first signs of the onset of the crisis begin to become visible to those in the know (b) the outbreak of the crisis, where the crisis becomes apparent to most, as well as its first results (c) the climax, where usually a lot of time is spent by the media (d) the regression of the crisis, where both its results and the interest of the publicWe will examine a case study of flood handling through the representation in media starting on the onset of the crisis to the regression stages and the regression of the crisis, as well as the conclusions concerning handling in the future.

Keywords: Crisis management; Floods; Media

Examining the relationships between urban resilience and disaster resilience: Evidence from Athens

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Abstract: Resilience is considered important for the development and well-being of society, especially in the current era of rapid urbanization and climate crisis. The term is approached and defined differently in different scientific fields and schools of thought as well as in various contexts and policies in which it is employed. This leads to a confusion causing theoretical and operational difficulties but also enables a flexibility allowing the concept to function as an umbrella-term for various scientific areas and policy fields. This research examines the terms "Urban Resilience" and "Disaster Resilience" and attempts to understand their interrelationship. This is particularly relevant presently when the combination of climate change on the one hand and rapid urbanization and urban pressures on the other already have caused significant negative impacts on urban environments and populations, particularly in big cities. At the center of this research is the city of Athens that was the first Greek city to participate in the "100 Resilient Cities" Rockefeller foundation initiative. We analysed the use and application of resilience in the policies and planning in the context of adaptation to climate change. We examined resilience policies as they unfold throughout the entire cycle from policy formulation to implementation and back again. A special focus was given to the assessment methods and the measurement of resilience as a basis for evaluating the success of resilience policies implementation. Within identified relevant policies, "Athens 2030 Resilience Strategy" is central, therefore it was examined thoroughly in terms of methodology used for its preparation, new tools introduced in local development planning and also in respect to its implementation and evaluation. Results indicate that Athens's participation in the international initiative “100 Resilient Cities” introduced and established resilience in the public debate and paved the way for the city to move further towards getting prepared for climate change challenges. “Resilience” was used both as a conceptual and as a practical tool. Initially, the notion was employed to indicate solutions to challenges the city was facing at that time, especially impacts of the socioeconomic crisis, and also future challenges, such as climate change. Through policy implementation regarding both urban development and disaster risk management, “resilience” was transformed from an inherent property of a system to a technique of reorganization of the physical environment and the social space.

Keywords: Resilience; Disaster; Policy; Urbanization; Athens

Methodological Solutions for Interactive Socio-Spatial Vulnerability "Dashboards" in Risk Assessment

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Abstract: Vulnerability is defined as physical, social, economic or political factors that increase the sensitivity of the social system/individuals to the effects of hazards/risks (UNDRR/ Prevention Web, 2017), while spatial vulnerability analysis identifies spatially vulnerable zones (i.e. in the social, physical sense) that require responsible institutional attention. We present the project where we aim to produce a socio-spatial vulnerability map of Lithuania (mainly by integrating spatial data on 2021 population census with risk data). Based on these maps, we are creating interactive "dashboards" with the socio-spatial vulnerability indicators that could be used by crisis management professionals in local and national institutions. This presentation will discuss methodological challenges creating open access interactive dashboards and will provide examples of the data based on (1) spatial data on risk exposure in dimensions of environmental, social, economic, technological and geopolitical risks and (2) population census data, including socio-economic indicators. These dashboards will inform about the areas of high risks and high level of vulnerabilities and will allow risk managers to identify needed actions to increase resilience. We will provide the inventory of indicators/ dimensions used in available solutions for socio-spatial vulnerably analysis. Also, this presentation will focus on spatial resilience, which refers to the ability of a spatially defined system to recover lost functions after an unforeseen shock/crisis (Brunett and Caldarice, 2020). The concept of spatial resilience foresees the active role of societies/ communities and involves targeted actions (as conceptualised by Steinberg and Steinberg (2021). Our proposed methodological solutions to socio-spatial vulnerability analysis will also integrate the dimensions for spatial resiliency analysis. This presentation is based on the project "Socio-spatial determinants of societal vulnerability and resilience to crises and strengthening the crisis response potential of communities" (SERENITY), funded by the Research Council of Lithuania, no. S-VIS-23-21.

Keywords: Socio-spatial; Vulnerability; Interactive

The importance of using risk-based methods as tools for the prevention and remediation of environmental damage

Ntzeremes P.[1], Rentizelas A.[1]

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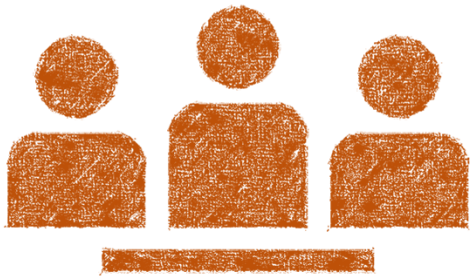
Abstract: As anthropogenic activities threaten biodiversity and more and more species are being threatened with extinction, significant efforts are being made by countries and organizations to adopt and implement effective policies to halt this trend. A landmark was the introduction by the European Commission and the Council of the Directive 2004/35/CE. The Directive issued for the first time in the European area the so-called polluter's pay principle. The notion of this principle is that each operator whose activity is responsible for causing environmental damage or is on the imminent threat of causing such damage is responsible to take all the necessary measures to prevent and protect the environment, and biodiversity in particular, otherwise the operator will be liable in remedying the damage his activity can cause. However, alongside regulations, an important issue in dealing with potential environmental damage is the development of effective methods that will provide practitioners as well as policy makers with sufficient risk estimates in order to prevent/mitigate potential damage, enhancing thus biodiversity protection. This presentation seeks to highlight the role of risk-based methods as the tool of applied scientific knowledge through which environmental risks can be described, estimated, evaluated and managed, within the context of the current level of knowledge and existing uncertainties. The point to be emphasized is that the use of such methods can drastically enhances the decision-making process by those concerned about environmental risks, while it can feature existing weaknesses and gaps.

Keywords: Environmental Risk Analysis; Policy-making

PANEL DISCUSSIONS



Considering risks in (spatial) development policies: Focus on the Mediterranean region

Panel Moderator: **Yorgos Melissourgos**, WWF - Greece

- **Miranda Dandoulaki**, Dr., Disaster Management Specialist, Greece
- **Adriana Galderisi**, Professor, University of Campania, Italy
- **Cassidy Johnson**, Professor, University College London, UK
- **Patrick Pigeon**, Professor, Université Savoie Mont Blanc, France
- **Louis Wassenhoven**, Professor Emeritus, National Technical University of Athens, Greece
- **Costis Hadjimichalis,** Professor Emeritus, Harokopio University of Athens, Greece

Key-Queries:

- What spatial development processes produce hazards/ risks especially in the Mediterranean region?
- One of the policy priorities of the Sendai Framework is "Understanding Risk". If a problem of misunderstanding or underplaying risk among public and private stakeholders is acknowledged, what may be suggested for dealing with this gap?

[PHOTO]

Risk priorities at personal, community, institutional level

Panel Moderator: **Maria Kousis,** Professor, University of Crete, Greece

- **Wändi Bruine de Bruin**, Provost Professor of Public Policy, Psychology, and Behavioral Science at the University of Southern California (USC), USA
- **Silvia Luis**, Professor, Lusófona University, Portugal
- **Roland Nussbaum**, Executive Board Member, Association Française pour la Prévention des Catastrophes Naturelles et Technologiques (AFPCNT), Paris, France
- **Apostolos Veizis**, Dr., Executive Director at INTERSOS HELLAS - Humanitarian Organization, Greece
- **Jeroen Warner**, Associate Professor at Wageningen University and Research Centre (WUR), Netherlands

Key-Queries:

- What level should Risk Mitigation be responsible for, when the risk manifests locally, but originates from distant agents and higher scales/levels?
- How can the priorities of citizens and institutions be changed when it comes to objectives related to development versus safety?
- How can risk research feed life-long learning for the benefit of individuals and communities at risk?

[PHOTO]

Adaptation to CC: What can be the role of technology, spatial planning and risk communication?

Panel Moderator: **Miltiadis Athanasiou**, Associate Researcher, Institute of Mediterranean Forest Ecosystems, Greece

- **David Caballero**, Dr., Head of Forest Fire Department, MeteoGrid, Spain
- **Pavlos Delladetsimas**, Professor Emeritus, Harokopio University of Athens, Greece
- **Stefan Greiving**, Professor, University of Dortmund, Germany
- **Sevastianos Moirasgentis**, Dr., Research Director, Institute for Environmental Research and Sustainable Development, National Observatory of Athens, Greece

Key-Queries:

- What should be the principal targets/objectives of CC adaptation policies? Do you anticipate more emphasis on CC adaptation in the future?
- Despite declared commitment and political rhetoric, implementation of CC mitigation and adaptation is lagging behind. What are the preconditions for acceptance by the local communities?
- Technological solutions and emergency management for Climate adaptation are currently preferred in the field of politics over spatial planning solutions which necessitate long periods and giving up land revenue expectations. How to change this mentality?

[PHOTO]

Risks of the past, present and future

Panel Moderator: **Kalliopi Sapountzaki**, Professor, Harokopio University of Athens, Greece

- **Terje Aven**, Professor, University of Stavanger, Norway
- **Virginia García Acosta**, Professor-Researcher at CIESAS (Center for Research and Higher Studies in Social Anthropology), Mexico
- **Allan Lavell**, Professor and Researcher at UCL, Middlesex University, the Metropolitan Autonomous University of Mexico and UNAM, the Central American Higher University Council and the University of Costa Rica, Costa Rica
- **Dimitris Kaliampakos**, Professor, National Technical University of Athens, Greece
- **Ragnar Löfstedt**, Professor, Kings College, London, UK

Key-Queries:

- What types of Hazards/Risks will be of principal concern for the human societies in the future and what Risk Science paradigms will be mostly helpful in meeting the challenges?
- Will Risk Governance be taken up widely as an effective model for Preventive Risk Politics or Crisis Management will continue to predominate as the basic response to (Disaster) Risk? Is Global Risk Governance a feasible perspective?
- Why are Risk Politics in Europe hazard-centred rather than vulnerability- and risk-centred? Has the Sendai Framework guideline "Understanding Risk" been applied in the case of the Europen and other Regional and national level institutions for risk policy-making?

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AWARDS AND AWARDEES

[PHOTO]

[Back of back cover: Family Photo]