2026 IRDR Young Scientists Lumos (6th)

UTC13:00-14:30, 27 November 2026, Online

Unfolding Vulnerability

Agenda

Registration: https://zoom.us/webinar/register/WN_CU0-Y4qLRVSxwlAJRsxTNQ

1. Rationale

In order to enhance the connection and promote the innovations and actions of young scientists, IRDR IPO designs a mechanism of "IRDR Young Scientists Lumos[1]", which will be webinars, sessions, meetings, or discussions mainly organised and participated in by young scientists and young professionals in the global disaster risk reduction (DRR) community.

Vulnerability is a fundamental component of disaster risk, yet its conceptualisation and assessment vary across disciplines, sectors and geographical contexts. Different schools of thought have examined vulnerability from perspectives including socio-economic conditions, inequalities, livelihoods and capabilities, as well as exposure, physical processes and the characteristics of affected populations and systems. With the growing complexity of disaster risks, there is a need to revisit these conceptual foundations, examine how different dimensions interact across scales, and address persistent challenges in vulnerability assessment and measurement. Therefore, IRDR and ISC launched a joint initiative, "Unfolding Vulnerability", at the side event of the ISC Mid-Term Meeting in October of 2026. The Initiative aims to advance scientific understanding of how, why and under what conditions vulnerability develops, interacts with hazards, and shapes disaster risk and its impacts.

This Lumos will bring together leading experts and young scientists from different regions to explore the foundations of vulnerability and share practical research evidence, approaches and case studies. Through cross-regional and interdisciplinary dialogue, the

[1] Lumos: a wand-light charm in Harry Potter series. This charm is used to create light and reveal hidden things. Lumos here means that the young scientists create innovations and generate the impacts to the world.

session aims to identify common challenges, methodological gaps and opportunities for advancing multi-scale vulnerability research, contributing to the ongoing IRDR - ISC joint initiative.

Aligned with the IRDR Young Scientists Programme's mission to amplify youth-led contributions to DRR, this session will:

- Examine vulnerability across different contexts and scales.
- Identify methodological challenges and research gaps.

It is expected that, through the discussion, the innovation cases from young professionals will be visualised and acknowledged by the global DRR community.

2. Agenda

Moderator: Fang Lian, IRDR

Item 1: Opening (2 minutes)

- Saini Yang, IRDR

Item 2: Keynote (8 minutes)

- *Unfolding Vulnerability*, Naxhelli Ruiz, National Autonomous University of Mexico, Mexico

Item 3: Regional perspectives (8 minutes each)

- *Mapping demographic proxy-based social vulnerability for small island coastal communities in a multi-hazard setting: Reference from Indonesia*, Martiwi Diah Setiawati, National Research and Innovation Agency of Indonesia, Indonesia
- *Beyond Exposure: Structural Vulnerability, Trust and Household Preparedness in a Landslide-Prone Rural Community in China*, Homa Bahmani, Chengdu University of Technology, China
- *Beyond Hydro-Climatic Exposure: Socio-Economic and Neighborhood Drivers of Micro-Scale Flood Vulnerability in Ravi Town, Lahore, Pakistan*, Shakeel Mahmood, University Lahore, Pakistan
- *Climate Vulnerability in Older Adults: A Multidimensional and Multilevel Conceptual Framework for Disaster Risk Reduction*, Fatemeh Rezaei, Isfahan University of Medical Sciences, Iran

Item 4: Reflections and commentary (20 minutes)

- Khamarrul Azahari Razak, Universiti Teknologi Malaysia, Malaysia
- Nuraini Rahma Hanifa, National Research and Innovation Agency (BRIN), Indonesia
- Ronald Roopnarine, University of the West Indies, Trinidad and Tobago
- Yu Lei, China-Pakistan Joint Research Center on Earth Sciences

Item 5: Q&A and discussions (25 minutes)

Item 6: Closing (3 minutes)

3. Bios and Abstracts



Martiwi Diah Setiawati

Researcher
National Research and Innovation Agency of Indonesia - BRIN)

Title: **Mapping demographic proxy-based social vulnerability for small island coastal communities in a multi-hazard setting: Reference from Indonesia.**

Abstract:
Indonesia, with the world's third-longest coastline and over 17,000 islands, faces significant risks from multiple hazards, including sea-level rise, floods, drought, wildfires, storms, and land subsidence. Social vulnerability in coastal communities, influenced by socioeconomic factors such as age, wealth, health, gender, and ethnicity, is critical to understanding their capacity to manage and recover from these hazards. This research maps social vulnerability using demographic proxy-based assessment within a grid system, focusing on Bintan and the Seribu Islands as pilot sites. Utilising Principal Component Analysis (PCA), five key socioeconomic indicators, including population density, share of children, share of women, share of elderly and poverty rate, were identified to develop a Social Vulnerability Index (SoVI). The results indicate that the Seribu Islands are more socially vulnerable than Bintan, with significant differences in vulnerability patterns across urban and rural areas. Age and gender have a greater impact in urban areas of Bintan, whereas economic factors have a greater influence in rural areas. In the Seribu Islands, economic factors and high population density contribute significantly to vulnerability. This study highlights the importance of detailed spatial planning and targeted interventions to strengthen community resilience. The grid-based approach provides a more robust assessment, helping policymakers prioritise areas for disaster mitigation and support.

Bio:
Dr. Eng. Martiwi Diah Setiawati is a Research Scientist at the Research Center for Oceanology, National Research and Innovation Agency (BRIN), Indonesia. She earned her doctoral degree (Dr.Eng.) from Yamaguchi University, Japan. Prior to joining BRIN, she worked as a Project Researcher at The University of Tokyo, contributing to Indonesia–Japan collaborative research on climate change adaptation. Following her appointment at BRIN, she continued her international research engagement as a Research Fellow at the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) in Tokyo, Japan until January 2026. Her expertise includes climate change adaptation, marine and coastal habitat studies using Geographic Information Systems (GIS) and remote sensing, and water sustainability. In addition to her active involvement in research, scientific publications, international research collaborations, and the supervision of master's and doctoral students, she also serves as an Associate Editor of the international journal Earth Systems and Environment (Springer).



Homa Bahmani

Senior Research Fellow (Research Professor)
College of Environment and Civil Engineering, Chengdu University of Technology (CDUT), Chengdu, China

Title: **Beyond Exposure: Structural Vulnerability, Trust and Household Preparedness in a Landslide-Prone Rural Community in China**

Abstract:
Vulnerability to landslides is commonly assessed through exposure, but less is known about how structural constraints and social relationships shape people's capacity to prepare and act. This study examines these links in Huangzhutang Village, Wuping County, Fujian, China. A whole-village survey of 42 households (one respondent each; 10–12 October 2025) was combined with regression analyses and a short scenario-based training exercise. Prior landslide experience was widespread (92.9%), yet household preparedness remained limited. Higher structural vulnerability, capturing resource, mobility and care constraints, was associated with lower preparedness ($\beta = -0.527$, $p = .002$), while trust in community preparedness and early-warning systems was positively associated with preparedness ($\beta = 0.561$, $p < .001$). Risk perception alone explained little variation in reported response. Residents identified sensory and interpersonal cues as common evacuation triggers; road obstacles were the leading practical barrier (59.5%). Three locally tailored AI-generated videos served as training materials, not validated hazard simulations. Immediately after

training, six of nine self-reported measures improved after correction for multiple comparisons, including shelter knowledge, confidence in guiding family members, trust in local actors, and evacuation decision confidence; route familiarity did not improve. These findings suggest vulnerability assessment should examine not only exposure but also the material and relational conditions associated with preparedness and barriers to evacuation. Risk communication and scenario-based learning need to be paired with shared resources, maintained routes, and repeated practical drills. The single-village, immediate post-training design does not establish sustained behavioural change.

Bio:
Dr Homa Bahmani is a Senior Research Fellow (Research Professor) at Chengdu University of Technology (CDUT), China, and a researcher at the State Key Laboratory of Geohazard Prevention and Geo-Environment Protection. An IRDR Young Scientist and Visiting Fellow at Middlesex University London, she researches disaster risk reduction, social vulnerability, evacuation behaviour, risk communication and community resilience. Her work combines field studies, behavioural analysis and computational methods to understand how households and institutions prepare for and respond to natural hazards, with particular attention to vulnerable populations.



Shakeel Mahmood

Chairperson
Department of Geography, GC University Lahore, Pakistan

Title: **Beyond Hydro-Climatic Exposure: Socio-Economic and Neighborhood Drivers of Micro-Scale Flood Vulnerability in Ravi Town, Lahore, Pakistan**

Abstract
Pakistan remains highly vulnerable to compounding hydro-meteorological hazards, with multiple major flood events having severely impacted the Indus River Basin. Focusing on an urban-river interface, this study presents a comprehensive geo-spatial assessment of community flood vulnerability along the Ravi River in Ravi Town, Lahore. By integrating primary empirical data—gathered through random-sampling household surveys, key informant interviews, and precise GPS tracking—with secondary administrative records, the research bridges socio-economic vulnerability with physical hazard exposure.
Methodologically, statistical analyses were performed in SPSS and MS Excel, while spatial interpolation was executed via the Inverse Distance Weighted (IDW) technique in ArcGIS 10.5 to geo-visualize micro-level variations in flood depth and elevation. A Weighted Overlay Analysis was subsequently implemented to construct high-resolution community vulnerability zonation maps.

The findings reveal that local demographic characteristics, socio-economic disparities, neighborhood structural properties, community risk perceptions, and the altered hydrological behavior of the Ravi River collectively drive localized vulnerability. Spatially, settlements such as Kot Begum, Jia Musa, and Shahdara emerge as critical vulnerability hotspots. By coupling empirical vulnerability indicators with actionable spatial analytics, this study provides vital decision-support insights for disaster risk reduction (DRR) authorities to design targeted, location-specific flood mitigation frameworks and resilient urban land-use policies.

Bio:
Dr. Shakeel Mahmood is Chairperson of the Department of Geography at Government College University Lahore, bringing over 18 years of dedicated experience in university teaching, high-impact research, and academic leadership. He holds a Ph.D. in Geography from the University of Peshawar, an MPhil from GCU Lahore, an MSc in GIS from the University of the Punjab, and an MSc in Geography (Gold Medalist) from the University of Peshawar. He is also an internationally certified Master Trainer.
A recognized leader in Disaster Risk Modeling, Climate Change Adaptation, and Geo-Environmental Hazards, Dr. Mahmood integrates Geospatial Data, Spatial Analytics and GeoAI, and to address complex Geo-environmental Challenges. Honored as an IRDR Young Scientist by the Integrated Research on Disaster Risk Reduction, he has authored over 80 peer-reviewed research articles and book chapters, accumulating a cumulative Impact Factor exceeding 120 and more than 1,800 citations. In addition to founding the academic journal *Climate Change and Disasters*, he has served as an author and academic editor for notable international volumes—including *Flood Risk Reduction: Cutting Edge Strategies and Innovative Technologies* and *Soil Erosion Risk Modelling and Management* (published by Springer Nature and IntechOpen)—while serving as an editor and reviewer for leading international peer-reviewed journals.
Guided by his core professional philosophy—*"All are vulnerable in hazard zone, and Disaster Risk Reduction is the business of all for resilient tomorrow"*—his ongoing research, postgraduate mentorship, and curriculum development continue to shape spatial risk governance and disaster resilience frameworks across Pakistan and South Asia.



Fatemeh Rezaei

Assistant Professor
Department of Health in Disasters and Emergencies, Isfahan University of Medical Sciences (IUMS), Iran

Title: **Climate Vulnerability in Older Adults: A Multidimensional and Multilevel Conceptual Framework for Disaster Risk Reduction**

Abstract:
Background: Research on climate change and ageing has largely addressed vulnerability and resilience separately, highlighting the need to understand how older adults' capacities and sensitivities interact with their contexts. This study aimed to develop a conceptual framework for climate resilience in older adults.
Methods: A framework-based conceptual synthesis drew on 12 articles, 2 instruments, and 4 international sources. It integrated the IPCC risk framework and climate resilience concepts with the WHO healthy ageing approach. Concepts were classified by roles in exposure, sensitivity and capacity across individual and contextual levels. Policy alignment was examined with the Sendai Framework, the Sustainable Development Goals (SDGs), and the UN Decade of Healthy Ageing.
Results: Eight domains emerged: Physiological (S); (2) Psychological, emotional and Coping (S,C); (3) knowledge & empowerment(C); (4) Family and community networking; (5) culture and values(C,S); (6) economic security, and livelihoods(C,S); (7) built, natural and environmental(C,S,E); and (8) governance and equity C,S). Physical factors primarily determined sensitivity, while environmental, social, economic, governance, cultural, and psychological factors shaped exposure, adaptive capacity, and resilience. Knowledge did not necessarily translate into action. Although the findings aligned with the SDGs, gaps persisted in addressing older adults' climate vulnerability, agency, social support, economic security, climate justice, digital inclusion, and accessible early warnings within the Sendai Framework and Decade of Healthy Ageing.
Conclusions: Climate resilience in older adults is a dynamic, multidimensional and multilevel capacity. It involves capabilities, contextual resources and enabling structural conditions to maintain essential functions, while learning and adaptation may enhance capacity over time.

Bio:
Dr. Fatemeh Rezaei is an Assistant Professor in the Department of Health in Disasters and Emergencies at Isfahan University of Medical Sciences (IUMS), Iran. She is a participant in the UN/ISC International Research on Disaster Risk (IRDR) Young Scientists Programme and a member and course facilitator with the Global Consortium on Climate and Health Education (GCCHE). A recipient of two WHO research grants and author of over 40 peer-reviewed publications, her research specializes in climate change adaptation in healthcare systems, health system resilience, and disaster risk reduction for vulnerable populations.