

ANNUAL REPORT 2019



GADRI

Global Alliance of
Disaster Research Institutes

GLOBAL ALLIANCE OF DISASTER RESEARCH INSTITUTES

GLOBAL ALLIANCE OF DISASTER RESEARCH INSTITUTES





The First Global Summit of Research Institutes for Disaster Risk Reduction was initiated by the Disaster Prevention Research Institute (DPRI), Kyoto University, Uji Campus, Kyoto, Japan in November 2011 and one of the outcomes was the proposition to establish a network of disaster research institutes fostered by DPRI, Kyoto University to bring together research institutes working on disaster risk prevention and mitigation in various disciplines.

The Global Alliance of Disaster Research Institutes (GADRI) was launched with a mandate to support the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 during Second Global Summit held at DPRI, Kyoto University, Uji Campus, Kyoto, Japan in March 2015 which was held soon after the UN World Conference on Disaster Risk Reduction (WCDRR, 2015) which took place in Sendai, Japan.

Currently, GADRI are members of the Scientific and Technical Advisory Group (STAG), and the Global Risk Assessment Framework (GRAF) of the United Nations Office for Disaster Risk Reduction (UNDRR). GADRI works closely with the science and technology community collaborating in research, endorsing policies related to disaster risk reduction, and disseminating and sharing cutting-edge knowledge and information supported by evidence-based research among research institutions, international organizations and the private sector in various nation states. GADRI community continue to evolve and strengthen research activities towards disaster risk reduction and management and find implementable solutions to achieve disaster resilience in the world.



We thank all members for
their inputs to the GADRI
Annual Report 2019.

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GADRI

Annual Report

2019





Message from the Secretary-General, GADRI

Once again, this year, we were reminded of the threats of natural disasters from typhoons to hurricanes to fires and it continued to affect livelihoods and economies.

With your support, GADRI moved forward in its contributions to the disaster risk reduction and mitigation of disasters. Our membership is over 200 institutes in 52 economies. GADRI, through its members, endeavoured to promote the new interdisciplinary field of disaster risk reduction and institutional capacity building efforts. When a disaster happens, it is vital for our members based in the area, to play an important role in the phases from response to recovery. Local institutes should take the lead to implement plans and/or strategies for DRR, as they know better the people and context in the area.

I would like to share with you a few activities of GADRI during 2019.

The 4th Global Summit of Research Institutes for Disaster Risk Reduction: Increasing the Effectiveness and Relevance of our Institutes was held at the Disaster Prevention Research Institute (DPRI), Kyoto University, Kyoto, Japan from 13th to 15th March 2019. 251 attendees representing 107 institutes in 33 economies participated in the conference. The summit specifically focussed on the contributions to the contextualization of the Science and Technology Roadmap. These deliberations were taken into account in the revised Science and Technology Roadmap which was presented at the Global Platform for Disaster Risk Reduction held in Geneva in May 2019.

The 2nd GADRI General Assembly was held on 15 March 2019 at the Granvia Hotel Kyoto, Japan. The meeting was attended by nearly 60 members from 26 economies. GADRI General Assembly is held once a biennium at the time of the GADRI Global Summit.

GADRI actively participated at the Scientific and Technical Advisory Group (STAG) and the Global Risk Assessment Framework (GRAF) of UNDRR.

GADRI Secretariat and many members were involved in various working groups of STAG and GRAF.

Under Disaster and Risk Research: GADRI Book Series, a few book proposals are sent to Springer Japan for publication.

GADRI held a session on Contributions to the Science and Technology Roadmap at the World Bosai Forum 2019 held at Tohoku University, Sendai, Japan from 9 to 12 November 2019.

GADRI also site visited European Commission, Joint Research Centre (EC-JRC), in Ispra, Italy in November 2019 to initiate discussions and preparations for the 5th Global Summit of GADRI to be hosted at EC-JRC from 15 to 17 March 2021 and to be followed by the EC-JRC, Disaster Risk Management Knowledge Centre (DRMKC) Annual Conference from 17 to 19 March 2021.

Without your support we cannot continue on this mission to deepen the understanding of disasters and find ways to prevent new disasters at all levels. It takes collective efforts to work on strengthening resilience to disasters and help build back better. Through the platform of GADRI, let us continue to work together, share our achievements and contribute toward the implementation of the goals of the Sendai Framework Agenda towards a resilient world.

We take this opportunity to thank all of you for being part of GADRI.

Hirokazu Tatano
Secretary-General, GADRI; and
Vice-Director, DPRI, Kyoto University,
Japan



GADRI Vision

To deepen the understanding of disasters and find implementable solutions to achieve disaster resilience, by integrating knowledge and technologies from around the world.

GADRI Objectives

- To support the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030
- To establish a global research network that promotes and engages disaster research.
- To provide a research road map, with plans that help facilitate the organization of disaster research groups.
- To promote capacity building and development of disaster research institutes and enhances researcher and student exchange.
- To promote exchange and sharing of data and information for scientific research across the globe.
- To serve as an advocacy organization presenting evidence-based approaches that influence decision-making processes.

GADRI Activities

- Planning and organization of regionally or globally collaborative disaster risk research initiatives
- Formation of international research groups to investigate current global disasters, and implement new research methodologies for disaster risk reduction and implementation
- Establishment of an international network for timely communication related to research on disasters
- Organization of conferences, workshops and meetings
- Dissemination and sharing of information, publications, reports, data and other research outputs
- Facilitation of rapid reconnaissance field surveys following disasters
- Preparation of GADRI news releases, policy recommendations, news bulletins, research reports, and other publications.





Disaster and Risk Research: GADRI Book Series is published under the auspices of the Global Alliance of Disaster Research Institutes (GADRI). The global status of disaster research reflects the major strides made in the disaster sciences. These volumes present the forefront of disaster research, including key scientific findings, methodologies, policy recommendations and case studies. Whilst disaster risk needs to be managed in an integrated manner, persistently isolated applications of knowledge, practice and policy are falling short of ensuring disaster-resilient societies.

Responding to this deficit calls for measurement, tools, techniques and institutional structures that can realistically support comprehensive risk assessment and management across multiple hazard landscape. As such, disaster research is now faced with a multi-disciplinary, multi-stakeholder challenge. Contributions to this series therefore address many varied and critical opportunities to advance the subject area. A cross-cutting vision shared across the Disaster and Risk Research volumes is to improve the future of scientific and technological guidance with clearly identifiable roadmaps to ensure human safety and security.

<https://www.springer.com/series/16177>

Disaster and Risk Research: GADRI Book Series

The first book on “Disaster Risk Reduction and Resilience” by Dr. Stefan Hochrainer-Stigler and Dr. Muneta Yokomatsu will be published by Springer.

This volume discusses how disaster risk reduction enhances resilience on different scales (global, regional, national, community, household) from various hazards. The introduction defines terms, followed by a section which examines the natural environment and how resilience flows from disaster risk reduction, across a wide

variety of natural hazards. Section II then examines the built and social environment, focusing on how resilience can be enhanced in the various aspects of these environments. Section III then provides cross-cutting case studies of enhanced resilience, across a wide variety of societies and applications. Lastly, Section IV concludes the volume with an overview of the current state of disaster risk reduction for resilience, and what is needed to achieve a resilient future.

Other Books Approved by the Publisher

1	Title: Proceedings of the 3 rd Global Summit of Research Institutes for Disaster Risk Reduction - Editors: Hirokazu Tatano, Andrew Collins, Wilma James,
2	Title: Enhancing Risk Governance to Manage Disaster Risks Proposed editors: Masamitsu Onishi, Yuichi Ono Coordinating editor: Masamitsu Onishi
3	Title: Health and Disaster Risk and Management Proposed Editors: Virginia Murray, Andrew Collins, Ryoma Kayano, Emily Chan Associate editors: Sakiko Kanbara, Sachiko Nakamura, Kevin Blanchard Coordinating editor: Virginia Murray
4	Title: Proceedings of the 4 th Global Summit of Research Institutes for Disaster Risk Reduction - Proposed editors: Hirokazu Tatano, Andrew Collins, Wilma James
5	Title: Global Disasters of 2017-2018 Editors: Charles Scawthorn and Mohsen Ghafory-Ashtiany
6	Strategic inclusion of Eco-system-based Disaster Resilience Editors: Mahua Mukherjee and Rajib Shaw

GADRI Connections with UNDRR

GADRI closely worked with the United Nations Office for Disaster Risk Reduction (UNDRR), Geneva, Switzerland.

GADRI is a member of the Science and Technology Advisory Group (STAG); and GADRI was elected as a member of the Expert Group on the Global Risk Assessment Framework (GRAF).

Science and Technology Advisory Group (STAG)

GADRI attended the Science and Technology Advisory Group (STAG) meeting held at the UNDRR, Geneva, Switzerland from 30 to 31 August 2019. Main focus of the meeting was the review of the 2016 Science and Technology Conference Roadmap and reporting the progress at the Global Forum 2019.

Global Risk Assessment Framework (GRAF)

GADRI was elected as a member of the Expert Group on the Global Risk Assessment Framework (GRAF) which was established as an important global initiative to support the implementation of the Sendai Framework Agenda for 2015-2030. The establishment of the Expert Group was one of the principal recommendations of the

The initial responsibility of the Expert Group is to provide guidance and direction in the co-design and collaborative development of the GRAF, including strategic, technical, functional and operational aspects. The Expert Group will guide the development and co-creation of a preliminary implementation roadmap, including the definition and possible composition of the GRAF Sub-Working Groups that will need to be established to support the co-design and development process.

Further details available at GADRI Actions—http://gadri.net/resources/pdf/GA-Newsletter_AugDec_2018.pdf



4th Global Summit of Research Institutes for Disaster Risk Reduction (4thGSRIDRR):

Increasing the Effectiveness and Relevance of our Institutes

DPRI, Kyoto University,
Japan, 13 to 15 March 2019



Prof. Juichi Yamagiwa, President, Kyoto University delivered the welcome remarks at the Opening Ceremony

The biennial Global Summit Series was initiated by the Disaster Prevention Research Institute (DPRI), Kyoto University, Uji Campus, Kyoto Japan with the first Global Summit of Research Institutes for Disaster Risk Reduction session held in November 2011 during the same year a triple disaster – Great East Japan Earthquake and Tsunami devastated Japan in March 2011. The First Global Summit which brought together 52 research institutes involved in disaster risk reduction and management from around the world, proposed the establishment of an international network of disaster research fostered by DPRI, Kyoto University. This proposal was further endorsed by the Second Global Summit that took place at DPRI, Kyoto University soon after the UN World Conference on Disaster Risk Reduction, participated by 83 institutes, and established the Global Alliance of Disaster Research Institutes (GADRI) to support the Sendai Framework for Disaster Risk Reduction 2015-2030 agenda. The Third Global Summit in March 2017 was successfully organized by GADRI with 102 institutes and 251 participants from around the world.

The Fourth Global Summit of Research Institutes for Disaster Risk Reduction (4th GSRIDRR, 2019): **Increasing the effectiveness and relevance of our institutes**, sponsored by GADRI and Kyoto University, was hosted and held at the Disaster Prevention Research Institute (DPRI), Kyoto University, Uji Campus, Kyoto, Japan from 13 to 15 March 2019.

One of the major highlights of the Opening Ceremony was the presence of Prof. Juichi Yamagiwa, the President of the Kyoto University. After welcoming the participants and congratulating the organizers, GADRI and the Disaster Prevention Research Institute (DPRI), Kyoto University, Prof. Yamagiwa expressed his pleasure to host the Global Alliance of Disaster Research Institutes (GADRI) at DPRI, Kyoto University Uji Campus, to support the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) and the work of the Science and Technology Advisory Group (STAG) of the United Nations Office for Disaster Risk Reduction (UNDRR).

The Global Summit series provided a platform for researchers, practitioners, policy makers, and other stakeholders in both government and non-governmental institutes involved in disaster risk reduction and resilience to come together to discuss, share and exchange ideas. It specifically focused on contributing inputs to the contextualization and revising the goals of the 2016 Science and Technology Roadmap to implementation of the Priority Areas of the Sendai Framework for Disaster Risk Reduction Agenda 2015-2030; and inputs for GADRI to move forward in its contributions to the science community in the world.

Expert opinions by global stakeholders based on their expertise and experiences covered management of scientific knowledge and its application for governments and industries to accomplish disaster risks and reductions. Further, provided various suggestions to bridge science and decision making gaps and to find implementable mechanisms to confront new scientific challenges in DRR and DRM.



Group discussion session on Earthquake and Volcano Disaster Related Chaired by Prof. James Mori, DPRI, Kyoto University, Japan

As disasters continue to increase in numbers and affect nations and communities by their impact and intensity, the Global Summit Series through its institutional structure advocate importance of engagement in collaborative research activities to accomplish disaster risk reduction and resilience at a global level. The Sendai Framework Agenda for 2030 calls for increased awareness of disaster risk reduction and resilience and implementation of policies to prevent new risks. GADRI commits to take a coherent and a global approach to disaster risk reduction and resilience through its network of disaster research institutes.



contextualization of the 2016 Science and Technology Roadmap. This was assisted by the unique high-level dialogues between governmental, UN and other leaders from the private sector and the science and technology community broadly defined. There were parallel thematic group discussion sessions, and panel sessions to present synthesis reports from group discussion sessions, and poster presentations and opportunities for participants to interact and review contributions that progress disaster risk reduction and resilience activities.

Group discussions session in particular focused on:

- GADRI Contributions to the 2016 Science & Technology Roadmap - how best could GADRI promote the SFDRR 2030 agenda?



- SDGs, climate change and adaptation - what engagement mechanisms and research linkages are needed to influence research directions among policy makers, governments, localities, media and other groups?
- Nation's Synthesis: Concept Design and Implementation, and the SFDRR Agenda 2030 – what systemic synthesis can be built?
- Research Funding - where is the funding for disaster risk reduction activities coming from and is this invested to the right causes and the areas that are most needing support?
- Data Working Group - what are the real strengths and weaknesses of data and risk management?

The conference attract 52 poster presenters .

Through the Fourth Global Summit, the Global Alliance of Disaster Research Institutes (GADRI) pushed forward to promote and contribute to the 2030 Agenda of the Sendai Framework and the

4th Global Summit of Research Institutes for Disaster
Risk Reduction:
DPRI, Kyoto University, Kyoto, Japan
Closing



Increasing the Relevance and Effectiveness of our
Institutes
from 13th to 15th March 2019
Banquet





Ms. Rakhi Kashyap, School of Ecology and Environment, Nalanda University, India; and Dr. Bang Henry Ngenyam, Bournemouth University Disaster Management Centre (BUDMC), UK at the poster session

Focusing on topics for each session, the Fourth Global Summit discussion sessions explored the governing nature of empirical research on disaster risk reduction conducted by various research institutions nationally and globally, and especially how evidence-based research results are utilized or implemented in mitigating disasters.

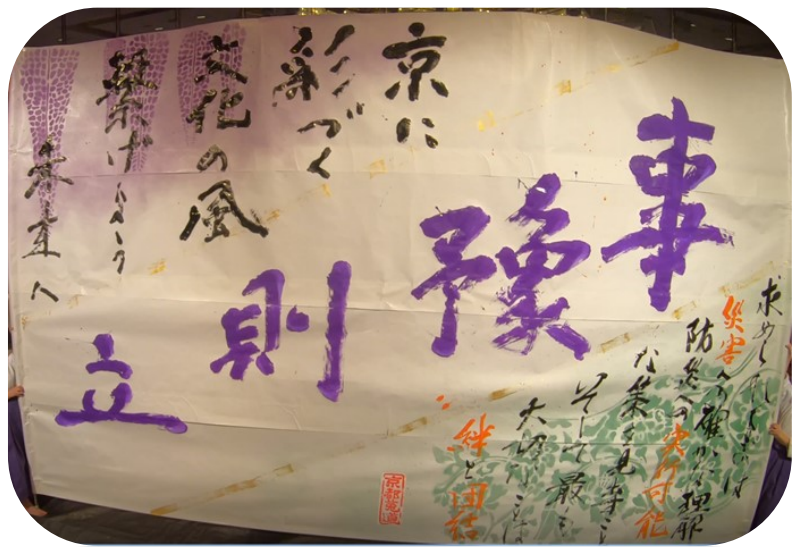
The speakers and presenters engaged in debates on challenges at hand and exchanging ideas and knowledge. The conference specifically focused on contributions to the contextualization of the 2016 Science and Technology Roadmap for the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030.

Following highlights a few of the accomplished goals:

1. Discussions and panel sessions on issues related to disaster prevention and contributions to Science and Technology Roadmap adopted to

support the implementation of the Sendai Framework Agenda 2015-2030;

2. Contributions to the contextualization of the Science & Technology Roadmap which will be presented at the Global Platform for Disaster Risk Reduction to be held in Geneva in May 2019.
3. Assessment of current efforts on global and national involvements in the field of disaster prevention research in relation to the implementation of the Priority Areas of the Sendai Framework for Disaster Risk Reduction 2015-2030;
4. Evaluation of current status of research knowledge and efforts and research gaps, and research results at institution level in each country.
5. Commitments to voluntary evaluation of the research projects and results; and reporting of voluntary evaluations and research inputs to the Science and Technology Community of the UNDRR and at the biennial Global Summits.



5th Global Summit closed with a Banquet organized by GADRI which included a performance by the Kyoto Todoh Senior High School Calligraphy Club.





Mr. Tadashi Yamamoto, Mayor, Uji City, Kyoto, Japan is greeted by Prof. Hajime Nakagawa, Director, DPRI, Kyoto University and Prof. Manabu Hashimoto, DPRI, Kyoto University. Mr. Yamamoto greeted the participants during the Opening Ceremony of the 4th Global Summit



Opening Ceremony of the 4th Global Summit



Mr. Shuichi Yamauchi, Vice-Governor, Kyoto Prefecture, Kyoto, Japan opened the welcome reception of the 4th Global Summit.



Participants at the Poster Session



At the Closing Banquet—(L-R) Prof. Hirokazu Tatano, Prof. Andrew Collins, Chair, GADRI Board of Directors; and Northumbria University, Newcastle, UK; Mr. Daisaku Kadokawa, Mayor, Kyoto City, Japan; Prof. Kayo Inaba, Executive Vice-President, Kyoto University, Japan; Prof. Mahua Mukherjee, IIT, Roorkee, India; and Prof. Virginia Murray, PHE, UK

Second GADRI General Assembly

Granvia Hotel Kyoto, Japan on 15th March 2019

The Second GADRI General Assembly was held at the Granvia Hotel Kyoto, Kyoto, Japan on 15th March 2019. This session was limited to GADRI member institutes. Over 60 members from 26 states attended the session.

Unanimous approval was obtained on a number of important issues such as the Chairman of the Board of Directors, the new members of the GADRI Board of Directors, and the members of the newly formed Advisory Board who joined in April 2018.

In particular, the meeting

- clarified the short-term and long-term issues to be tackled in each research field through group discussions, and
- agreement to provide contributions and commitment by each institute to provide recommendations to the Science and Technology Roadmap.

The participant unanimously agreed to report and review achievements and information at GADRI biennial summits and other opportunities.

GADRI Secretariat also used the opportunity to encourage members to further disseminate their research reports, conferences, capacity development activities through GADRI website, GADRI Actions, and to be engaged in GADRI activities to the extent possible.

On the topic of the GADRI Global Summit series initiated by the Disaster Prevention Research Institute (DPRI), Kyoto University, the participants observed that the title of the Global Summit series is too long and it should be shortened. The fixed title would be Global Summit of the Global Alliance of Disaster Research Institutes (GADRI) with a colon. A subtitle will be attached to it at each session which will clearly describe the current theme of the conference.



Side Event on Efforts and Responses to Major Disasters Around the World: Narratives and Communications

Disaster Prevention Research Institutes (DPRI), Kyoto University
Uji Campus, Obaku Plaza, Kyoto, Japan on 12th March 2019



Srikantha Herath, Director, CURW, and Senior Advisor, Ministry of Megapolis and Western Development, Sri Lanka; Prof. Bijay Anand Misra, SPA, Kerala, India; Prof. Charles Scawthorn, PEER, University of California, Berkeley, USA; Prof. Paul Kovacs, ICLR, Western University, Canada; Dr. Jennifer Tobin on behalf of Prof. Lori Peek, Director, NHC, University of Colorado, Boulder, USA; Prof. Mahua Mukherjee, Head, CoE in Disaster Mitigation and Management, IIT, Roorkee, India; and Prof. Jean Paul Pinelli, Florida Institute of Technology, USA.

Each presenter was given 10 minutes and was requested specifically to describe the event as follows:

GADRI organized the side event on the Efforts and Responses to Major Disasters Around the World: Narratives and Communications at the Obaku Plaza on 12th March 2019 from 13:00-17:00 hours. The event was participated by nearly 100 participants.

The session was divided to two Panel sessions. Panel 1 on Earthquakes, Tsunami, Volcano Eruptions and Recovery Related; and the Panel II on Water Related issues.

Panel One consisted of five presentation by Prof. Jim Mori, DPRI, Kyoto University; Prof. Yuichi Ono, International Research Institute of Disaster Science (IRIDeS), Tohoku University, Japan; Dr. Craig Davis, American Society of Civil Engineering (ASCE), USE, Dr. Irwan Meilano, Institut Teknologi Bandung (ITB), Indonesia, and Dr. Rodrigo Cienfuegos, Centro de Investigación para la Gestión Integrada del Riesgo de Desastres (CIGIDEN), Chile.

Panel Two was covered by Prof. Toshio Koike, Director, International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM), Japan; Prof.

- The event - described the region, what nature did and the damage it caused (structures destroyed, killed, dollar loss etc.)
- The Recovery: described, given the damage, how recovery is occurring – the plan, its status, problems
- Knowledge gaps: described what gaps exist, what research is needed, how DRIs can contribute

Prof. Andrew Collins, DDN, Northumbria University, UK delivered the wrap-up and closing remarks.

As a concluding result, the participants and the panelists of the event endorsed to publish a compendium of the papers as a book under the *Disaster and Risk Research: GADRI Book Series*. It will be titled as Global Disasters of 2017-2018 and edited by Prof. Charles Scawthorn and Prof., Mohsen Ghafory-Ashtiany.

After the conference, Prof. Scawthorn submitted a book proposal which was approved by the GADRI Board of Directors on 4th June 2019.

GADRI Presence at the Global Platform for Disaster Risk Reduction 2019

The main focus of the GADRI 4th Global Summit of Research Institutes for Disaster Risk Reduction was the contributions to the contextualization of the Science and Technology Roadmap which was presented during the Science and Policy Forum on 13 to 17 May 2019 at the Global Platform 2019 in Geneva, Switzerland.

Prof. Hirokazu Tatano, Secretary-General of GADRI was invited to discuss in the session on “Presentation of the contextualized Global Science and Technology Roadmap, for adoption by the participants” at the Science and Policy Forum. “ Forum focused on advancing interdisciplinary collaboration and better linkages between the science community and policy-makers to build

effective and coherent approaches to risk reduction and resilience building thereby supporting the

transformative change required to achieve the ambitious 2030 Agenda in an increasingly interconnected

and cascading risk landscape to ensure nobody is left behind.”

The Science and Technology Roadmap is intended as a living document living document to be implemented by the science and technology community in partnership with other stakeholders. During the GADRI 4th Global Summit, participants contributed collectively for the improvement and contextualization of the Science and Technology Roadmap.

Further details can be found at the website - <https://www.unisdr.org/conference/2019/globalplatform/programme/preparatory-days/view?id=965>

Revised Science and Technology Road Map - [https://www.preventionweb.net/files/globalplatform/5d2c4c49ab99020190411_Science_Technology_Road_Map_Final_\(1\).pdf](https://www.preventionweb.net/files/globalplatform/5d2c4c49ab99020190411_Science_Technology_Road_Map_Final_(1).pdf)



GADRI Session at the World Bosai Forum 2019



The Global Alliance of Disaster Research Institutes (GADRI) and the Disaster Prevention Research Institute (DPRI), Kyoto University actively participated at the World Bosai Forum 2019 held at Tohoku University, Sendai, Japan from 9 to 12 November 2019.

GADRI Session on Contribution to the Science and Technology Roadmap for the Implementation of the Sendai Framework for Action for Disaster Risk Reduction 2015-2030 at the World Bosai Forum was held on 11 November 2019.

The session particularly drew attention to current status of research conducted by members of GADRI in line with the targets of the Science and Technology road to implement the Sendai Framework for Agenda for 2030.



Prof. Manabe Hashimoto, Director, Disaster Prevention Research Institute (DPRI), Kyoto University greeted the participants and shared information on DPRI, Kyoto University activities.

This was followed by Prof. Hirokazu Tatano, Secretary-General, GADRI; and Vice-Director and Professor, DPRI, Kyoto University who delivered an outline of GADRI and purpose of the GADRI Session at the World Bosai Forum 2019. He reiterated the important role played by its members to further facilitate contributions from the science and technology community towards achieving the goals of the Science and Technology Roadmap to deliver on the Priority Areas of the Sendai Framework.





Prof. Yin-Nan Huang, Associate Professor, Dept. of Civil Engineering, National Taiwan University; and Division Head, Earthquake Disaster Simulation Division, National Center for Research on Earthquake Engineering (NCREE), Chinese Taipei presented an overview of his institute activities and the aligning research projects towards the S&T Roadmap. In his presentation, he touched on Sendai Framework, Priorities for Action and the initiatives taken by NCREE:

- Understanding disaster risk
 - New ground-motion prediction equations using local data
 - Seismic disaster/risk simulation
 - Scenarios for planning and drills of seismic disaster reduction
- Strengthening disaster risk governance to manage disaster risk
 - Revision of design codes
- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response and to “Build Back Better”
 - New design and construction methods
 - New monitoring and early warning systems
 - Methodologies for capacity evaluation and retrofit
 - Educational activities and publications



Prof. Ana Maria Cruz, DPRI, Kyoto University delivered a presentation on NATECH research and its contributions to the S&T Roadmap. In her presentation, she covered the main NATECH research gaps and challenges.

- More research needed to support and develop Natech accident modeling and simulation, and risk assessment addressing cascading events, risk reduction.
- Social impacts of Natechs is a topic to be further explored.
- Research on Natech-economic impacts is lacking.
- More research on risk communication and evacuation planning needed.
- Complex scenarios – Multi-stakeholder interactions – Risk governance issues
- Limited awareness and understanding of Natech scenarios among all stakeholders
- Industries are hesitant to share information
- Afraid of government sanctions, security issues, reputational risk.
- Lack of systematic collection of Natech data.
- Need a paradigm shift to expand traditional technological risk management to a holistic systems perspective (contributing to societal resilience)

Dr. Tetsuya Takemi, DPRI, Kyoto University described Global Summit series from Weather, Climate Change Adaptation and SDG Perspective. He shared **What GADRI can do for SDG and climate change adaptation** as follows;

Communication:

- Understand mechanisms through which policy on climate change is enacted -- Share experiences to develop mechanisms in individual countries or regions; Facilitate to adjust the mechanisms in individual contexts

Information dissemination:

- Foster the scientific community to implement long term projects on climate change in collaboration with policy makers to build common understandings and trust

Linkage:

- Identify/prioritize the most significant climate indicators, from a scientific point of views, that account for risks so that policy makers could focus on the implementation more practically and effectively



Dr. Subhajyoti Samaddar, DPRI, Kyoto University presentation focused on the GADRI Global Summit series

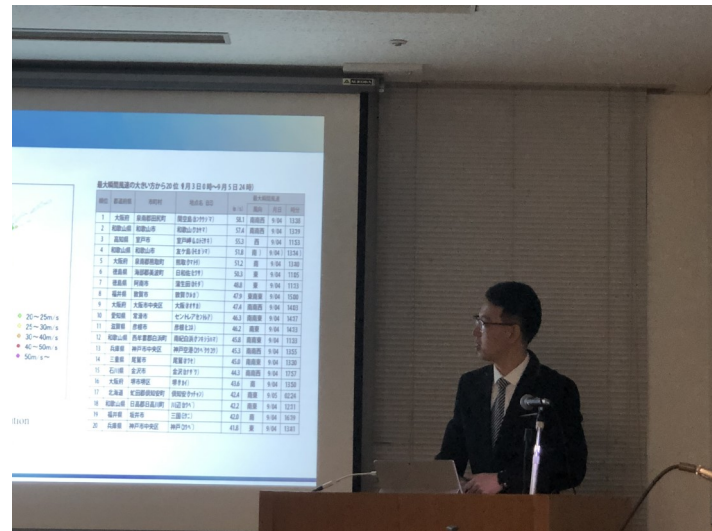
In addition, three students from DPRI-KU contributed to the Flash Talk sessions.



Haris Rahadiano presenting a paper on Damage Distribution of Typhoon No. 21 in 2018 on Osaka and Wakayama Prefecture based on Questionnaire Surveys



Alessandra Colocci presenting a paper on A social-ecological approach to disaster risk management applied to the case study of the Marche Region, Italy



Hasi presenting a paper on Fragility curves for economic losses in industrial sectors after strong wind disaster: A case of 2018 Typhoon Jebi

Left: Yuki Matsuoka, Head of UNDRR Office in Japan; and 3rd from Left is Sakiko Kanbara from University of Kochi, Japan





Keeping in touch with members



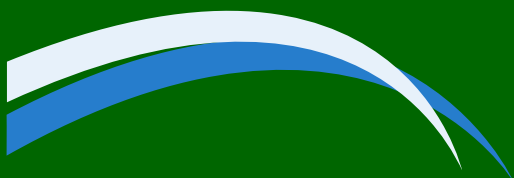
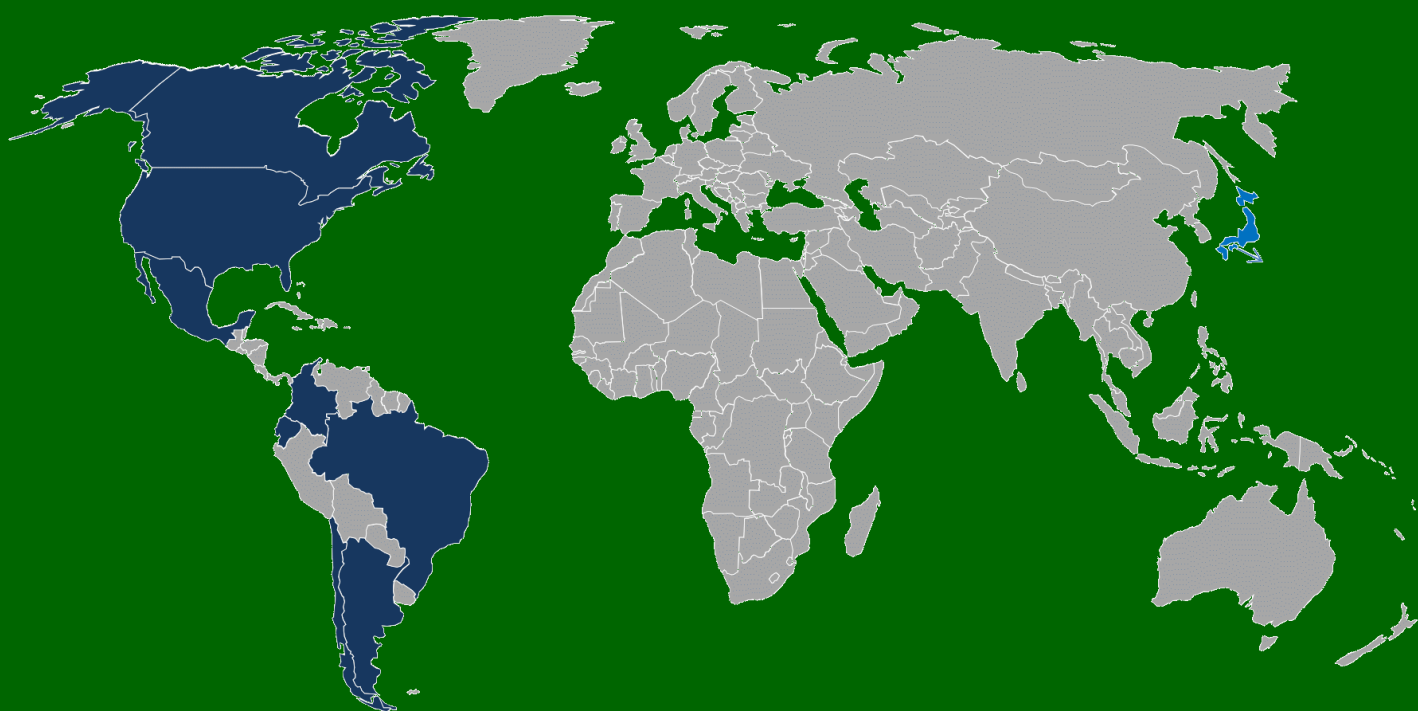


Keeping in touch with members



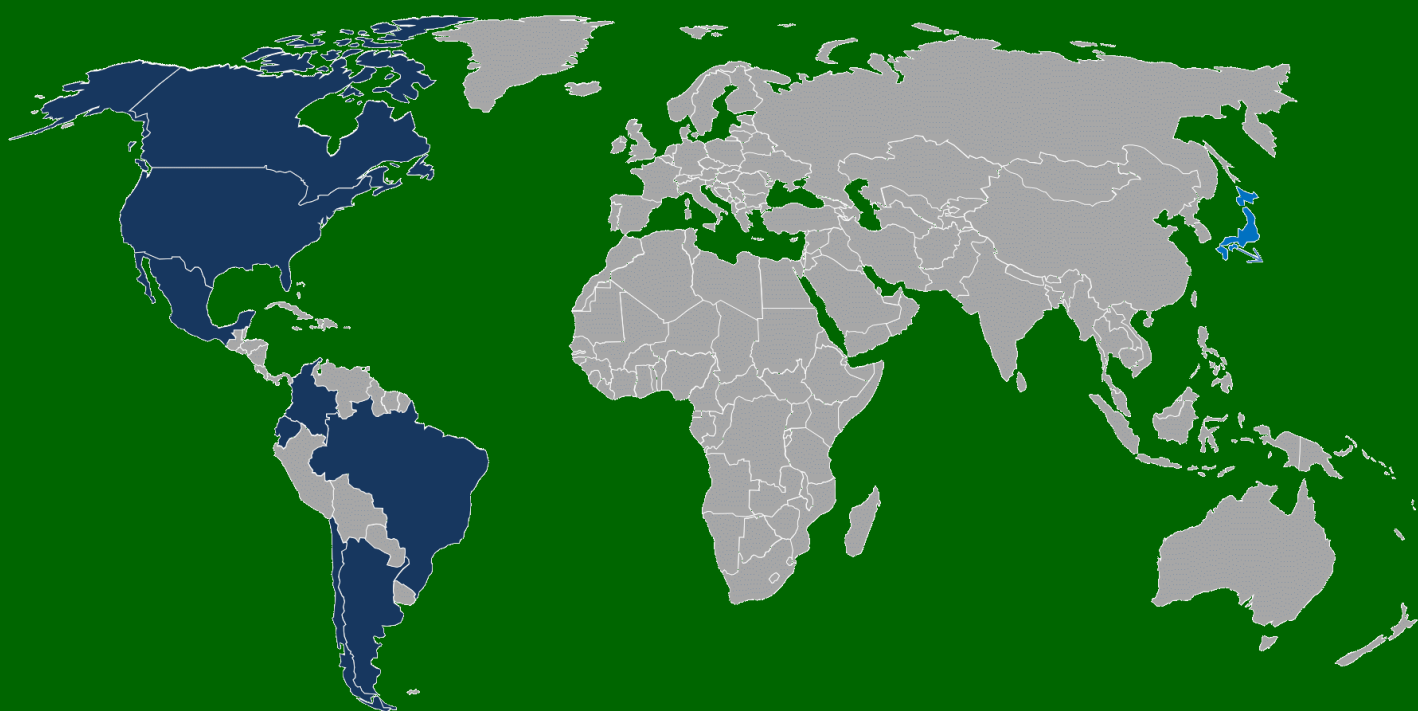


Americas





Americas



Americas—Members

Argentina	Environment and Natural Resources Research Program (PIRNA), Instituto de Geografía “Romualdo Ardisson”, Facultad de Filosofía y Letras, Universidad de Buenos Aires
Brazil	Department of Civil Engineering, Centre for Technology and Natural Resources, Federal University of Campina Grande
Brazil	Universidade Federal do Rio Grande do Sul (UFRGS)
Canada	The Institute for Catastrophic Loss Reduction (ICLR), Western University
Chile	Centro Nacional de Investigación par la Gestión de Desastres Naturales (CIGIDEN)
Colombia	Department of Chemical Engineering, Universidad de los Andes
Colombia	National Unit for Disaster Risk Management in Colombia (NGRD) (Unidad Nacional para la Gestión del Riesgo de Desastres de Colombia-UNGRD)
Colombia	Seismological and Geophysical Observatory of the Southwest (Observatorio Sismológico y Geofísico del Suroccidente (OSSO)), Valle University (Universidad del Valle)
Ecuador	Pacific International Center for Disaster Risk Reduction (PIC-DRR), Escuela Superior Politécnica del Litoral
Mexico	Institute of Geography, National Autonomous University of Mexico (UNAM)
Mexico	Structures Laboratory, University of Michoacan
Mexico	Research Institute of Risk Management, University of Michoacan
USA	American Society of Civil Engineers (ASCE)
USA	Center for Emergency Management and Homeland Security, Arizona State University (ASU)
USA	Pacific Earthquake Engineering Research Center (PEER), University of California, Berkeley
USA	Resilient Communities Research Institute (RCRI), College of Architecture and Environmental Design, California Polytechnic State University
USA	Natural Hazards Center (NHC), University of Colorado Boulder
USA	Center for Risk-Based Community Resilience Planning, Colorado State University
USA	Disaster Research Center, University of Delaware
USA	Wind and Hurricane Impact Research Laboratory (WHIRL), Florida Institute of Technology (FIT)
USA	Center for Wind Hazard and Infrastructure Performance, Texas Tech
USA	Dept. of Business Information Technology, Virginia Tech
USA	Program on Population Impact, Recovery and Resilience (PIR2), College of Global Public Health, New York University
USA	Nevada Seismological Laboratory, University of Nevada
USA	Global Resilience Institute, Northeastern University
USA	Coastal Resilience Center (CRC), University of North Carolina at Chapel Hill (UNC)
USA	Advanced Radar Research Center, University of Oklahoma
USA	Center for Infrastructure, Transportation, and the Environment (CITE), Rensselaer Polytechnic Institute (RPI)
USA	Department of Industrial and Systems Engineering, Rensselaer Polytechnic Institute (RPI)
USA	Southern California Earthquake Center (SCEC)
USA	Center for Risk and Economic Analysis of Terrorism Events (CREATE), University of Southern California
USA	Hazard Reduction and Recovery Center (HRRC), Texas A&M University (TAMU)
USA	Geologic Hazards Science Center, U.S. Geological Survey
USA	Department of Environmental Studies, Resilience Institute, Western Washington University



Federal University of Campina Grande (UFCG), Brazil

<https://portal.ufcg.edu.br/>



Typical convective systems generating flash floods in north-eastern Brazil

In 2019, UFCG continued its policy of building and maintaining partnerships in several initiatives related to DRR. In this report we highlight three of them related to the water sector:

The Federal University of Campina Grande (UFCG) conducts studies and research on environmental disasters in a broad sense, spanning several areas. This is partly motivated by the institution's location in the semiarid region of Brazil, high populated and socially and economically vulnerable to environmental hazards, such as droughts, desertification, land degradation, flash floods, health vulnerability, leading to social inequality. Our present interests are on understanding local and regional needs and the social aspects of Disaster Risk Reduction (DRR).

- Flood prevention and mitigation in highly vulnerable urban settlements (slums)

This initiative involves assessing current flood protection infrastructure in slums located in several cities of the country. Hydrologic and hydraulic simulation models are used to assess both the existing infrastructure and the implementation of low-impact and nature-based measures as well as appropriate technologies. Citizens and communities take active part in the process of designing and implementing such measures. The partnership involves a nationwide research network under the Metropolis Observatory network and the Civil Defense departments of the municipalities. A related initiative targeted at areas vulnerable to inundation within the city of Campina Grande has the Center for Water Systems of the University of Exeter (UK) as an international partner.



Prof. Carlos de Oliveira Galvao

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- Water supply reservoir management under droughts

This long-term research initiative, conducted under a network of Brazilian and international universities and research centers, received important support from two leading Japanese groups: the Research Center for Urban Safety and Security of Kobe University (RCUSS) and the Disaster Prevention Research Institute of Kyoto University (DPRI). UFCG and RCUSS researchers started to explore the potential of Quantum Optimization for reservoir operation, while UFCG and DPRI are employing stochastic approaches for exploiting new ensemble seasonal rainfall forecasts produced by FUCEME, a Brazilian Research Center.

- Groundwater management

Groups of UFCG and the University of Waikato (NZ) proposed a new framework for joint management of aquifers and land use, based on the principles of Landscape Scale Planning. A regional aquifer in the Atlantic coast of north-eastern Brazil was the first pilot case, receiving recommendations for increasing groundwater recharge through improved land-use planning. On the other hand, in partnership with the Cities Research Institute of Griffith University (AU), improved community governance strategies were proposed for small and shallow aquifers located inland in a semi-arid area. These water resources have been used for centuries by indigenous and contemporary communities for small scale agriculture, but recently have suffered from poor management and institutional constraints. The new governance approach is currently being implemented in a pilot project with the local community cooperative, state water agency and other relevant partners.



Small alluvial aquifers for community supply.



Centro de Investigación para la Gestión Integrada del Riesgo de Desastres (CIGIDEN), Chile

<https://www.cigiden.cl/en/home/>

In 2019, CIGIDEN specifically engaged in following activities::

- Creation of the Coast Observatory, which brings together researchers from CIGIDEN and other academic institutions, with also representatives from non-governmental organizations and members of civil society. The aim of this observatory is to give rise to a new Coastal Law for Chile. This year, the observatory published two policy papers related to coastal protection, both promoting a new law to protect coastal ecosystems and reduce disaster risk.
- Public commemoration of the 1730 earthquake in the city of Valparaíso. A dozen simultaneous talks were held in different schools in the risk zone, reaching thousands of students. Later a scientific-citizen fair was held exposing tsunamis, floods and earthquakes simulations. A policy document was published, and presented during a seminar, on the importance of discussing vertical evacuation as a mean to reduce risk in case of a tsunami in the Chilean coast.



- To generate a space for discussion and exchange of visions in disaster risk reduction, CIGIDEN held the Sixth International Seminar. During the morning session we presented “Risk and resilience of critical systems: science and public policy for disaster risk reduction”; in the afternoon, our experts holds a citizen conversation about “Science and communities in the context of global change”. The seminar featured speakers from public and governmental institutions, non-profit organizations, members of the CIGIDEN’s International Advisory Board and researchers from our scientific center.
- Participation of CIGIDEN’s researchers at COP25, held in Spain, with scientific talks about the impact of climate change on the Chilean coast, disaster risk management in the coastal zone and the urgent need to protect coastal ecosystems in our country.



Dr. Rodrigo Cienfuegos

Director

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Various publications of CIGIDEN:



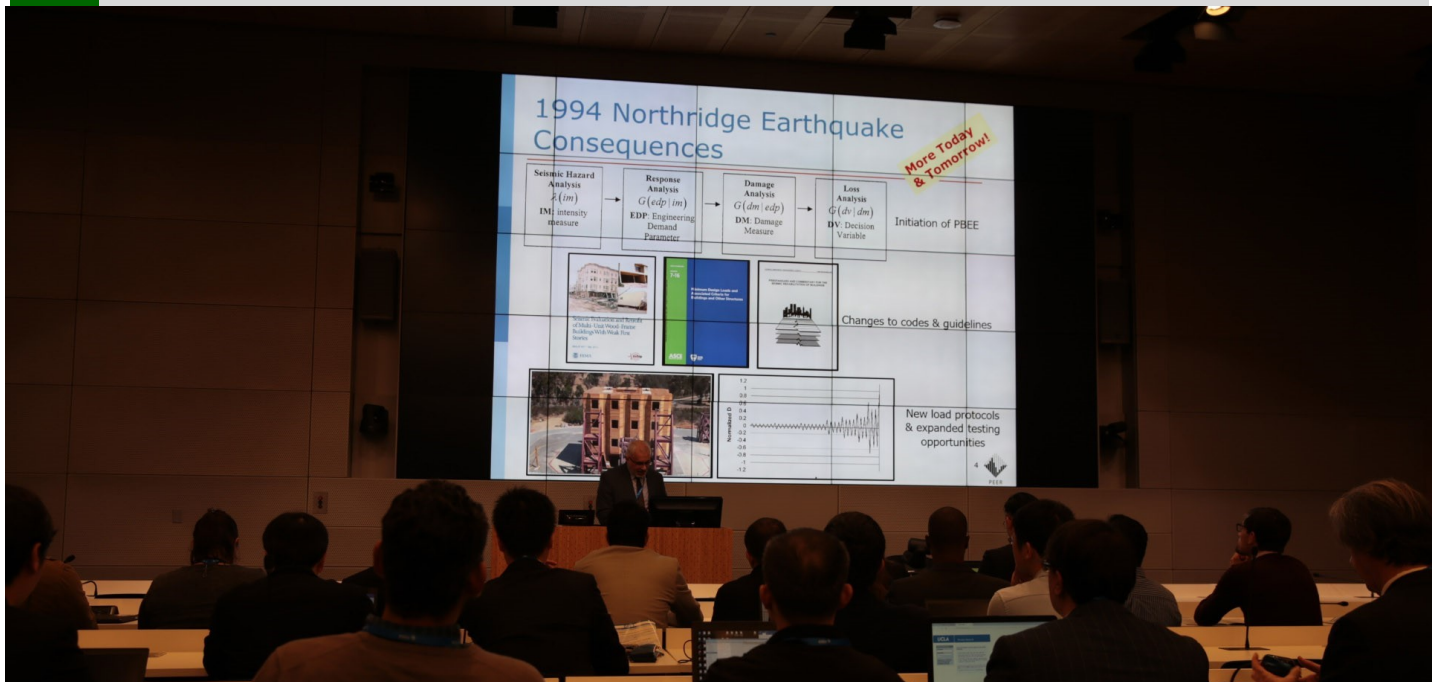
Various workshops and conferences held during 2019 by CIGIDEN:





Pacific Earthquake Engineering Research (PEER) Center, University of California Berkeley, USA

<https://peer.berkeley.edu>



PEER Annual Meeting at UCLA – Opening Remarks

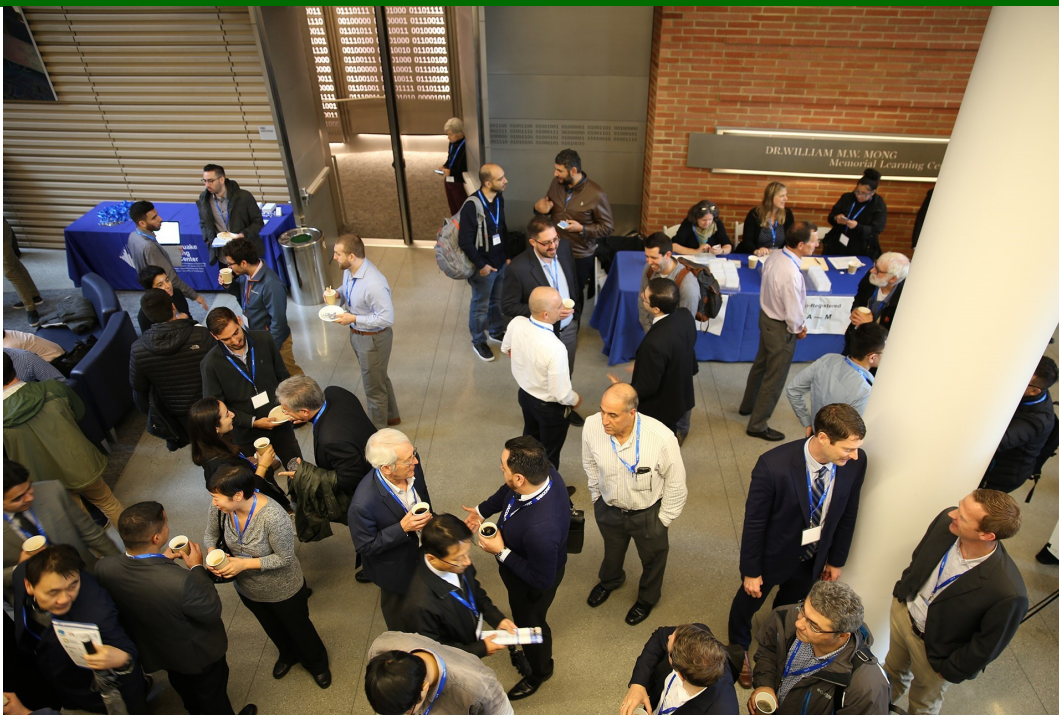
- PEER started 2019 with organization of the PEER Annual Meeting at the UCLA campus with a participation of 200 attendees. Held on January 17 & 18, 2019, this meeting commemorated the 25th anniversary of the Northridge earthquake with active participation from researchers, practitioners and the city officials of Los Angeles.
- PEER conducted the first image-based structural damage recognition competition (PHI Challenge) in late 2018, and issued a report in 2019 summarizing the background development and competition results. This work highlights the pioneering work by PEER researchers in the emerging field of Data-driven Decisions.
- Following successful blind prediction contests on resilient bridge columns and foundation settlement, a new contest was held in 2019 on rocking columns.
- PEER continued the solicitation of proposals and funded 11 projects in 2019, spanning a range of topics consisting of new ground motion modeling trends, resilient infrastructure, modeling & simulation and tsunami research.
- In 2019, PEER was awarded \$4.9 million from the California Energy Commission (CEC) to develop seismic risk assessment tool for natural gas storage and transmission systems.
- In 2019, PEER researchers completed the experimental work on the CEA project to quantify the seismic performance of retrofitted homes. Furthermore, the Next Generation Liquefaction (NGL) project is progressing under the leadership of PEER researchers at UCLA and UW.



Prof. Khalid Mosalam

Director

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PEER Annual Meeting at UCLA

- PEER added three (3) Educational Affiliates in 2019: Southern Methodist University, Carnegie Mellon University and University of Alaska, Anchorage.
- PEER signed several Memoranda of Understanding (MOUs) with international organizations, most notably with five (5) Japanese research institutions: National Research Institute for Earth Science and Disaster Resilience (NIED), RIKEN Center for Computational Science (R-CCS), Center for Mathematical Science and Advanced Technology (MAT/JAMSTEC), Kobe University Graduate School of Engineering (KU Engineering), and Kobe University Research Center for Urban Safety and Security (RCUSS).
- PEER issued a brochure titled “Expected Earthquake Performance of Buildings Designed to the California Building Code.”, with the objective of educating the general public about the intentions of seismic codes and clarifying the common misunderstood aspects.



PEER Blind Prediction Winner





Natural Hazards Center, University of Colorado, Boulder, USA

<https://hazards.colorado.edu/>

<https://converge.colorado.edu/>

In 2019, the Natural Hazards Center at the University of Colorado Boulder launched the new National Science Foundation (NSF)-funded CONVERGE facility. CONVERGE is the newest initiative of the Natural Hazards Engineering Research Infrastructure (NHERI) for the United States. CONVERGE, which is led by principal investigator Lori Peek, is dedicated to advancing the ethical conduct and scientific rigor of extreme events research. CONVERGE is home to the Leadership Corps, which brings together the principal investigators of the NHERI facilities that support rapid response research and the NSF-funded Extreme Events Research and Reconnaissance networks for geotechnical engineering, social sciences, structural engineering, nearshore science, operations and systems engineering, sustainable materials management, and interdisciplinary science and engineering. The CONVERGE research team has developed a series of free, online training modules, briefing sheets, and check sheets to accelerate the training of a diverse next generation of hazards and disaster researchers. CONVERGE has partnered with the RAPID facility at the University of Washington to advance social science and interdisciplinary mobile applications for data collection. CONVERGE also has a subaward with the DesignSafe cyberinfrastructure at the University of Texas Austin, which led to the development of the first social science and interdisciplinary data

model for publishing social science and interdisciplinary data, data collection instruments, and research protocols for the hazards and disaster field. For more information, visit: <https://converge.colorado.edu/>

Peek is also the principal investigator for the NSF-supported Social Science Extreme Events Research (SSEER) network and the Interdisciplinary Science and Engineering Extreme Events Research (ISEEER) network. SSEER currently has nearly 1,000 members globally. SSEER researchers and their expertise is highlighted via an interactive map and platform hosted on the CONVERGE website. ISEEER offers best practice resources in the science of team science, convergence science, and for interdisciplinary methods and approaches for hazards and disaster research. For more information on SSEER, ISEEER, and the other NSF-supported research networks, please see: <https://converge.colorado.edu/research-networks>.



Prof. Lori Peek

Director

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In addition to launching CONVERGE, the Natural Hazards Center has also advanced and supported the development of several other initiatives over the reporting period including:

- Serving as the Secretariat for the North American Alliance of Hazards and Disaster Research Institutes (NAAHDRI). <https://naahdri.org/>
- Maintained a global map and list of university-based hazards and disaster research centers and published the data associated with the map and list. See: <https://hazards.colorado.edu/resources/research-centers>
- Co-developing the new English- and Spanish-language version of the *Landslide Guide for Residents of Puerto Rico*. <https://hazards.colorado.edu/research-projects/puerto-rico-landslide-hazard-mitigation-project>
- Hosting the 44th annual Natural Hazards Research and Applications Workshop in Broomfield, Colorado, which involved over 650 researchers, practitioners, and policy makers. <https://hazards.colorado.edu/workshop/index>
- Co-facilitating the annual Researchers Meeting in Broomfield, Colorado, which involved over 250 hazards and disaster researchers. <https://hazards.colorado.edu/workshop/2019/researchers-meeting/overview>
- Publishing the *Research Counts* series as well as a special collection of the publication focused specifically on Children and Disasters. <https://hazards.colorado.edu/news/research-counts>
- Publishing *Disaster Research—News You Can Use*. <https://hazards.colorado.edu/disaster-research/current>
- Hosting the Disaster Grads listserve for undergraduate and graduate students in the hazards and disaster field. <https://hazards.colorado.edu/signup>





Center for Risk-Based Community Resilience Planning Colorado State University, USA

<http://resilience.colostate.edu>

The year 2019 was very exciting for the Center for Risk-Based Community Resilience Planning. There was a large number of accomplishments over the 13 university partnership headquartered at Colorado State University, but the three major events were: (1) The December release of the Interdependent Networked Community Resilience Modeling Environment (IN-CORE); (2) the formal submittal of the five-year renewal proposal to NIST (which was announced in Feb 2020); and (3) the addition of a new Co-Director Jamie Kruse, Professor of Economics. Details for these two achievements within the Center are provided below.

IN-CORE Release Information

After several years of development as part of the NIST-funded Center for Risk-Based Community Resilience Planning (CoE), the **Interdependent Networked Community Resilience Modeling Environment (IN-CORE)** is available for your use in research, development, and modeling of communities. It is open source and available on GitHub (<https://github.com/IN-CORE>). Here is the webpage on the CoE Colostate website which points to the National Center for Supercomputing Applications (NCSA) website. http://resilience.colostate.edu/in_core.shtml Here is the link directly to the NCSA page: <https://incore.ncsa.illinois.edu> Setting up an account is completely free and the Joplin tornado and Seaside EQ-Tsunami example Jupyter notebooks can be found here: <https://incore.ncsa.illinois.edu/doc/incore/notebooks.html> There is quite a bit more to see, so I encourage you to explore the website and pages, including the IN-CORE manual, etc. On the CoE webpage at http://resilience.colostate.edu/in_core_publications.shtml, there is a listing of published Journal paper abstracts which provides more information on the breadth of community resilience research that will find its way into IN-CORE soon. Acknowledgments are available at: <https://incore.ncsa.illinois.edu/doc/incore/acknowledgement.html>

The National Institute of Standards and Technology (NIST) funded the Center of Excellence for Risk-Based Community Resilience Planning (CoE) (Cooperative Agreement 70NANB15H044), to develop the measurement science to support community resilience assessment. The measurement

science is implemented on a platform called **Interdependent Networked Community Resilience Modeling Environment (IN-CORE)**. It incorporates a risk-based approach to decision-making that enables quantitative comparisons of alternative resilience strategies. On the IN-CORE platform, data from the community can be seamlessly integrated which allows users to optimize community disaster resilience planning and post-disaster recovery strategies intelligently using physics-based models of inter-dependent physical systems combined with socio-economic systems.

IN-CORE consists of multiple components as shown below:

pyIncCore is a Python package consisting of three primary components: 1) a set of service classes to interact with the IN-CORE web services described below, 2) IN-CORE analyses and 3) visualization. The pyIncCore allows users to apply various hazards to infrastructure in selected areas, propagating the effect of physical infrastructure damage and loss of functionality to social and economic impacts. Refer to [pyIncCore section](#) for detailed information.

IN-CORE Web Services are written in Java with JAX-RS specification and are comprised of a Hazard Service, DFR3 (Damage, Functionality, Repair, Recovery, Restoration) Service, Data Service, Geospatial Visualization Service, Semantic Service, and Space Service. These services allow users to create and access hazards, fragilities and data. Users can access and utilize these services via pyIncCore and IN-CORE Web Tools. For detailed information, please refer to the [technical reference document](#).



Prof. John W. van de Lindt

Co-Director

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IN-CORE Web Tools is a set of web viewers for interacting with the different IN-CORE web services. The viewers enable users to browse, search **Datasets**, **Hazards**, **Fragility curves**, **Repair curves**, etc., view the metadata and visualizations, and download items allowed. For detailed information, please refer to the [IN-CORE Web Tools section](#).

IN-CORE Lab is a customized Jupyter Lab with **pyIncore** installed and hosted on a NCSA cloud system. It allows users to develop/run/test their scientific model with pyIncore in their own workspace. Example Jupyter notebooks are provided with each pyIncore analysis to help users get started and to help them understand how to use the pyIncore. For detailed information, please refer to the [IN-CORE Lab section](#).

News Release Highlighting the Renewal

NIST renews partnership with CSU community resilience center of excellence

How well and how quickly a community recovers following a natural disaster depends on complex interactions involving physical infrastructure and socio-economic systems. Five years ago, a multidisciplinary team of researchers funded by the National Institute of Standards and Technology (NIST) formed a center of excellence to improve community resilience. The Center for Risk-Based Community Resilience Planning developed the first quantitative assessment of all the disparate factors necessary to prepare for, withstand and recover from a disaster. On Jan. 29, NIST announced the center's renewal for another five years, to support application of its science-based measurement approach.

The first five years

In collaboration with 12 partner universities, the Colorado State University-based center of excellence developed a computational system that allows an analyst to model a community and study the effect of natural hazards on community response and recovery. More than 90 researchers, programmers, NIST collaborators, postdoctoral scholars and graduate students – with expertise in engineering, economics, data and computing, and social sciences – contributed to this tool, called IN-CORE, or the Interconnected Networked Community Resilience Modeling Environment.

"The center of excellence has made great strides in the science of measuring community resilience," said CSU civil and environmental engineering Professor John van de Lindt, who co-directs the center with CSU Professor Bruce Ellingwood and East Carolina University economics Professor Jamie Brown Kruse. "Prior to the center's work over the last five years, resilience was less quantitative."

Engineers and social scientists previously had studied resilience separately, from distinctly different disciplinary angles, but the center approached it comprehensively by forming interdisciplinary teams at the outset.

"Center investigators were among the first to achieve a truly interdisciplinary approach to community resilience assessment," noted Ellingwood.

The next five years

"With the basic science well underway as part of the computational environment IN-CORE and its supporting databases, it is now time to put science to work for society," van de Lindt said.

As the center moves from science creation to implementation, it will partner with four to six communities to better understand what they need to make resilience decisions when planning for natural disasters. Using the knowledge they gain from these partnerships, the team will refine their models as they develop the next release of IN-CORE in 2021, and the final release a few years later.

"Ultimately, our goal is for communities to understand the resilience planning choices they have prior to making them through measurement science," van de Lindt said. "Through our close cooperative agreement and technical partnerships with NIST, we envision IN-CORE to be the preeminent community resilience planning tool in the U.S. and worldwide."

As population and economic growth increase, especially in hazard-prone areas, and social and economic disparity widens, the need to ensure effective recovery of communities following natural disasters is imperative.

"The center has informed our understanding of physical infrastructure, such as buildings and utilities, with social science and economics to allow all to be modeled together," van de Lindt said. "Decisions are made based on judgment, but the ability to inform decisions with metrics that are proven, reliable and reproducible will be the center's biggest contribution to society."

New Co-Director Announcement

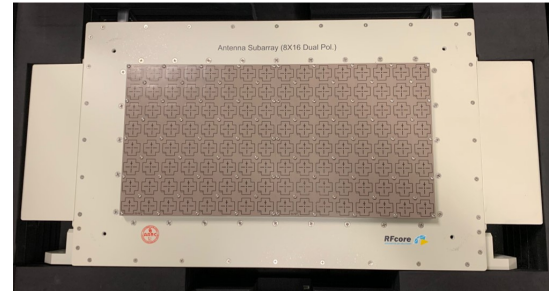
Please join us in welcoming Dr. Jamie Kruse to the CoE! Jamie's expertise includes risk and decision making, experimental economics, industrial organization and regulation, natural hazards economics, insurance and risk mitigation, and interdisciplinary research that integrates economic analysis with engineering, ecology, and the geosciences. She is the HCAS Distinguished Professor of Economics at Eastern Carolina University, North Carolina, USA.



Advanced Radar Research Center (ARRC) University of Oklahoma, USA

<https://arrc.ou.edu>

1. The ARRC's research expenditures were \$9.2M in FY2019 with funding from NSF, NOAA, NASA, DARPA, ONR, AFRL, AFOSR, private industry, and others.
2. Dr. Alexander Ryzhkov, ARRC faculty member and CIMMS Senior Research Scientist, and Dr. Dusan Zrnic, Senior Scientist and leader of the Doppler Radar and Remote Sensing Research at the National Severe Storms Lab, have co-authored a book titled "Radar Polarimetry for Weather Observations" Published by Springer International Publishing.
3. Multiple students won paper competition or research awards:
 - Nicholas Peccarelli (PhD) was awarded 2nd place in the student paper competition at the 2019 IEEE International Symposium on Phased Array Systems and Technology Conference.
 - Andrew Mahre (PhD) received the 2019 Weathernews Inc. (WNI) Scholarship, which was established to enhance advanced research and development of radar technology through collaboration between the university and private industry.
 - Shajid Islam (PhD) received the Gallogly College of Engineering Dissertation Excellence Award at the University of Oklahoma.
 - Andrew Byrd (PhD) was awarded the 3rd place in the student competition of oral presentation at the AMS 39th International Conference on Radar Meteorology.
 - Andrew Mahre (PhD) was awarded the 3rd place in the student competition of poster presentation at the AMS 39th International Conference on Radar Meteorology.
 - Alexander Pham (undergraduate student) received an honorable mention in the Three Minute Thesis (3MT) competition at the 2019 IEEE International Microwave Symposium.
 - Russell Kenney (MS) received the 2nd place in IEEE Region 5 Student Paper Competition.
 - Eivy Arroyo-Diaz (MS) received the first place in the student paper competition at the 2019 IEEE Wireless and Microwave Technology conference.
4. In 2019, the ARRC continued working on the mobile C-band polarimetric atmospheric imaging radar (PAIR), which can offer unprecedented temporal resolution and flexibility through digital beamforming (DBF). Specifically, PAIR is capable of transmitting a fan beam and applying DBF to produce *simultaneous* range height indicator (RHI) of polarimetric variables. The PAIR has the potential to the advancing the understanding of fast evolving weather phenomena such as tornadoes, hurricanes, cloud electrification, etc. and improving warning lead time of severe and hazardous weather events. This year, the active tile array prototype called the subarray was fabricated and fully integrated, in collaboration with RFcore. The major components are (1) antenna subarray for transmission and receiving electromagnetic energy including two 8x8 antenna arrays, TRMs and beamformers, (2) tile controller for controlling power, data, etc, (3) cold plate for cooling, (4) interface board, and (5) housing for all the components and cable harness. A picture of the subarray front view is shown in the attached figure. The subarray is the building block of the PAIR and the production of the subarray is an important milestone of the project.

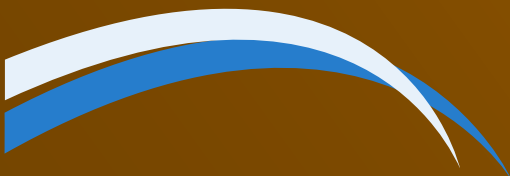
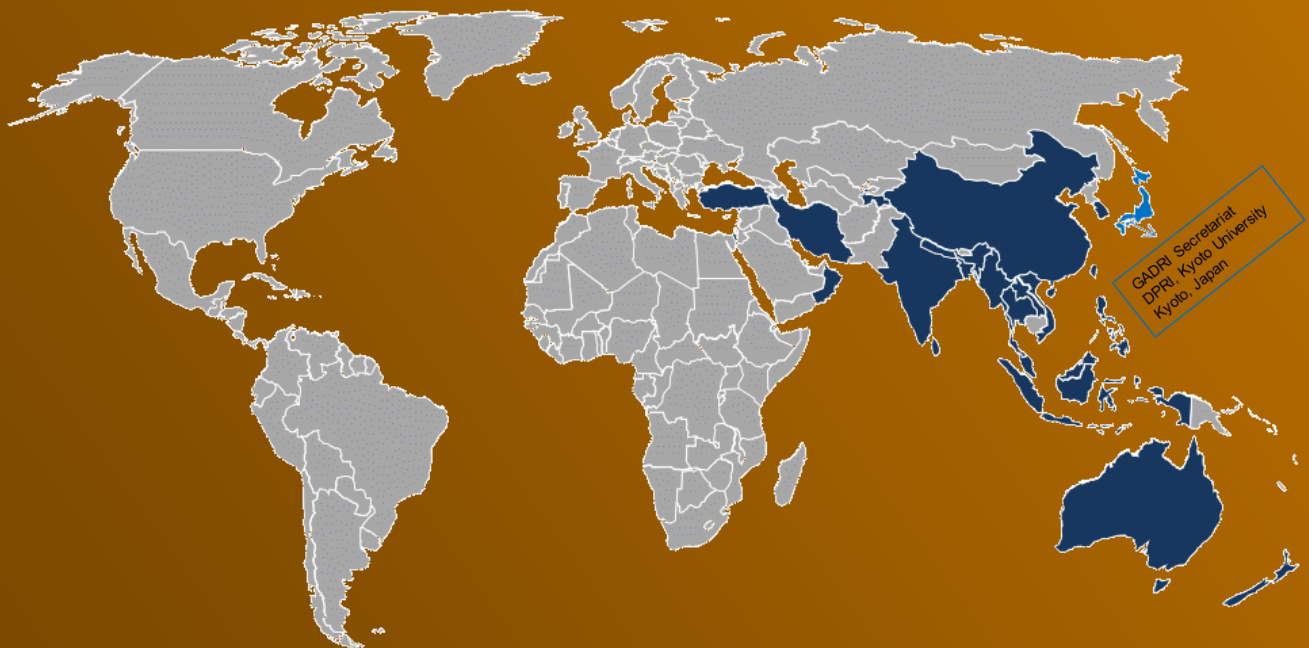


Prof. Tian-you Yu
Director of Operations
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Asia

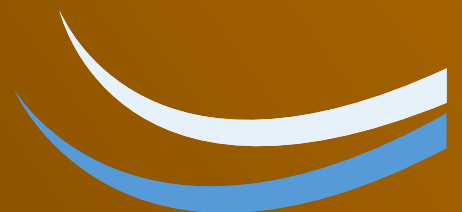
Japan and Oceania





Asia

Japan and Oceania



Asia — Members

Bangladesh	Institute of Water and Flood Management (IWFM), Bangladesh University of Engineering and Technology (BUET)
Bangladesh	Department of Disaster Science and Management (DSM), Faculty of Earth and Environmental Sciences, University of Dhaka
China	Center for Energy and Environmental Policy Research (CEEP), Beijing Institute of Technology (BIT)
China	Integrated Risk Governance Project (IRG-Project), State Key Lab of Earth Surface Processes and Resource Ecology (ESPRE), Beijing Normal University
China	School of Environmental Science and Engineering, Chang'an University
China	Institute of Tibetan Plateau Research, Chinese Academy of Sciences (ITPCAS)
China	Beijing National Earth Observatory, China Earthquake Administration (CEA)
China	State Key Laboratory of Geo-hazards Prevention and Geo-environment Protection (SKLGP), Chengdu University of Technology
China	Key Laboratory of Coastal Disaster and Defence (KLCDD), Hohai University
China	Natural Disaster Research Institute, Northeast Normal University
China	College of Engineering, Ocean University of China
China	College of Architecture and Environment, Sichuan University (SCU)
China	Institute for Disaster Management and Reconstruction (IDMR), Sichuan University - The Hong Kong Polytechnic University
China	State Key Laboratory of Hydraulics and Mountain River Engineering (SKLH), Sichuan University
China	Shanghai Institute of Disaster Prevention and Relief, Tongji University
China	China Research Center for Emergency Management (CCEM), Wuhan University of Technology
Hong Kong, China	Hong Kong Academy of Medicine, Hong Kong Jockey Club, Disaster Preparedness and Response Institute (HKJCDPRI)
India	Centurion University of Technology and Management (CUTM)
India	Department of Geography, Delhi School of Economics, University of Delhi
India	Disaster Mitigation and Management Centre (DMMC), Uttarakhand Secretariat
India	Humanities and Social Sciences Department, Indian Institute of Technology Bombay (IITB)
India	Research & Development, Indian Institute of Technology Gandhinagar (IITG)
India	Center of Excellence in Disaster Mitigation & Management, Indian Institute of Technology Roorkee (IITR)
India	Jindal School of Liberal Arts and Humanities, O.P. Jindal Global University
India	School of Ecology and Environment Studies, Nalanda University
India	School of Planning and Architecture (SPA), Delhi

Indonesia	Brawijaya University
Indonesia	Gadjah Mada University, Faculty of Engineering
Indonesia	Geological Agency (GA), Ministry of Energy and Mineral Resources of the Republic of Indonesia
Indonesia	JASA TIRTA I Public Corporation
Indonesia	Research Center for Disaster Mitigation, Institut Teknologi Bandung (ITB)
Iran	International Institute of Earthquake Engineering and Seismology (IIEES)
Iran	Soil Conservation and Watershed Management Research Institute (SCWMRI), Agricultural Research, Education and Extension Organization
Iran	Department of Environmental Science, Faculty of Natural Resources, University of Tehran
Israel	Institute of Earth Sciences, The Hebrew University of Jerusalem (HUJ)
Israel	National Knowledge and Research Center for Emergency Readiness, University of Haifa
Korea	International Water Resources Research Institute, Chungnam National University
Korea	Department of Disaster Prevention & Safety Engineering, Kangwon National University
Korea	Seoul National University
Korea	School of Urban & Environmental Engineering, Ulsan National Institute of Science and Technology
Lao PDR	Asia Research Center, National University of Laos (ARC-NUOL)
Lao PDR	Disaster Risk Reduction Division, Department of Climate Change (DCC), Ministry of Natural Resource and Environment
Malaysia	Institute for Environment and Development (LESTARI), University of Kebangsaan Malaysia
Malaysia	Center for Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), Universiti Kebangsaan Malaysia (UKM)
Malaysia	Universiti Sains Malaysia (USM)
Malaysia	Universiti Tenaga National (UNITEN)
Malaysia	Centre for Coastal and Ocean Engineering (COEI), Universiti Teknologi Malaysia (UTM)
Malaysia	Centre for Environmental Sustainability and Water Security (IPASA), Research Institute for Sustainable Environment, Universiti Teknologi Malaysia (UTM)
Malaysia	Malaysia Japan International Institute of Technology (MJIT), Universiti Teknologi Malaysia (UTM)
Malaysia	Disaster Management Institute (DMI), Universiti Utara Malaysia (UUM)
Myanmar	Emergency Operations Centre, Department of Disaster Management
Nepal	International Centre for Integrated Mountain Development (ICIMOD)
Nepal	Institute of Engineering, Tribhuvan University
Oman	German University of Technology in Oman (GUTech)

Philippines	PEMSEA Resource Facility, Partnerships in Environmental Management for Seas of East Asia
Philippines	R&D, Graduate School, Philippine School of Business Administration
Philippines	National Hydraulic Research Center, National Engineering Center, University of the Philippines, Diliman Campus
Philippines	University of the Philippines Resilience Centre (UPRI)
Philippines	Philippine Society of Emergency Medical Technicians
Sri Lanka	Central Engineering Consultancy Bureau (CECB)
Sri Lanka	Center for Urban Water (CUrW)
Sri Lanka	National Building Research Organisation (NBRO)
Sri Lanka	Sri Lanka Institute of Information Technology (SLIIT)
Chinese Taipei	National Center for Research on Earthquake Engineering (NCREE), National Applied Research Laboratories
Chinese Taipei	Taiwan Typhoon and Flood Research Institute (TTFRI), National Applied Research Laboratories
Chinese Taipei	Disaster Prevention Research Center (DPRC), National Cheng-Kung University (NCKU)
Chinese Taipei	Tainan Hydraulics Laboratory (THL), National Cheng Kung University (NCKU)
Chinese Taipei	National Science and Technology Center for Disaster Reduction (NCDR)
Chinese Taipei	Center for Weather Climate and Disaster Research (WCDR), National Taiwan University
Tajikistan	Mountain Societies Research Institute (MSRI), University of Central Asia
Thailand	Global Environmental Studies/Management, Asian Disaster Preparedness Center (ADPC)
Thailand	Disaster Preparedness, Mitigation and Management (DPMM), Asian Institute of Technology (AIT)
Turkey	Kandilli Observatory and Earthquake Research Institute, Bogazici University
Vietnam	Department of Geo-Environment, VietNam National University (VNU), Hanoi





Institute of Water and Flood Management (BUET) Bangladesh University of Engineering and Technology, Bangladesh <http://iwfm.buet.ac.bd/site/>



The most important successes during this period of 2019 were JICA, DECCMA, CDKN Delta, Ichamoti, WARPO projects. Under the Japanese Government Science and Technology Research Partnership for Sustainable Development (SATREPS) program, JICA project aims to improve the economy and living conditions of the rural people of Bangladesh by increasing the capability of flood and storm surge disaster prevention and mitigation at the same time enhancing the relevant knowledge through education, training and research. Kyoto University, Japan and IWFM, BUET, Bangladesh are jointly conducting this collaborative research program. The Japan Science and Technology Agency (JST) and the Japan International Cooperation Agency (JICA) are funding this five-year research program. Many journal and conference articles related to these ventures are already published.

The DECCMA project is funded under IDRC-Canada and DFID-UK's CARIAS programme, with IWFM collaborating as Lead Bangladeshi Partner with UK, Ghana and India partners. The project aims to investigate how people in three deltas in South Asia (GBM and Mahanadi deltas) and Africa (Volta delta) respond to the physical effects of climate change, such as rising sea level, in addition to socio-economic pressures. This aims at developing methods for forecasting how these three deltas will change over the next 50 to 100 years and providing policymakers with the knowledge and tools to ensure that future policies will optimize planning services and programs for the benefit of the population of the region.



Prof. Munsur Rahman

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There is a particular focus on the potential benefits of planned migration versus other adaptation choices. This project also contains books and various publications. CDKN Delta is a project that aims to test the adaptation requirements identified in the DECCMA research project for the coastal region of Bangladesh on the ground and outlines a policy brief for the Bangladesh Delta Plan 2100 based on the findings. There have already been two field trips. There were two workshop and meeting with policy makers to introduce this project and model of adaptation. The fundamental target of the workshop is to present the adaptation model with policy makers and to update the assessed adaptation options to support the demand for climate finance at the national level. There are many positive feedbacks to

continue this project and there are many suggestions to improve the outputs. Through training workshops and meetings, the model outputs are successfully explored to the stakeholders clearly of various departments and they are highly interested to implement the model in future. Ichamoti project will assess technical viability, economic feasibility, environmental acceptance and social benefits for revival of flow through Ichamoti River in Pabna district. The goal of this ongoing project is to re-establish the Ichamoti River connection with the mighty Ganges River, test various options (considering 'with' and 'without' proposed in the Ganges Barrage Project's Feasibility Study) to maintain the Ichamoti as a flowing channel throughout the year.



Integrated Risk Governance Project (IRG-Project), State Key Lab of Earth Surface Processes and Resource Ecology (ESPRe), Beijing Normal University, China

<http://ceep.bit.edu.cn/english/>



In 2019, IRG Project initiated and co-organized two important international conferences in China, i.e., the High Level Forum on Plateau Sciences and Sustainable Development held in Xi'ning, from July 12 to 13, and the International Symposium on Green Development and Integrated Risk Governance was held in Shenzhen from October 13 to 14. Both conferences invited experts, scholars and senior officials from various countries and international organizations with a focus on exploring the ways to incorporate the disaster risk reduction into the climate change adaptation and sustainable development.

As the first high-level forum on plateau science and sustainable development, it garnered a high specification, large scale and wide influence with more than 1000 participants from 11 countries. With the theme of "gathering talents' intelligence and serving the development of the plateau", the forum launched multi form and in-depth dialogues and exchanges in various fields such as plateau education, plateau history and culture, plateau resources and environment, plateau bioecology, plateau health, plateau disaster prevention and mitigation, and plateau digital economic development. At the International Symposium in Shenzhen, the

development strategy of Shenzhen, Hong Kong and Macau, and the international, national and regional development strategy of the Great Bay area of Guangdong, Hong Kong and Macau were discussed by senior executives of finance, information technology, insurance with experts and scholars in the academic community under the context of the challenges and opportunities of development and response to disaster risk.



Prof. YE, Qian

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Institute of Tibetan Plateau Research, Chinese Academy of Sciences (ITPCAS), China

<http://ceep.bit.edu.cn/english/>



Signing of the Agreement of Cooperation between Disaster Prevention Research Institute (DPRI), Kyoto University, Japan; and the Institute of Tibetan Plateau Research, Chinese Academy of Sciences (ITPCAS), China

DPRI (Disaster Prevention Research Institute, Kyoto University) and ITPCAS have signed a cooperation agreement since 2009. Since then, the two sides carried out fruitful collaborative research activities. After negotiations between the two sides, DPRI representative professors were invited to visit ITPCAS in July 2019. They jointly held a seminar and signed a new round of cooperation agreement.

Under the financial support by DPRI, Prof. Bai from ITPCAS led a study on the 2015 Gorkha Nepal Mw7.8 earthquake. They found that Lateral variation of the Main Himalayan Thrust controls the rupture length of the 2015 Gorkha earthquake in Nepal. This paper is published in the Journal Science Advances.

Prof. James Mori from DPRI, Prof. Ling Bai from ITPCAS (No. 29W-03)

Publications:

- Bai, L., Klemperer, S. L., Mori, J., Karplus, M. S., Ding, L., Liu, H., Li, G., Song, B., Dhakal, S., 2019. Lateral variation of the Main Himalayan Thrust controls the rupture length of the 2015 Gorkha earthquake in Nepal. *Science Advances* 5, eaav0723.

Ongoing Project:

- International research project supported by DPRI, Study of the 2015 Mw7.8 Nepal earthquake using near-field seismic data, Primary investigator:



Prof. Yaoming Ma

E-mail: yyma@itpcas.ac.cn



东北师范大学
Northeast Normal University

Natural Disaster Research Institute (NDRI)
Northeast Normal University, China
<http://ndri.nenu.edu.cn/>



Participated in China-Japan disaster prevention expert forum, Chengdu, China, 2019.10.15-17

In 2019, a few of our activities include:

1. The Innovation Base of Application of Jilin Risk assessment and prevention of agricultural meteorological disasters by Department of Science and Technology of Jilin province .2019.08.
2. The National Key Research and Development Program of China: Research on meteorological disaster risk assessment and safeguard technology of main economic crops .2019.12-2023.12.
3. The International (Regional) Cooperation and Exchange Programs of National Natural Science Foundation of China: Risk warning and information sharing of forest and grassland fire disaster in Mongolian Plateau under the background of climate change.2020.01-2020.12.
4. Key Scientific and Technological Research and Development Projects of Science and Technology Development Plan for Jilin province: Development of fine dynamic early warning technology and information sharing platform of maize drought disaster risk in Jilin province. 2019.01-2021.12.
5. Key Scientific and Technological Research and Development Projects of Science and Technology Development Plan for Jilin province: Study on key technologies of risk assessment and comprehensive restoration of polluted urban sites. 2019.01-2021.12.
6. Geological Hazard Risk Assessment and Emergency Resources Survey of Jilin Province:2019.06-2019.12.
7. Over 25 academic papers related to disasters were published in high-level international academic journals.
8. Invited 10 experts in the field of disaster from the United States and other countries to conduct academic exchanges and cooperative research.



Prof. Jiquan Zhang

Director

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College of Architecture and Environment Sichuan University (SCU), China

<http://www.scu.edu.cn/acem/>



In 2019, there are 25 earthquakes with the magnitudes above four occurred in Sichuan Province of China. The research team held a workshop on "Engineering Resilience and Disaster Prevention in Seismically Active Areas" in Chengdu in July 2019. Six domestic and foreign experts were invited to exchange ideas and discuss related fields such as earthquake disasters, monitoring and early warning, seismic isolation and mitigation, and the novel materials for earthquake engineering. Along with this workshop, the Department of Civil Engineering of Sichuan University held in Chengdu in July 2019 "International Exchange Camp" activity. Four

professors from the United States and Canada were invited to the summer program. For courses, including Engineering Risk Analysis, Structural Health Monitoring, Advanced Experimental Techniques for Earthquake Engineering, and Finite Element Method were given by Professor Solomon Tesfamariam, Professor Shen-En Chen Professor Cheng Chen, and Professor Ashraf El Damatty, respectively. Around 300 students and engineers have been participated in these activities.



Prof. Kaoshan Dai
Chair

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Institute for Disaster Management and Reconstruction, Sichuan University (SCU), China

<http://www.idmr.scu.edu.cn/>



四川大学—香港理工大学
灾后重建与管理学院

Sichuan University - The Hong Kong Polytechnic University
Institute for Disaster Management and Reconstruction

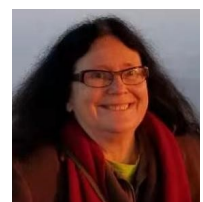


Notable accomplishments of IDMR in 2019 include: 1) continuing to build our international initiatives; 2) taking new leadership roles in China at the national and provincial levels, and; 3) designing our new undergraduate curriculum.

With respect to international initiatives, we continued to work on four main initiatives, and to focus on increasingly integrating our various leadership contributions. These include: our leading role with the Himalayan University Consortium on their Thematic Working Group on Disaster Risk Reduction and Resilience (in collaboration with 20 universities and ICIMOD); our collaborations on youth and young professionals in DRR research, which includes a major focus on the U-INSPIRE movement, catalyzed by the UNESCO Jakarta Office, with support from UNDRR and IRDR; our collaboration with the Chinese Academy of Sciences Institute for Mountain Hazards and the Environment (IMHE) on disaster risk reduction on the silk roads, and; most importantly, our work with

the High-Level Panel of Experts and Leaders on Water and Disasters (HELP).

We brought participants of all four of these major efforts together in a set of overlapping meetings at IDMR, from June 30 – July 6, 2019, under the broad umbrella of a meeting sponsored by the Chinese Ministry of Education on “Models for Multinational Collaboration on Disaster Risk Reduction and Response”.



Prof. Gretchen Kalongi

Dean

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This included the first steering committee meeting of the Alliance of Alliances on Research and Education on Water and Disasters (AoA), co-chaired by IDMR Dean Gretchen Kalonji and Prof. Toshio Koike, of ICHARM, which was successful in determining basic strategic directions for the AoA in the future, including a major focus on youth in DRR research. In December 2019, IDMR hosted a major conference on “Youth and Young Professionals in Disaster Risk Reduction Research: Mobilizing Youth through International Collaboration”, in which young researchers from 30 countries participated and generated plans for future actions. On other international fronts, Dean Kalonji was successful in her work with Academician Cui Peng to gain recognition from the Chinese Academy of Sciences as Co-Directors of an initiative on DRR in belt and road countries called ANSO-DRR. At the global level, IDMR also contributed to the Fourth UN General Assembly Special Thematic Session on Water and Disasters, convened by HELP in June 2019. Kalonji spoke to the assembly on the roles of higher education on disaster risk reduction and response.

IDMR also made major progress in 2019 on our leadership roles in China and in Sichuan Province. We were successful in being awarded a provincial key laboratory, under the Ministry of Emergency Management of Sichuan Province, on “Integrated Disaster Mitigation and Emergency Management”. On the national level, we worked together with the Institute of Disaster Reduction (Hebei), on co-organizing two meetings, involving multiple universities from throughout China and active participation from the national Ministry of Emergency Management and the Ministry of Education, to discuss China’s needs for undergraduate degree programs related to disasters. In this regard, IDMR is very excited about the design of its new undergraduate degree program on “Integrated Disaster Sciences and Management”, which will promote new models of multidisciplinary, multinational, project-based education in disaster risk reduction and response, in collaboration with our closest partner universities worldwide.



Dean Kalonji was successful in her work with Academician Cui Peng to gain recognition from the Chinese Academy of Sciences as Co-Directors of an initiative on DRR in belt and road countries called ANSO-DRR.



Hong Kong Jockey Club Disaster Preparedness and Response Institute (HKJCDPRI), Hong Kong, China

<http://www.hkjcdpri.org.hk/>



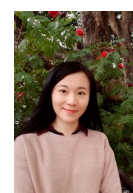
Education theatre was used to educate primary school students.

Housed in and led by the Hong Kong Academy of Medicine, the Hong Kong Jockey Club Disaster Preparedness and Response Institute (HKJCDPRI) was set up in 2014 with an aim to build a disaster-resilient community in Hong Kong.

With our partners from various sectors including the academia, government departments, and community organisations, the HKJCDPRI provides a platform for comprehensive training, capacity building, research, policy discussion and knowledge exchange to enhance our knowledge in building resilience in the community.

Professional Development

The HKJCDPRI develops capacity building programmes for care providers to enhance their knowledge and skills required for disaster response. HKJCDPRI's leadership development courses highlight the importance of critical decision making and effective communication and coordination skills for emergency operations. The HKJCDPRI utilises different teaching modalities including online learning, Virtual Reality (VR) simulation, table-top exercises and case sharing for blended learning.



Ms. Eva Lam

Director

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Community Engagement

The HKJCDPRI collaborates with different organisations and schools on “Community Campaign on Disaster Resilience” to deliver public awareness and education campaigns, tailored to the specific potential hazards the community is facing.

During this year, the HKJCDPRI launched two pilot disaster education programmes for kindergartens and primary schools. The two pilot programmes aimed to raise the awareness of children on risks of disasters; to acquire safety habits; to develop suitable attitudes and behaviors in case of emergencies and to develop basic skills in response to emergencies.

The HKJCDPRI also joined hands with partner NGOs to strengthen the capacities of the specific groups of population living in vulnerable environments including people of lower socioeconomic status. Through a wide range of educational and environment improvement activities specifically designed for the target population, such as community education booths, door-to-door visit, safety equipment installation and collaborative meetings with different levels of community partners, disaster preparedness awareness and coping mechanisms among target communities were enhanced.

Roundtable Discussion with panelists from the Civil Engineering and Development Department, the Hong Kong Fire Services Department, Hong Kong Polytechnic University, the Hong Kong Red Cross, the Peak Re Company and the 100 Resilience Cities of the Rockefeller Foundation.



The HKJCDPRI representative, Ms Tiffany Yeung, presented on “Typhoon Preparedness Measures of the Hong Kong Public for Typhoon Mangkhut that hit Hong Kong in 2018.

Research Studies

The HKJCDPRI and working partners collaborate in conducting disaster preparedness related research and initiating policy discussion. Research and policy brief papers were produced for multi-sectoral stakeholders to discuss global issues of disaster risk reduction, local and regional preparedness, community resilience, and also to develop, implement and evaluate related policies.



Cyclone Fani

(3rd May 2019, Odisha, India)



Aftermath of Cyclone FANI, Source: The Hindu, Date: 6th May, 2019

1. Context

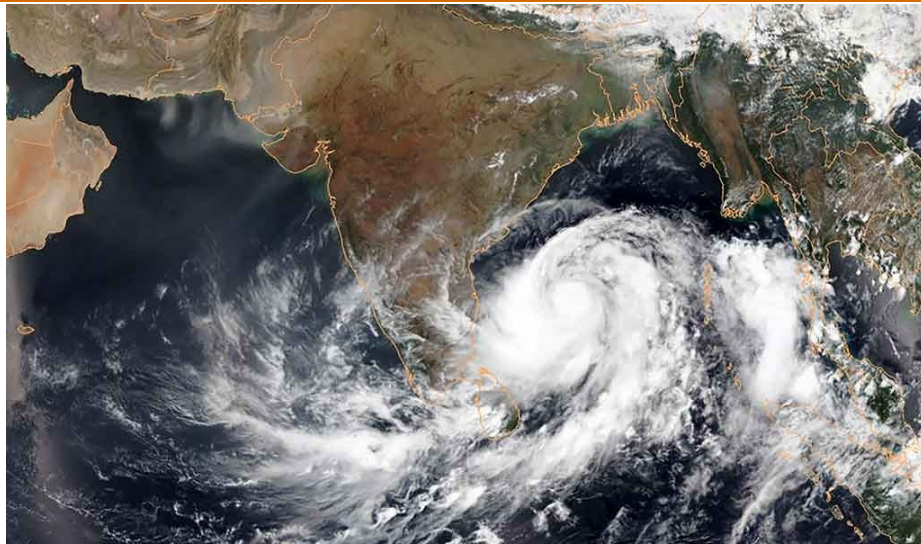
The current report briefly describes the immediate impact of very severe tropical cyclone, named 'Fani', that made landfall at 8.12 AM on 3rd May 2019 at Puri, Odisha, East Coast of India. The Category 4 cyclone had an estimated maximum sustained surface wind speed of 175-185 km/hr, gusting to 210 km/hr. Along the path it moved through the densely populated coastal Odisha, affecting 16.5 million in 14 districts, with severe destruction of life and property in the districts of Puri, Khurdha, Cuttack, Jagatsinghpur and Kendrapara.

Fani evolved from a depression in Indian Ocean, on the west of Sumatra on 26th April 2019. It maintained its intensity after crossing the sea, even after an interaction with land, and did not cause heavy rainfall. Its track remained closer to Odisha coast during its lifespan of 11 days, in the sea and land put together.

Ms. Payal Nayak

Assistant Professor

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Satellite image of Fani intensifying in the Bay of Bengal (National Oceanic and Atmospheric Administration, 1st May 2019). Source: Dhaka Tribune, Date: 2nd May, 2019

2. Pre-Cyclone Initiatives

Till 27th of May, 2019, the Indian Meteorological Department (IMD) did not predict any major impact on Odisha. However, The Joint Typhoon Warning Center (JTWC) suggested possible impact of the cyclone on the Odisha. IMD issued warnings on 30th of May, 2019 predicting that Fani would likely move northwestwards from its position and recurve towards Odisha coast. Skymet predicted intensification of Fani while it gained latitude.

More than 1.2 million people from 14 coastal and interior districts were evacuated to 900 cyclone shelters in 24 hours creating a record history. People were informed about the cyclone and coping

strategy through regular announcements in electronic, print and social media. 2.6 million text messages were sent to warn about the cyclone. Fishermen were asked to refrain from the sea from 30th April night.

3. Immediate Impact

In spite of such huge evacuation and communication, the state witnessed a loss of 64 precious human lives, 8 million livestock, 10 million trees, electricity, telecommunication and road infrastructure and other property.



Ripped off coconut farms in Puri District.

Source: New Indian Express, Date: 10th May, 2019

Loss of Agriculture and agriculture based livelihood

The estimated damage to standing crops has been pegged at US\$ 20 million, besides destruction of storage facilities and harvested crops. About 150,000 hectares of agricultural land has been affected by the cyclone. About 30,000 hectares of horticulture land with perennial crops such as mango, cashew, coconut and betel vine have been affected. These crops are relatively more valuable and were still standing in the field when the cyclone hit. Infrastructure used for floriculture, such as greenhouses, drip irrigation and sprinkler systems, have also taken a heavy hit.



Police officer requesting a resident to evacuate

(Source: Outlook India, Date: 4th May, 2019)



Aftermath of Cyclone, Devastation of electrical infrastructure

Source: Outlook India, Date: 7th May, 2019

Loss of non-farm livelihood

The cyclone has also destroyed the livelihood of craftsmen, who depended on natural products such as coir (for handicraft) and natural dyes (for painting) derived from trees. Tourism has got major blow. Over 600 hotels buzzing with tourists during summer days are mostly unoccupied. At the same time in previous year, 129 hotels in Puri had accounted for 84,000 summer tourists. The debris, damaged hotels and electricity infrastructure has brought down tourists to almost nil in the city. As far as fishermen are concerned their livelihood has gone due to loss of boats and fishing equipment.

Loss of infrastructure

The Odisha government has estimated Fani induced physical infrastructure loss at US\$ 1700 million. It includes half a million houses, roads, culverts, electricity poles and wires, street lights, drains, community centers, town halls, parks, etc. 200,000 electric poles, 5030 km of 33 kV lines, 38613 km of 11 kV lines, 79485 km of low tension lines and 64304 distribution transformers are reportedly damaged. 2000 telecommunication towers have

been damaged. (Hindu, 15th May, 2019).

4. Relief and Restoration Initiatives

44 teams of National Disaster Response Force, 20 teams of Odisha Disaster Rapid Action Force, 525 teams of Fire Services and 8 teams of Odisha Forest Development Corporation were deployed for search and rescue, tree cutting and road clearance in the affected areas.

200 gang men from Andhra Pradesh and 50 each from Telangana and West Bengal were engaged in the restoration of the electric poles. Heavy duty generators were engaged by Public Works Department to supply drinking water, since water storage and treatment facilities were majorly hit due to uprooting of trees.

Because of devastated telephone towers, HAM radio and satellite phones, were used to communicate with district headquarters. As relief measures for affected populations, rolls of polythene, food items, and survival kits were distributed by the state, market and civil society organisations.



5. Concluding Remarks

The state of Odisha, on the eastern seaboard of India, with 480 km of coastline, 11 major river systems and the geo-climatic conditions is vulnerable to different disasters such as floods, cyclones, droughts and heat waves. It has been witnessing a growing intensity of frequent disasters over the past 50 years.

The 'zero casualty' policy of the country has been driving the state's disaster management strategy and it has done a commendable job in issuing early warnings and evacuations of vulnerable people.

However, there is a need to strengthen its post-disaster restoration and rehabilitation strategies. It can be strengthened through building of strong community-based institutions and developing robust linkages with government departments. While the pre-disaster operations are mostly centralized due to the nature of its interventions requiring prompt actions, rehabilitation and restoration lacked considerable state and civil society partnership. It was reported that food relief was not received by some areas even after 48 hours and the communities and civil society agencies came forward to fill the gap. These groups have the potential to supplement the humungous task of relief and restoration during and post-disasters, because of their proximity, local knowledge and voluntary spirit.

Finally, there is a large need to develop context specific knowledge, and affordable disaster resilient technology and infrastructure to deal with the frequent occurring of cyclones in this economically backward coastal state in the long run, if it has to come out of the vicious cycle of disaster and economic underdevelopment.

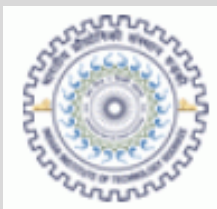
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- <https://www.dhakatribune.com/around-the-web/2019/05/02/how-cyclone-fani-got-its-name>
- <https://thewire.in/environment/cyclone-fani-death-toll-in-odisha-rises-to-64>



Relief Distribution at Nimapada Block, Puri District

Source: Payal Nayak, CUTM, Date: 17th of May, 2019



Centre of Excellence in Disaster Mitigation & Management Indian Institute of Technology (IIT) Roorkee, India

<https://www.iitr.ac.in/centers/COEDMM/ pages/Home.html>

1. The Centre has organized the **8th Asia Pacific Hydrology and Water Resources Conference (APHW2019)** conference during 21-23 November, 2019 on “**Emerging technologies in Urban Water Management**”. The conference provided the global vision of being among the global leaders that provide engineering and technological solutions toward establishing integrated methodologies for disaster prevention based on natural and social sciences, and educating students in related fields. Department of Science & Technology (DST) India, Japan Society of Hydrology and Water Resources, Japan-Asian Science Technology and Innovation Platform and National Disaster Management, Authority, Government of India sponsored the event.



2. The conference champions the APHW global vision of being “among the global leaders that provide engineering and technological solutions toward establishing integrated methodologies for disaster prevention on the basis of natural and social sciences, and educating students in related fields”. The aim of this was to interact and explore in order to evolve more of such technologies, and methods that will help mitigate and reduce urban water disaster risks.



8th Asia Pacific Hydrology and Water Resources Conference



Prof. Mahua Mukherjee

Director

E-mail: coe_dmm@iitr.ac.in

3. The Centre has established **D' CONSCIENTIA'19** with the aim of conducting educational programme, cutting edge research and training on Disasters, Vulnerability and Mitigation with the collaboration of ESRI, TARU and RMSI on August 2019.



4. Our Centre organized the UN-SPIDER International Training Course on “**Space-based Information System for Ecosystem-based Disaster Risk Reduction (Eco-DRR)**”, 25 – 29 November 2019 in IIT Roorkee, Uttarakhand, India. The outcomes of the training course will elaborate the role of Earth observation in the implementation of the Sendai Framework on Disaster Risk Reduction 2015-2030.

5. The Centre has conducted the **National Level Training Programme on Climate Change, Hill Area Development and Landslides Management sponsored by NIDM** on 05-07 December 2019. The main objectives of this training course

- To develop better understanding about Disaster Risk Reduction and Resilience (DRR&R).
- To develop solutions for development of hilly terrains and mitigation and management of recurring disasters.
- To initiate activities on formulation of disaster management plan for their functional and geographical regimes.



6. International day for disaster risk reduction was celebrated through a weeklong program (6-11 October 2019) in our center in which three events were organized. Collage Competition based on theme “Technological Intervention in Disaster Mitigation Community Strategy in Disaster Resilience”, “90-Sec Concept Challenge” and Expert Lecture based on theme “**Disaster Risk Reduction**”.



CoEDMM Head Mahua Mukherjee with Mami Mizutori, SRSG in GPDRR, 2019

Presence of the CoEDMM in International Platforms:

- GADRI Board Meeting in March, 2019; Approval for GADRI Book Series Volume on EcoDRR was presented for discussion and later approved.
- Attended Science and Technology Advisory Group Meeting at UN Office in Geneva organized by UNDRR during 13-14 May, 2019
- UNDRR's Global Platform Conference, 2019 in Geneva organized by UNDRR during 15-17 May,

2019 and brought the issue of the Blue-Green Infrastructure for Discussion in Eco-DRR and City Resilience Session.

- IDMR, Sichuan University, China during 30 June- 4 July, 2019.
- United Nations International Conference on Space-based Technologies for Disaster Risk Reduction - "A Policy Perspective" and Commemoration of 10 Years of UN-SPIDER Beijing Office, 11-12 September 2019, Beijing, China
- UNOOSA's International Charter PM Training on 10th September, 2019 in NDRCC, Beijing China

- Workshop on Building Disaster and Climate Resilience in Cities during 15-16 October 2019 organized by the Asian Network on Climate Science and Technology (ANCST) coordinated by SEADPRI Universiti Kebangsaan Malaysia, in Kuala Lumpur, Malaysia
- Asia-Pacific Science, Technology and Academia Advisory Group (APSTAAG) Board Meeting on 16 -17 October 2019 in Kuala Lumpur.

Students and Scholars' Corner:

1. 2 Ph.Ds. and 10 M.Tech. Degrees have been awarded in 2019.
2. **Kumar Abhinay**, M. Tech 2nd Year Student, from CoEDMM, got the **DAAD fellowship** for his Graduate dissertation in TU Dresden.
3. **Praveen Kumar Singh** is doing his research work in collaboration with ICMOD Nepal.
4. **A.Mugesh – Best Presentation Award** in Indian Geotechnical Conference (**IGC**) conduct by NIT Surat on 19/12/2019 to 21/12/2019.
5. **Shivani Chouhan –Best Poster Award** in National Mission on Himalayan Studies (NMHS) on 26/08/2019 to 27/08/2019.
6. **Ganesh Kumar** presented paper in the International Workshop on Climate Change and Extreme Events in Himalayan Region on the topic "Augmentation of Snow Drift for Water Resource and Avalanche Hazard Management in Himalayan Passes" at Indian Institute of Technology Mandi, Himachal Pradesh, India on 18-20 April 2019.

7. **Ganesh Kumar** presented paper in the International Symposium on Snow Avalanches & Mitigation Strategies (SAMS) on the topic "Simulation of Wind Flow across Snowdrift Control Structures" at Snow and Avalanche Study Establishment SASE RDC, DRDO, HIM PARISAR on 07 – 09 July 2019.
8. **Jaydeo K. Dharpure** presented paper in India-UK Water Centre Workshop on Science and Innovation for Catchment Management in Understanding the spatial differences in terrestrial water storage variations in the Indus, Ganga, and the Brahmaputra river basin at **University of Warwick, UK** on **8th – 10th May 2019**
9. **Sangeeta** and **Jeevan Madapala** selected for IRDR Young Scientists.
10. **Sangeeta** attended "International School on Landslide Risk Assessment and Mitigation (LARAM) in University of Lausanne (Switzerland) during 2-13 September 2019.

11. Shubham Awasthi presented paper in PolInSAR 2019, Frascati on the topic “Forest biophysical parameters retrieval using L-band airborne multi-baseline UAVSAR datasets” at European Space Agency, ESRIN, Frascati, Italy from 28th January to 1st February 2019.
12. Shubham Awasthi attended 1st International Conference on Unmanned Aerial System in Geomatics (UASG-2019), IIT Roorkee Noida Campus, Greater Noida, 6th and 7th of April 2019
13. Shubham Awasthi presented paper in IEEE Geoscience and Remote Sensing Symposium on the topic “PSINSAR based land deformation based disaster monitoring using Sentinel-1 datasets” at Yokohama, Japan from July 28-2 August, 2019.
14. Vickyson Naorem presented paper in World Congress on Disaster Management (WCDM-2019) on the topic “Assessment of Green Vegetation Cover and Impervious Surface for Shaping the Future with Reference to Kakching, Manipur, India” at Mumbai from 29th January – 1st February, 2019.
15. Vickyson Naorem presented paper in 4th Global Summit of Research Institute for Disaster Risk Reduction (4th GSRIDRR) on the topic “Transforming Flood Risk Management: A Case of Kakching, Manipur, India” at, Kyoto, Japan from 13th – 15th March, 2019.
16. Vickyson Naorem presented paper in 1st International Conference on Unmanned Aerial System in Geomatics on the topic “Comparing Sensors for Feature Extraction” at IIT Roorkee Noida Campus from 6th – 7th April 2019.
17. Vickyson Naorem attended International Training Workshop on Natural Disaster Reduction (ITW) at Taiwan from 25-27 June, 2019.
18. Tanu Gupta presented paper in IEEE International Conference on Systems, Man and Cybernetics (SMC) on the topic “A Deep-CNN Based Framework to Detect Abnormal Crowd-Motion Behavior in Videos for Predicting Crowd Disaster” at Bari, Italy from 6-8 October, 2019.
19. Tanu Gupta presented paper in IEEE International Conference on Systems, Man and Cybernetics (SMC) on the topic “A Web-based Tool for Disaster Relief Logistics with Vehicle Route Planning.”, at Bari, Italy from 6-8 October, 2019.
20. Aishwarya Narang presented a paper in 16th NCB International Seminar on Cement, Concrete and Building Materials on the topic “An assessed fire performance on Bi-material concrete element” from 03-06 December 2019 in New Delhi.
21. Jeevan Madapala attended a “Regional Workshop on Disaster Risk Management and Risk-Informed Urban Planning” in Asia Asian Disaster Preparedness Center, from January 21-24, 2019
22. Jeevan Madapala attended a “Workshop on Incorporating both Technical and Human Elements to Reduce Hazards and Vulnerabilities in Sensitive Facilities” organized by Oak Ridge National Laboratory, Sandia Nation Laboratories and Texas A&M University in Pandit Deendayal Petroleum University, India May 14-16, 2019
23. Jeevan Madapala attended “International Symposium Disaster Resilience and Green Growth for Sustainable Development” in National Institute of Disaster Management, September 26-27, 2019
24. Jeevan Madapala attended a workshop on “Space-based Information System for Ecosystem-based Disaster Risk Reduction (Eco-DRR)” in Indian Institute of Technology Roorkee, November 25-29, 2019
25. Jeevan Madapala and Vickyson Naorem jointly participated in “Youth and Young Professionals in Disaster Risk Reduction Research” in Sichuan University, China, December 6-8, 2019



A. Mugesh – Best Presentation Award



Shivani Chouhan – Best Poster Award



Liberal Arts and Humanities

O.P. Jindal Global University, India

<http://www.jslh.edu.in/>



Source: Liberal Arts and Humanities website

O.P. Jindal Global University is one of India's youngest and fastest growing universities. Just ten years old, it has grown from a single school (Law) into a fully-fledged social science and humanities based university with schools of Law, International Affairs, Government and Public policy, Banking and Finance, Architecture, Liberal Arts and Humanities, Journalism, Business and, most recently, a new school of Environment and Sustainability. This latter programme, which has its origin in a smaller Centre, is now being expanded into an independent school with both undergraduate and post-graduate degree courses.

O.P. Jindal Global University is named in honour of the father of the founding Chancellor, Mr. Naveen Jindal, who was tragically killed in an air crash while travelling on business overseeing the activities of the large Jindal Group of companies. It aims for excellence, and is ranked as an 'A' grade university by the National Accreditation Council and was in 2019 awarded the coveted status of an "Institution of Eminence" by the Ministry of Education, one of the only two private universities to initially achieve this. It aims to be a truly global university, with almost 20% of the faculty being recruited from outside India, and with extensive international collaborations for research and student exchanges, including with leading universities in the USA, Europe, and China.

A distinctive feature of the university is that it is basically a social science based institution, and does not have or plan to have dedicated science or engineering departments. The evolving approach in

the new School of Environment and Sustainability will be to systematically apply social science insights, drawing not only on environmental studies, but very much on the expertise of sociologists, anthropologists, architects, economists and lawyers found throughout the university. O.P. Jindal Global University has always stressed inter-disciplinary work and the School of Environment and Sustainability builds on this foundation. The Law School, which is ranked as the top law school in a private institution in India, has an active program in environmental law, and other courses are available across the university in environmental philosophy, environmental sociology, anthropology and ecology, environmental economics, psychology, information science, design thinking, environmental reporting and media studies and in other topics.

A principle objective of the School of Environment and Sustainability is to develop high quality courses and research of particular relevance to India, which faces just about the whole range of both sustainability issues (including climate change impacts, poverty, intense urbanization, energy needs, water and health issues) and disaster related ones, including cyclones, drought, earthquakes, tsunamis and floods. Given the huge environmental variability of India, and its cultural complexity the country requires the contextualization of disaster-related prevention and mitigation knowledge, and at the same time is an amazing laboratory for interventions, experiments and the application of comparative approaches to disaster studies and policy applications. Situated as it is on the northern edge of the major metropolis of Delhi, O.P. Jindal is closely linked with collaborative networks of research in urban sustainability, urban sociology and architecture in India and beyond. It has now established close links with the Global Alliance of Disaster Research Institutes (GADRI) at Disaster Prevention Research Institute (DPRI), Kyoto University, and looks to expand collaboration with other GADRI members throughout Asia and Beyond.



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In 2019, Nalanda University continued activities on the grant received from Australian Center for International Agriculture Research related to Aquifer Storage & Recovery (ASR). It focuses on raising the groundwater availability for irrigation water in South Bihar, India by installing a number of ASR wells. Through this project, we are trying to evaluate the side effects that may be caused by direct injection of surface water into the aquifers through ASR technique. In ASR, water from potable, reclaimed, or other sources is injected into aquifers during surplus periods and withdrawn from the same well during deficit periods. The interest in ASR as one of the long-term water supply strategies to cope up with climate change has increased in recent years. In India, the ASR projects are primarily focused on the quantity of stored water in the aquifer, however there is a significant risk to contaminate the aquifer by introducing untreated surface water to the aquifers. The composition of recharged water in the aquifer further evolves as it passes through the unsaturated zone and enters and flows in the saturated aquifer. Injected waters may interact with aquifer minerals and organic matter, and mix

and react with native groundwater. Geochemical processes during and after aquifer recharge can either improve or cause a deterioration of water quality. In order to use ASR as an option to enhance the groundwater availability in the water scarce region and to develop a complete understanding of risks associated with recharged water on human health and environment, a model is being set by balancing the quantity of recharged water and the quality of resulting groundwater resources in the proposed project.

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SCSC 12th Conference on Standards and Conformance: Applying Digital Technology and Standards to Respond to the Impacts of Climate Change on Infrastructure, organized by Asia-Pacific Economic Cooperation (APEC)

The Center for Disaster Mitigation and Technological Innovation (GAMA-InaTEK) as part of Universitas Gadjah Mada undertakes research, development, and implementation of science that supports disaster mitigation efforts and technological innovation to mitigate the impact of potential disaster. The most important activities of GAMA-InaTEK from 1 January 2019 to 31 December 2019, has been participated on the :

- 8th International Workshop on Multimodal Sediment Disaster (IWMSD2019), Integrated Water and Sediment Management in Reservoirs, organized by MSD Network, JICA, and GAMA-InaTEK in Surakarta – Indonesia, 22 to 23 January 2019.
- International Collaboration and An International Co-authorship by Strengthening the Research Function, organized by Tokyo University of Agriculture and Technology in Tokyo -- Japan, 25 February 2019 to 4 March 2019.
- Visiting Professor of the UNESCO Chair 2019 Field School on Geoenvironmental Disaster

Reduction, organized by Shimane University in Shimane -- Japan, 12 to 18 March 2019.

- Ecosystem-based Disaster Risk Reduction and Climate Change Adaptation in Asia Pacific, organized by United Nations Environment Programme in Yogyakarta – Indonesia, 18 to 22 March 2019.
- 11th Pacific Conference on Earthquake Engineering – New Zealand Society for Earthquake Engineering (ZSEE), organized by the Australian Earthquake Engineering Society (AEES) in Auckland – Selandia Baru, 1 to 8 April 2019.



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- International Conferences on Urban Disaster Resilience (ICUDR) 2019, organized by Universitas Tadulako, JICA, Universitas Gadjah Mada, GNS Science, supported by Ministry of Foreign Affairs and Trade (MFAT) New Zealand, NZAid Programme, in Palu – Indonesia, 22 April 2019 to 1 May 2019.
- 2019 Joint Workshop on Disaster Prevention & Management Industry, organized by MSD Network in Yogyakarta – Indonesia, 16 July 2019.
- SCSC 12th Conference on Standards and Conformance: Applying Digital Technology and Standards to Respond to the Impacts of Climate Change on Infrastructure, organized by Asia-Pacific Economic Cooperation (APEC) in Puerto Varas – Chile, 18 to 19 August 2019.
- International Programme on Landslide (IPL) Conference, organized by International Consortium on Landslides (ICL) and supported by UNESCO in Paris – France, 16 to 19 September 2019.
- 9th International Workshop on Multimodal Sediment Disasters, organized by Mie University and MSD Network in Tsu, Mie – Japan, 17 to 19 October 2019.



- Project of International Standard on Early Warning System: SNI 8235:2017 and ISO 22327:2018 by ISO/TC 292: Security and Resilience, 1 January 2019 to 31 December 2019.
- Project of Strengthened Indonesian Resilience: Reducing Risk from Disasters (StIRRRD), organized by Universitas Gadjah Mada and GNS Science, supported by Ministry of Foreign Affairs and Trade (MFAT) New Zealand, NZAid Programme in Indonesia – New Zealand, 1 January 2019 to 31 December 2019.



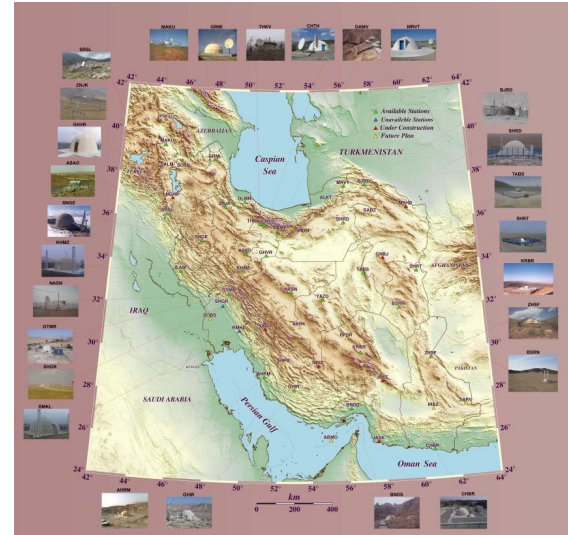
Project of Strengthened Indonesian Resilience: Reducing Risk from Disasters (StIRRRD), organized by Universitas Gadjah Mada and GNS Science, supported by Ministry of Foreign Affairs and Trade (MFAT) New Zealand, NZAid Programme



8th International Workshop on Multimodal Sediment Disaster (IWMSD2019)

In 2019, following activities were undertaken:

- Development of Earthquake-induced Landslide Hazard Zonation Model Using Iran Database
- Application of Perfectly Matched Layer (PML) in Dynamic Analysis of Embankment Dam-Foundation Interaction
- Analytical development of seismic vulnerability functions for gas transmission pipelines in Iran
- Improving the existing methods for inclusion of kinematic interaction in seismic evaluation of soil-structure systems
- Development of Spatial Statistics Methods to Evaluate Seismic Vulnerability of Lifeline Networks
- Evaluating the Interaction of Surface Fault Rupture – foundation – Steel Structure
- Direct time integration from earthquake-induced equations of motion with steps larger than conventional without direct dependence to the response
- The Increasing of Energy –Absorption of CBFs by using of the new Steel or aluminum Cases based on experimental investigations
- Self-Centering Wall, Level of Structural Damages, Energy Dissipation, Outside Steel Plate, Stiffener



- Development of an Image Based on Response recording Software
- Precising Measurement of Shear Modulus and Damping Ratio by resonant Column Test
- Upgradation of National Center of Broadband Seismic Network of Iran



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Soil Conservation and Watershed Management Research Institute (SCWMRI), Iran

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As mandate under “Landslide group” of “Soil Conservation and Watershed Management Research Institute for implementing research works on landslide, in 2019 the followings 13 research projects are ongoing in this group:

1. Landslide occurrence risk assessment in the selected for basin (4 project).
2. Evaluation of landslide vulnerability potential in the selected basins (2 project)
3. Revising the zoning maps of landslide hazard based on inappropriate prediction after heavy rain fall in western Iran in 2018-2019 (2 project)
4. Research on the effect of landslides on sediment delivery of landslide susceptible basins (4 project).
5. Joint project with KU Leuven university Belgium entitled "The effect of Tectonic index (GPA, Earthquake intensity, faulting density, landslide coverage) on sediment delivery in different basins,

Paper Publication:

- Shoaie, Z., Emamjomeh, SR, 2019, Prediction of Time to Failure in Creep Type Large-Scale Landslide, Quarterly Journal of ECOPERSIA, (Accepted, 24 Dec. 2019, (Waiting to be Published)

Book Publication

- Publication of a comprehensive book on Landslide, recognition, assessment and control for students and engineers covering all subject of field work including surface and subsurface exploration, geophysical exploration on landslide, monitoring and early warning as well as some example of real study works done on areas with high number of landslides in Iran. This book was published by Geological Survey of Iran (GSI) with 617 pages.



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Israel National Knowledge and Research Center for Emergency Readiness University of Haifa, Israel

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The National Knowledge and Research Center for Emergency Preparedness was established in January 2018 with 85 researchers divided among 8 disciplinary research teams: Law; Public Policy; Social Science; Public Health and Emergency Medicine; Welfare and Social Work; Engineering, Technology and Planning; Risk Assessment and Management; and Environment. The focus of the Center is the interdisciplinary research among team members.

In 2019, the second year activities of the Center had a twofold focus. The four research grants for projects meeting the multidisciplinary need analysis criteria identified in 2018 were awarded at the end of 2018 are completing their first year:

- Robust Preparedness against Surprises in Extreme Events: multi-site fires and earthquakes
- Insurance, Thresholds and Mechanisms for Post Disaster Resilience
- Managing a Nation and its Citizens During a Crisis: interrelation test between government and public during emergency times

- Using Twitter for Near Real-time Alerts and Damage Analysis of Natural Hazards in Israel and its Close Surroundings.
- In April, after a second round of proposals, three more research projects were awarded:

Developing Urban Community Resilience and Spatial Planning Schemes for Emergency Readiness: multi-disciplinary research comparing local level preparedness for emergencies resulting from war with those resulting from extreme weather conditions



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- Towards an Israeli Doctrine and Legislative-Regulative Framework Dealing with Emergencies
- Between Emergency and Recovery - the twilight zone following a destructive earthquake

In October, at the request of Israel NEMA (National Emergency Management Authority), another research project funded through the Center's short-term research monies was chosen:

- Consequences of the Fire and Evacuation of Residents: the dimensions of individual and community resilience in Mavo Modiim. This village was completely destroyed by fire in May, 2019.

Researchers in all projects meet with expert practitioners at the beginning and at points during the project to explore possible research applications to practice.

- Simultaneously, the second focus includes the following activities:
- Website: <http://muchanut.haifa.ac.il>
- Database development
- Bi-monthly seminar lectures, all archived on YouTube and can also be watched in real-time
- Consortium on Youth/Children in Prolonged Crisis

- Responses to ad-hoc knowledge/research questions
- Submission to Horizon 2020 program as part of an international research team: Decisions Make Sense: human factors, and social, societal, and organizational aspects for disaster-resilient societies
- Two day course on Who is Afraid of Psycho-trauma? To be held on 4-5.12.2019 at Center
- Conference presenting Center research, to be held on 29.12.2019 at the University of Haifa; tour of Haifa's disaster hazards and readiness on 30.12.2019
- Presentations in international forums
- Preparation of Special Issue, *International Journal of Disaster Risk Reduction*, on Cascading Disasters

More information about Center research is available on our website at:

<http://muchanut.haifa.ac.il/index.php/en/research/center-research>



Meeting of the Consortium on Youth/Children in Prolonged Crisis with people from Shaar Hanegev (Israeli local community near Gaza)



Disaster Risk Reduction Division, Department of Climate Change (DCC), Ministry of Natural Resource and Environment, Lao PDR

<http://www.monre.gov.la>

Report on Disasters in 2019 in Lao PDR

Since July to September 2019 due to wet season and climate change the country inundated with heavy rainfall, tropical typhoon and storm affecting whole or many parts of the country. Results of these phenomena were cases of flooding, storm/Hailstorm, landslide/Flash Flood, drought, Earthquake, Extreme weather and Epidemic to make a many thinks a loss and damage for life and social-economy of the country.

On 5 to 7 August 2019 Tropical Storm Wipa brought heavy rains and flash flood to the Oudomxay, Hoauphan and Luangphabang provinces in the Northern part of the country, and affected 4 villages, 4 losses of lives and more than 600 peoples.

On 29 August (Thursday) and 02 September (Monday) 2019, the Lao PDR Department of Meteorology and Hydrology (DMH), Ministry of Natural Resources and Environment, Lao PDR reported potential affected areas in the central and southern part of Lao PDR due to the existence of a Low Pressure Area (LPA), Tropical Storm PODUL, and Tropical Depression KAJIKI. Subsequently, flooding was reported in six (6) provinces: Champasak, Saravan, Savannakhet, Sekong, Khammouan, and Attapeu (in descending order of most affected province).

On 5 September, the center of Tropical Depression Kajiki was estimated to be in the coastal area of Viet Nam; and according to Lao PDR's Department of Meteorology and Hydrology (DMH), light to moderate with intermittent heavy rains will be experienced over Central and Southern provinces due to the weather disturbance. Currently, flood has been reported in six (6) provinces namely Khammouan, Savannakhet, Champasack,



Saravane, Sekong, and Attapue provinces. Provincial Disaster Prevention and Control Committee has call for emergency meeting and planning for response, especially to deploy rescue boat in collaboration with the army and police for evacuation. According to Lao PDR's National Disaster Management Organisation (NDMO Lao PDR), emergency relief items has been distributed to the affected population.

As of 9 September, ongoing flooding in southern Laos across the 6 provinces of Khamoun, Savanhkhet, Attapeu, Salawan, Chamapasak Sekong has affected 59,613 families (or 105,767 people) with 33,407 families displaced in 20 evacuation centres. 4 deaths have been reported and 2 people are missing. 78 schools and 2 health centres have been damaged along with 6 bridges and 26 irrigation canals.



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Floods caused by the passage of Tropical Cyclone PODUL and Tropical Depression KAJIKI have resulted in 14 fatalities and 1 missing person across Lao PDR, as of on 10th September. The most affected areas are the southern Provinces of Attapeu, Champasak, Khammouan, Saravan, Savannakhet, and Sekong. Over 1 million people are affected (approximately 150,000 families) and 102,000 have been displaced. From the preliminary assessment, approximately 1,000 sq/km is flooded in southern Laos, while 313 schools and 15 hospitals have been affected by flood waters. Various humanitarian partners are supporting national authorities with response operations, including assistance provided to the affected population. Continued heavy rainfall is forecast in northern Laos and in the already affected provinces over 11-12 September.

Earthquake by 6,2 magnitudes was occurred in Xayyabouly province of the Northern part, however the vibration force from earthquake could be distribution is widespread in many parts of the country



and event in Vientiane City was feeling. Two districts in Xayyabouly province was affected and coast damage assessment among 28,260 US\$, but was lucky nobody death.

As of 13 September, the National Disaster Management Office (NDMO) states that 1,658 villages across 47 Districts have been affected. An estimated 140,029 households are affected (total people affected 309,176) with 21,563 households displaced in 20 evacuation centres. A

total of 18 deaths have been reported. At this stage information from each province is limited to NDMO reports and unable to be verified for accuracy.

Since early October 2020 because of the El Nino

phenomenon and climate change due to has increasing a temperature to 2,5 degrees. Due to high temperatures, drought has caused widespread drought in the country, which has severely damaged food security and water resources. It is currently impossible to assess the impact of the drought.

The Ministry of Labor and Social Welfare (MLSW) of Lao PDR organised and led a National Multi-Sectoral Joint Disaster Needs Assessment in the 6 affected provinces, to support information-based efforts to recover faster after the massive flooding. The assessment was conducted from 21 September to 5 October 2019, consisting of a total of 21 persons from several sectoral bodies of Lao PDR ministries. Regarding to the final report on 14 October after disaster and said that at least 765,000 people have been affected and 19 killed by Tropical Storm Podul and Tropical Depression Kajiki in Lao PDR. As many as 97 bridges, 747 schools, 43 health centres and hospitals, 462 road places, 275,114 livestock and poultry were affected by the floods. Total damage is estimated to cost US\$164 million (1.45 trillion Laotian Kip).





Institute for Environment and Development (LESTARI-UKM)

University of Kabangsaan Malaysia, Malaysia

<http://www.ukm.my/lestari/ms/>



Final report presentation of TRGS project on vulnerability and adaptation assessment due to the impacts of sea level rise on Fisheries Sector. (at the Ministry of Higher Education, Malaysia)

The Institute for Environment and Development (LESTARI) is known as a unique institute carrying out research and training activities in multidisciplinary fields under the umbrella of The National University of Malaysia. LESTARI is serving as a reference center addressing issues related to sustainable development and contributing in Malaysian policy. The current report briefly describes LESTARI's initiative and contribution towards food security and safety due to climatic as well as anthropogenic stresses in fisheries sector of Malaysia.

Malaysia is one of the highly vulnerable countries due to climatic changes and its impact is already being felt in term of rising temperature and sea level. The changing climate is likely to have serious influence on fisheries sectors and eventually on the food security of Malaysia. Even though Malaysia is a very fast-growing developing country, it never reached self-sufficiency level of food production. Malaysians are among the world's biggest consumers of fish, eating at least 56.5 kilograms of fish per person each year and as a result fisheries industry has been identified as one of the main sectors of food supply. Considering this, an extensive study has been carried out under the research project funded by Ministry of Higher Education through TRGS project scheme to assess the vulnerability of fisheries sector due to climate change and to propose adaptation strategies for food security through fisheries sector. The study predicted

decreasing trend of fish landing in the states Selangor and Terengganu. Significant impact of air temperature and sea level changes were observed on brackish water production in Terengganu. Moreover, the freshwater production in Terengganu was significantly influenced by air temperature, number of freshwater culturist and wholesale value of freshwater production. The study explored that the vulnerability of fisheries sector was most closely linked with adaptive capacity, followed by exposure and sensitivity. Among the two states considered in the study, Selangor was more vulnerable than Terengganu. Eventually the study proposed few adaptation strategies such as promoting cage culture, empowering aquaculture industry, introducing new technologies to improve the quality of aquaculture products, increasing the number

of hatcheries, introducing effective enforcement effort, maintaining coastal ecosystem and establishing new curriculum on climate change and ecosystem change at the school level.

Furthermore, the importance of eating fish is emphasized by health experts to maintain good health but unfortunately, fish may include pollutants which is linked to infections and can cause a number of health problems, including cancer. Therefore, LESTARI is conducting research on formulating fish consumption advisory based on the contamination level in fish and shellfish for ensuring the healthy consumption as well as for protecting the consumers from possible risk related to fish toxicity. This project is funded by The National University of Malaysia and carried out in collaboration with The International Medical University, Malaysia; Institute for Medical Research (Ministry of Health, Malaysia) and University Malaysia Sabah. The final product of this project is the online tool "MyFishAd" which is considered as Malaysia's first fish consumption advisory.



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Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM)

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SEADPRI-UKM was awarded as Integrated Research on Disaster Risk (IRDR) International Centre of Excellence (ICoE) for Disaster Risk and Climate Extremes in 2016. Hence SEADPRI-UKM is now one of the 16 ICoEs at the global level, which aims to promote DRR activities and programmes

meteorological and hazard models to enable better forecasting of climate extremes and physical hazards in Kuala Lumpur. The final product of the project is the Kuala Lumpur Multi-Hazard Platform, which was launched on 15 Oct 2019. The Kuala Lumpur Multi-hazard Platform (KL-MHP) is a visual decision-making theatre that displays the modelled products of geophysical and atmospheric hazards driven by meteorological forecasts, to graphically communicate risk.



The Kuala Lumpur Multi-Hazard Platform was launched by a representative of the Mayor of Kuala Lumpur, witnessed by the CEO of MIGHT, Malaysia and UK Project Leaders together with all NUOF Thematic Leaders.

The project on “Promotion of Social Entrepreneurship in Disaster Risk Reduction to Build Community Resilience” commenced on 1 September 2019, funded by the International Development Research Centre (IDRC) for a duration of 3-years. The general objective of the Project is to foster long-term community climate resilience in Malaysia and Cambodia by empowering young female social entrepreneurs to develop disaster resilience plans supported by community engagement and citizen science on an open-access digital platform.

Led by Universiti Kebangsaan Malaysia's Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), key partners include the Royal University of Phnom Pehn (RUPP), Geological Society of Malaysia

within the respective regions. The ICoE represents, in this case of SEADPRI-UKM, the South East Asian region, focusing on strengthening localised inputs to address regional DRR related matters. SEADPRI-UKM will continue to capitalise on this partnership framework to further advance work related on DRR.

(GSM) and Malaysian DRR Service Organization (MDRRSO)

SEADPRI-UKM completed a research project involving teams from Malaysia and the United Kingdom, awarded under the Newton-Ungku Omar Fund, administered by Innovate UK and the Malaysian Industry-Government Group for High Technology (MIGHT). The project, Disaster Resilience Cities: Forecasting Local Level Climate Extremes and Physical Hazards for Kuala Lumpur focuses on ways to best adapt selected

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Riverdale activity and floating wetland

Highlights of activities in 2019:

1. The International Conference on Environmental Sustainability and Resource Security (IC-ENSURES 2019) from 5th to 6th November 2019 at Royal Widad Residence Kuala Lumpur.
2. ANNUAL HUB ASSEMBLY 2019 FOR WATER SECURITY AND SUSTAINABLE DEVELOPMENT HUB (GCRF) - FIELD TRIP organized by IPASA, Newcastle University Medicine Malaysia and Newcastle University, UK in Sg. Johor River Basin, Malaysia, on 25 September 2019
3. COLLABORATION MEETING with ASIA-PACIFIC CENTRE for ECO-HYDROLOGY, INDONESIA UNESCO CATEGORY II (APCE) organized by IPASA and Eco-Hydrology Research Group, Universiti Teknologi Malaysia at IPASA, UTM Johor from 7-8 August 2019
4. Taiwan-Malaysia Workshop on Clean Water and Sustainable Energy Day 2 (6/8/2019) at Lecture Hall 1 (DK1), Faculty of Science, Block C17, UTM Skudai.
5. GCRF Water Security & Sustainable Development Hub MEL workshop from 9 to 11 July 2019 at IPASA UTM.
6. Riverdale activity and floating wetland



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Images of severe flood and landslide in Myanmar



Images of flood and landslide in Myanmar



Capacity Building Trainings for Government Officials



The Department of Disaster Management (DDM) under the MSWRR is the National Disaster Management Organization that leads not only disaster risk reduction efforts and but also response coordination for effective, efficient and timely responses. In 2019, the Centre engaged in the following activities.:

- EOC was fully equipped with high tech equipment and operationalized as International Standards. USFS technical assistance has helped DDM reaching salient achievements such as the evaluation of the Myanmar Disaster Response System, Standard Operating Procedure of EOC development, and initiation of the Disaster Management Law Review.
- Officials from EOC were deployed to India for Post Graduate of GIS and Remote Sensing. EOC trainings for trainers and EOC Management trainings were also conducted for enhancement of capacity of EOC staff. Moreover, EOC staff attended trainings of Unmanned Aerial Vehicles for officials which opened at Meiktila University of Aeronautical and

Space Technology. (2) UAVs were purchased and utilized for disaster risk reduction activities.

- Maps of South Nawin Dam's surrounding areas, tracks of cyclones, floods in Mon state and Bago region were produced and compiled with the technical assistance of MIMU and One Map Myanmar.
- For effective, timely and expeditious responses, EOCs were also opened at Chin and Rakhine states.



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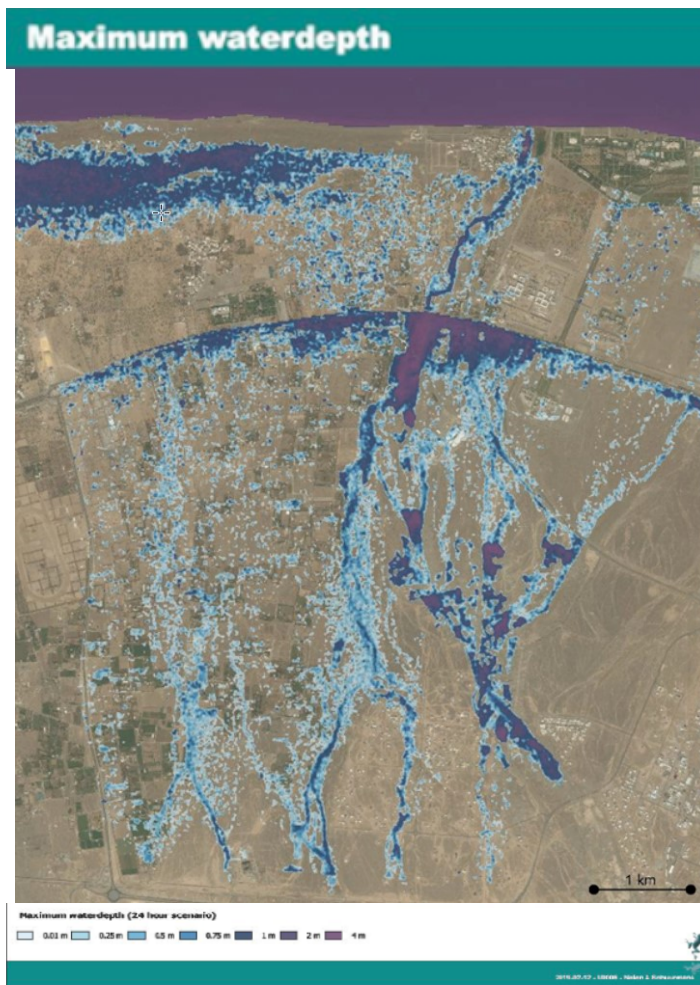


Figure 2: Maximum inundation map according to the flood model of wadi Majraf-Manumah, for details see: Nelen & Schuurmans (2019), Hadidi et al. (under review)

Work on the project “Towards a flood-resilient Omani society: improved tools for flood management”, funded by the Omani Research Council (TRC), was finalized. The final report was submitted in April to the TRC summarizing the major results of the last funding period (Holzbecher 2019).

The report includes major findings concerning flood risks in lowland regions, where in many places aspects of urbanization have to be considered as well. The general situation was discussed by Holzbecher & Hadidi (2019). A flood model was developed for wadi Majraf-Manuma in Muscat, Oman. The model region is in the lowlands near the coast of the Oman Sea, which has seen a rapid urbanization recently. A flood scenario was set-up, assuming inflow as result of a

severe precipitation event in the Hajar mountains. The model was developed in cooperation with Nelen & Schuurmans in the Netherlands, using the 3Di software. 3Di enables users to construct flash flood scenarios and run them in a cloud environment (Nelen & Schuurmans 2019). For details of the model see Hadidi et al. (under review). The figure below shows a map with maximum inundation depth in the model region according to the chosen flood scenario. The study demonstrates the use of a novel modeling tool and highlights the need for regular updating of flood simulations.

In order to evaluate flood risks, it is eligible to construct flood maps on the computer. In an environment of rapid urbanization it is necessary to perform regular updates. For such purpose, advanced flash flood simulation tools are available that deliver accurate results in short time with high-resolution information and advanced capabilities to model hydrodynamic processes. The high level of detail, the short computational time and the interactive access via web browser make 3Di software a suitable tool for flood modeling. The presented approach is thus important for decision-making, in the planning phase as well as in actual flood management.

We continued our former work on watershed delineation with special focus on automatic delineation tools as they are currently available in GIS software. The major findings were presented by Holzbecher & Hadidi (2019).



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Figures 2: Flow experiment, inlet view, before and after the flood

They conclude that “automatic watershed delineation is not a suitable tool for flood risk mapping in regions with small topographic gradients, as in coastal lowlands. There are three major reasons for this. (1) Accuracy errors in the digital elevation maps (DEMs) have a more relative weight for small elevation heights. (2) Watershed boundaries are shifting in response to flood events; a DEM may not reflect the current state relevant for a flood to come. (3) Water divides are relevant only for not inundated regions, and become irrelevant in case of inundation”.

Flood Experiment Destroyed by Flood

A flood experiment was designed at GUTech campus in December 2019. A flood channel of 100 m length, 1 m width and height was dug, with inlet and outlet basins on both sides. The discharge was to be measured by V-notch at inlet and outlet. Several sensors were installed at several positions measuring pressure, salinity (EC) and temperature in the flowing water as well as humidity in the soil below. A first experiment with 10.000 gallons water from a tanker led to an artificial flood of 3 hours duration. Two days after heavy rainfall in Oman led to a complete inundation of the entire channel and basins (see figures). The place had been dry for years before. The scientists hope that the sensors can be recovered and their measurements read out.

Publications

- Holzbecher E. (2019) Towards a flood-resilient Omani society: improved tools for flood management, Final report, proposal no. ORG/EBR/13/005
- Holzbecher E., Hadidi A. (2019) Flood risk mapping in low coastal regions considering watershed delineation uncertainty, 38th IAHR World Congress, Panama, Proceedings
- Holzbecher E., Hadidi A., On watershed delineation for flood modelling in lowlands, 5th Intern. Symp. on Flash Floods in Wadi Systems, Kyoto, accepted
- Hadidi A., Holzbecher E., Infiltration and recharge processes inside a wadi channel, 5th Intern. Symp. on Flash Floods in Wadi Systems, Kyoto, submitted
- Hadidi A., Holzbecher E., Molenaar R., Flood mapping in face of rapid urbanization: a case study of wadi Majraf-Manumah, Muscat, Sultanate of Oman, Urban Water Journal, under review
- Nelen & Schuurmans (2019) Guideline Flood Risk Mapping in Oman, internal report •
- Saber M., Kantoush S., Sumi T., ... Holzbecher E., Hadidi A. et al) Integrated management of flash floods in wadi basins considering sedimentation and climate change: an international collaboration project, Sustainability, under review



Philippine School of Business Administration (PSBA) Philippines

<http://psba.edu/>

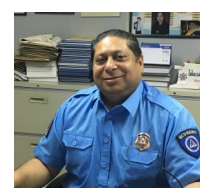


Figure 1. Front from left: Dir. R. Cabantac Jr., Hon. Mayor Joy Belmonte, Hon Guest, Dr. J. Peralta, Dir. Salvador, and Dr. T. Raza; Back from left: Mr. R. Espinosa, Mr. K. Lim, Engr. E. Lopez; receiving the Gawad KALASAG Award for PSBA-Manila.

The Disaster Risk Management (DRM) Unit of the Philippine School of Business Administration – Manila (PSBA-Manila) Graduate School of Business (GSB) once again won the Regional Gawad KALASAG Award 2019 for the Higher Education Institution category in the Philippine National Capital Region on July 30, 2019 at the Armed Forces of the Philippines Commissioned Officers Clubhouse, Camp General Emilio Aguinaldo, Quezon City, Philippines. This award recognizes various stakeholders that design and implement Disaster Risk Reduction and Management programs that protect high-risk communities against hazards, improve coping capacity, and addressing vulnerabilities. This was the second year PSBA-Manila won the award. In this event, the School also signed a partnership with the Office of Civil Defense (OCD) National Capital Region (NCR) to send its students for internship on DRM-related activities by the government office.

In addition, the PSBA-Manila DRM Unit co-organized two International Seminars and one International Training Program in collaboration with its local and international partners including the Quezon City Local Government; School of Urban and Regional Planning, University of the Philippines, Diliman; IQRA University, Karachi, Thailand; Lahore College for Women University, Lahore, Pakistan; and Pamantasan ng Lungsod ng Marikina, Marikina, Philippines. These are:

- International Faculty Strengthening Program 2 held on January 27-29, 2019 at the Training Room, 3rd Floor Legislative Building, Quezon City Hall, Quezon City.
- 3rd International Research Symposium (3IRS) entitled “Business Continuity and Disaster Risk Reduction Challenges in the Organization, Policy Formulation, and Implementation” held on March 23, 2019 at the Grand Auditorium, Philippine Heart Center, Quezon City, Philippines.
- Second International Training Program (2ITP-2019) held on July 20-22, 2019 in the City Planning and Development Office (CPDO) Conference Room, 4th Floor, Civic Center D, City Hall Compound, Quezon City, Philippines.
- 4th International Research Colloquium towards Disaster Risk Transfer (4IRC-DRT) held on November 9-10, 2019 at the Quezon City Experience (QCX) Theater, Quezon City Circle, Philippines.



Prof. Tabassa, Raza

Director, DRM Unit

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The proceedings for these events are disseminated through the PSBA-Manila website at <http://psba.edu/downloads>

Researches produced by the DRM Unit (excluding the thesis of students who are also DRM Unit Research Fellows) for the year of 2019 include:

- Raza. T., Rentoy. F., et al. (2019). "Water challenges and Urban Sustainable Development in Changing Climate: Economic Growth Agenda for Global South; European Journal of Sustainable Development", 8(4) pp. 421-436, Published by ECSDEV, Via dei Fiori, 34, 00172, Rome, Italy
- Raza. T., Cuña. A., et al. (2019). "Sustainable Development Challenges due to Extreme Weather Impact: Innovating a Science and Policy Framework for Sustainable and Disaster-resilience Quezon City, Philippines". United nation, Global Platform for Disaster Risk Reduction 2019, May 13-17, 2019, Geneva,

Switzerland

- Raza. T., & Peralta. J. (2019) "Education, Capacity Development and Disaster Resilience". International Symposium, Disaster Resilience and Sustainable Development, Panel Discussion (PD-01), March 7-8, 2019, Asian Institute of Technology, Thailand

PSBA-Manila also graduated its pioneer batch of twelve students from the School's Master in Business Administration specialization in Disaster Risk Management (MBA-DRM) program.

Finally, the recognitions from DRM offices and Mayor of Quezon



Figure 2. The Pioneer batch of the PSBA-Manila MBA-DRM Program with the Dr. Jose Peralta, Dean; Mr. Alberto Kimpo, City Administrator of Quezon City; Hon. Mayor Joy Belmonte, Mayor of Quezon City; Dr. Aman Rashid, Ambassador of Pakistan to the Philippines; and Dr. Tabassam Raza, Associate Dean and Director, DRM Unit.



UPRI

University of the Philippines
Resilience Institute (UPRI), Philippines
<https://resilience.up.edu.ph/>



The UP Resilience Institute was established as a proactive hub of benchmark innovative information vital to the nation's efforts in climate change mitigation and adaptation.

Its mission is to empower local communities through multidisciplinary actions toward resilience.

As a response through its Memorandum No. PAEP-16-67, the UP Board of Regents (BOR) approved on 28 July 2016 the establishment of the University of the Philippines Resilience Institute (UP RI) to have the following functions and programs concerning multi-hazard, multidisciplinary, multisectoral, comprehensive disaster risk reduction and management (DRRM).

In 2019, the UP Resilience Institute (UPRI) and the Philippine Academic Society for Climate and Disaster Resilience (PASCDR) held the first academic conference on climate and disaster resilience entitled *SHARE. COLLABORATE. EMPOWER. Strengthening the Role of the Academe in Climate and Disaster Resilience* last November 27-28, 2019 at the University of the Philippines Diliman, Quezon City, Philippines.

The conference brought together the academe from higher education institutions (HEIs) across the Philippines to establish greater linkages and collaborations in the field of Disaster Risk

Reduction and Climate Action (DRR-CA). They affirmed the importance of the academe by formally organizing the Philippine Academic Society for Climate and Disaster Resilience. Invited speakers were academicians and researchers working on climate and disaster resilience from different academic disciplines. Programs, researches, and innovations were presented during the conference in five plenary sessions, such as: Science-based innovations for disaster reduction and climate change action, The role of arts, culture, and social sciences in resilience building, Enhancing resilience through health and social services, Enhancing technologies for resilience architecture, engineering and technology, and Business, governance, and public safety for climate and disaster resilience.



Prof. Mahar Lagmay

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More than 200 people participated in the conference, and more than 150 pledged their membership and commitment to the Academic Society.





Center for Urban Water (CURW) Sri Lanka

<https://www.curwsl.org/>



Figure 3: Weather Stations installed at various schools

This report will summarise the activities done by the Center for Urban Water (CURW) during 2019. Main activities of CURW are listed below.

1. Completing the flood damage survey and derivation of depth-damage functions from the survey results
2. Progress in the water level gauge and weather station deployment
3. Starting to obtain canal discharge measurements using ADCP equipment
4. Participation in two the following workshops:
 - Short course on "UAV Advanced Mapping and Applications" from the Postgraduate Institute of Science (PGIS), University of Peradeniya (a 2-day residential workshop)
 - Workshop on "The role of Project Procurement" from Eng. Saman Kandanearachchi at Skills Development Fund (SDFL) (One day workshop)

Following provides detailed descriptions of above activities:

1. Completing the damage survey and derivation of depth-damage functions from the survey results

CURW conducted a field survey on flood damage to the building content for the non-residential buildings, for the loss estimations for past and future flood scenarios. The losses will generally occur in the following aspects.

- Structural damage for buildings (Damages to building structural elements such as walls/roof)
- Content damage for buildings (Damages to things inside the building such as sofas/television/refrigerator)
- Damages to the economic activities (Damages

occur from not conducting the economic activities such as interruptions to businesses etc.)

- Damages to the prominent infrastructure (such as bridges, roads, culverts, telephone connection points and poles, electrical infrastructure, flood protection structures etc.)
- Damages to vehicles
- Expenditure for relief (cost borne for the relief requirements of the flood affected people, which is usually born by the relevant governmental authorities such as Disaster Management Centre, National Disaster Relief Services Centre, Municipal councils, Urban Councils and Divisional Secretariats)

There are more types of damages that can be seen in a disaster, which are not easily captured by a physical property, such as the value of a (lost) human life and the extent of a disease outbreak which is due to the cascading effect of the flood event.



Prof. Srikantha Herath
Director

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Currently, CURW adopts damage functions prepared for the structural damages and the content damages, which were prepared based on the field surveys carried out by the internal staff of CURW, in order to calculate the respective damages. At the same time, CURW seeks opportunities to develop relevant damage curves for the other types of the aforementioned damage categories, through possible partnerships, methodologies and workarounds.

2. Progress in the water level gauge and weather station deployment

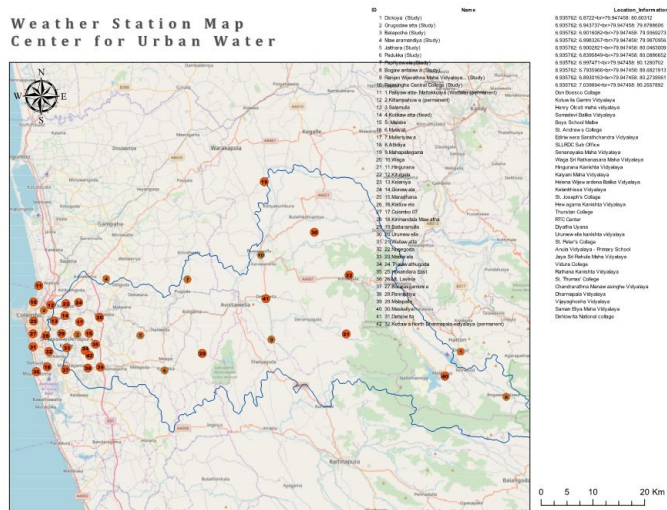


Figure 1. Locations of the weather stations and the water level gauges

CURW has been installing weather stations to cover the whole island, including the Metro Colombo Urban Development Project (MCUDP) area. The installation work of the weather stations is reaching its completion, having more than 80% of the planned stations already being installed. The center will need another two months of time to complete the rest of the installations, with the existing conditions. Furthermore, 8 water level gauges are currently under operation, and procurement of the others are progressing. The locations of the weather stations and the water level gauges are shown in the Figure 1.

Some snaps from the weather stations at the schools are shown in the pictures of Figure 3.

In addition, the data summaries are being displayed in the CURW website, which is accessible to the public. Furthermore, historical data will be available for the stakeholders and for the registered users. The links to access the public webpages are mentioned below.



Figure 2. Water level gauge at Mattakkuliya

Observed Total Rain (1, 3 and 24 hrs): <https://www.curwsl.org/curwsl/rainfall/content/observed-total-rain-1-3-and-24-hrs>

Observed Hourly Rain: <https://www.curwsl.org/curwsl/state-water/content/observed-hourly-rain>

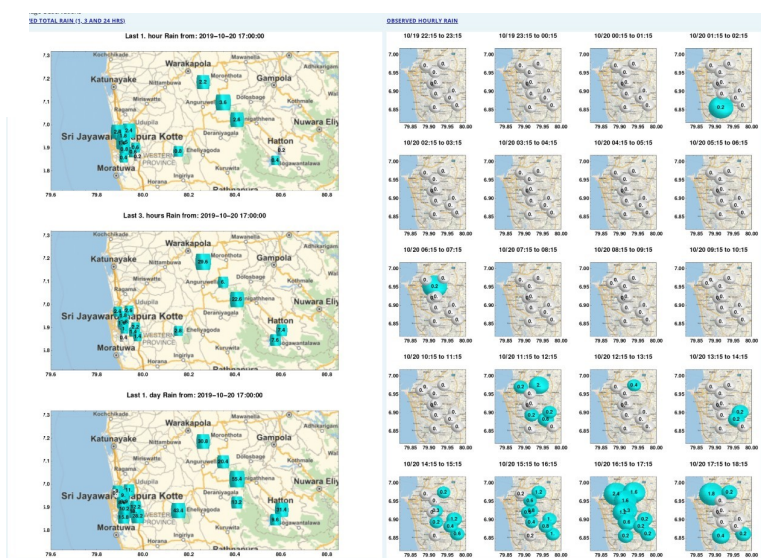


Figure 4. Observed hourly rainfall and Observed total rain (publicly accessible)

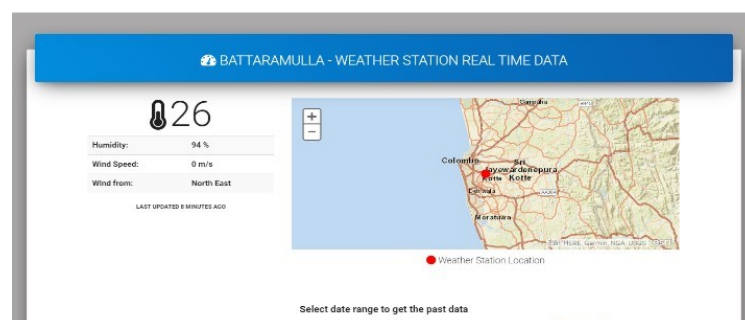


Figure 5. Historical data from the CURW website (access only for stakeholders and registered users)

3 Obtaining canal discharge measurements using the ADCP equipment

During the heavy rains in this quarter, CURW was able to measure the canal discharges using the Acoustic Doppler Current Profiler (ADCP) equipment, for several canal outfalls in Colombo. Field visits were made to the outfall locations based on the rainfall and water levels of the canals, and the discharges were recorded.

Some activities from the field visits are attached below.

The canal discharges and many other information is processed using the measurement data and extracted on the site using the dedicated software for the measuring device. A preview of such a result obtained for a particular canal is attached below. Also, CURW has internally developed its capacity to derive the cross-section profile data of the measured cross sections as shown below, as the dedicated software does not directly provide the cross-section data.

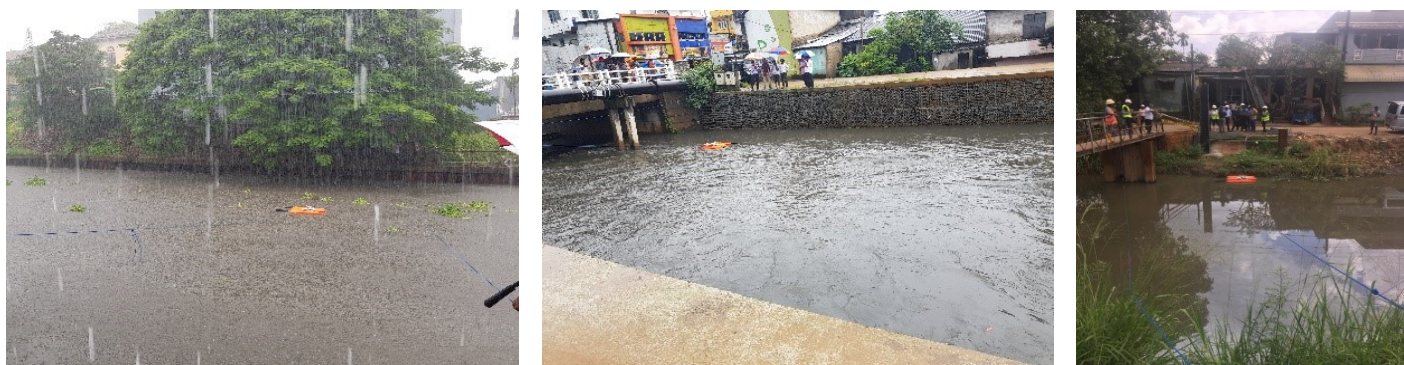


Figure 6. Snapshots during the canal measurement field visits
(Left: @Wellawatta Canal, Middle: @Nagalagam Street, Right: @Sedawatta Canal)

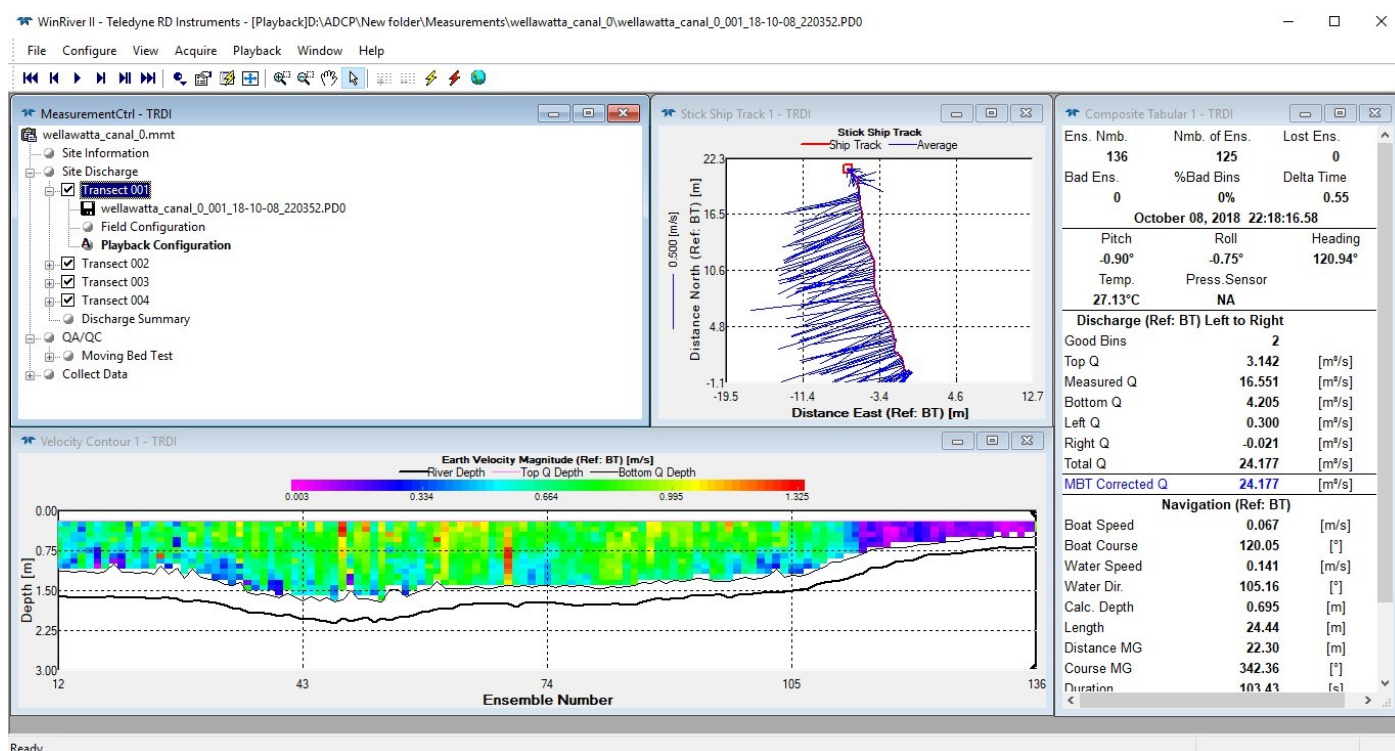


Figure 7. User interface of the dedicated WinRiverII software



4. Workshop

With the University of Peradeniya, CURW organized a workshop on,

1. Short course on "UAV Advanced Mapping and Applications" from the Postgraduate Institute of Science (PGIS), University of Peradeniya (a 2-day residential workshop)

The course was organized by the Postgraduate Institute of Science (PGIS), University of Peradeniya, and covered the following topics: 1. Introduction for UAV, 2. UAV Flight Planning and Management, 3. UAV Image Acquisition and Data Processing, 4. Global Navigation Satellite System 5. Internet of Things (IoT) and 6. Presentations of Participants (CURW interns). Some of the moments captured during the workshop is attached herewith.





National Building Research Organisation (NBRO) Sri Lanka

<http://www.nbro.gov.lk>

International Symposium on 'Equitable Resilience'



National Building Research Organisation held its annual research symposium on 17th and 18th December 2019 in Colombo for the tenth time in a grand manner. The theme of the symposium was 'Equitable Resilience' and it was attended by many local and international participants who shared their knowledge and experience. Many local and foreign agencies came forward to assist NBRO in organising this symposium.

At present, vulnerability not only to disaster, but also to associated environmental, social, health, economic and other related issues are also taken into consideration in building disaster resilience. Adaptability is the key issue and it is thus becoming a way of life. In this context, equitable resilience, a form of resilience practiced by taking into account various issues of social and other vulnerabilities and access to power, knowledge, and resources is considered as important. Having realized the complexities in multidisciplinary approach of NBRO in building disaster resilience in the country and completion of a multitude of related research, this Annual

Research Symposium was held under the theme of 'Equitable Resilience'.

NBRO conducted research in various subjects; ranging from landslide to human settlement studies, construction materials studies to building codes, and from substrata studies to air quality studies and their outcomes were presented in the technical sessions and panel discussions under the subthemes of Codes for resilient Sri Lanka, Practicing resilient construction, Data Sharing for resilience, Equitable mitigations, Retrofit for resilience, Sustainable resilience, and Resilient environment. The discussions that followed enlightened the audience.



Dr. Asiri Karunawardena

Director General

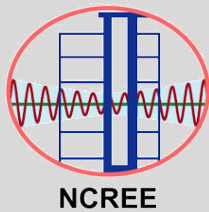
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At this symposium several important NBRO publications were launched. “Manual on Nature Based Solutions for mitigation of Landslide risk” was published as an outcome of the World Bank funded Nature Based Landslide Risk Management Project in Sri Lanka, implemented by the NBRO with technical assistance from Asian Disaster Preparedness Center (ADPC), Thailand. “Guideline for Management of Chemical Disaster Risk in Industry and facility in Sri Lanka” was published as a component of a government-funded project of Systematic Diagnostic Assessment of Chemical Disaster Risk in Sri Lanka. “Geotechnical Guideline on Safe Construction of Building Foundations” and “Technical Guidelines on Building Demolition Work in Sri Lanka” were compiled by respective technical divisions of NBRO with the

assistance of experts in the field and published. “The Handbook on Test Methods and Specifications for Material and Product Selection - Vol 1: Common Building Materials and Products” was compiled by NBRO researchers with the assistance of national experts and published. In addition, a web based ‘Subsurface Geological Geotechnical Model for Disaster Resilient Housing in Colombo Municipal Council’ prepared by NBRO was launched as well. Information in these products are immensely useful to relevant stakeholders, researchers, practitioners and also the general public and are available for free downloading at NBRO website.





National Center for Research on Earthquake Engineering (NCREE), Chinese Taipei

<https://www.ncree.org/>

International Conference in Commemoration of 20th Anniversary of the 1999 Chi-Chi Earthquake, 15 to 19 September 2019



The 1999 Chi-Chi earthquake, which was induced by the rupture of the Chelungpu fault, struck central Taiwan on September 21 (local time), 1999 with a local magnitude (M_L) of 7.3. The length of the fault rupture zone observed on the ground surface was 85 km and the maximum fault displacement was over 10 m. Disastrous effects occurred over a large area characterized by high intensity near the Chelungpu fault. These included 2,415 deaths, 11,305 severely wounded people, and over 50,000 severely damaged buildings. Although the earthquake was a disaster for Taiwan, much was learned from it.

In the last two decades, the extensive and high-quality ground motion data from the Chi-Chi earthquake have contributed significantly to advancements of seismology and earthquake engineering, especially in ground motion prediction, studies of near-fault effects, seismic evaluation, and seismic retrofit. This information also benefited the development of disaster prevention technologies, including earthquake early warning, and seismic loss and risk assessment. The International Conference in Commemoration of the 20th Anniversary of the

1999 Chi-Chi Earthquake held from 15 to 19 September 2019 aimed at providing a forum to bring together researchers, professionals, engineers, and academics to promote and exchange new ideas and experiences in the fields of earthquake engineering, disaster management, seismic prevention, and many related issues. Therefore, the conference addressed the issue of “Sustainable and Seismic-Safe Society” to learn from the past, to examine the progress made so far, and to look forward to a more seismic-safe society in the future.



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Director-General

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Large-Scale Multiaxial Laminar Shear Box: An Apparatus Advancing Soil Liquefaction Experiment

The construction of a “large-scale multiaxial laminar shear box” was completed in 2019 to serve as an experimenting trust in response to the government’s green energy technology policy. The unique mechanism enables the soil specimen to move horizontally without torsion, thereby considerably reducing the boundary effect. The box will mainly be used in offshore wind foundation tests. Additionally, together with the earthquake simulator in NCREE’s Tainan Laboratory, the box can be used to study the

impact of near-fault earthquakes on geotechnical earthquake engineering. As a result, NCREE is able to further develop cutting edge seismic technology and propel Taiwan to reach the status as an earthquake-resilient country.



Fig.2. The large-scale multiaxial laminar shear box





National Science and Technology Center for Disaster Reduction (NCDR), Chinese Taipei

<https://www.ncdr.nat.gov.tw/>

In 2019, NCDR has continued making efforts in advancing information intelligence for emergency operations, disaster risk reduction researches, and regional capacity building. Meeting demands of information age, big data and crowdsourcing data not just facilitate trade activities and business operation, but also directly bring benefits to disaster risk reduction, emergency preparedness, business continuity planning, resilient global supply chain, critical infrastructure protection and tourism safety. NCDR had organized two three-day workshops (the International Training Workshop on Natural Disaster, ITW) in the first half of 2019 and major themes focused on applications of big data and social media for assistance in disaster risk reduction and emergency preparedness. The two workshops demonstrate innovative applications of using the state-of-the-art information and telecommunication technology to enhance coverage and efficiency of information facilitation. There are more than 70 participants from 16 countries attending in the two workshops and including six delegated by GADRI.

Meanwhile, NCDR got the support from APEC Secretariat to hold the “APEC Resilience Week” that was held from 30 September to 2 October in Taipei City. NCDR invited disaster managers, governmental officers, and researchers of the APEC region to attend the event that focused on using science technology to enhance the regional resilience. In total, 13 economies attended to collect brainstorming on sharing best practices related to enhancing regional resilience.

Besides that NCDR also keeps close collaboration with partners in Asia-Pacific partners through carrying out the Program of Smart Disaster Risk Management in several target areas, to deliver the training courses and transfer modern equipment. Technologies covered include monitoring systems for precipitation and seismic activity, as well as online platforms for public information updates.



The 2019 International Training Workshop on Natural Disaster

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Mountain Societies Research Institute (MSRI) University of Central Asia, Tajikistan

<https://www.ucentralasia.org/Research/MSRI>



In 2019, Mountain Societies Research Institute (MSRI), University of Central Asia strengthened ongoing partnerships and research programs, initiated new projects, taught courses in the Earth and Environmental Sciences major at UCA, conducted a Certificate Programme on Natural Resources Management, and hosted Summer Universities and workshops.

The following are the main MSRI achievements:

Pathways to Innovation

As part of the Pathways to Innovation project, funded by the International Development Research Centre (IDRC), MSRI offered a 30 ECTS (European Credit Transfer and Accumulation System) Certificate course on Natural Resources Management (CNRM) to 20 faculty members from Badakhshan University, Bamyán University, Khorog State University and Aga Khan Foundation in Afghanistan. The 3-week course offered in July-August 2019 was well received and included modules on concepts of sustainability and sustainable land management, integrated agricultural management and food systems, livelihoods in rural mountain communities, natural hazards and disaster risk reduction, and climate change. In November-December 2019, MSRI conducted post CNRM workshops at Badakhshan, Bamyán, and Khorog State Universities to disseminate knowledge and transfer various

technical skills to other faculty members and students. A total 121 faculty members and students attended workshops, 43% of which were female.

THRIVE Tajikistan

Throughout the life of the project “Thrive Tajikistan: Enhancing Social Services, Governance, and Economic Inclusion in Border Regions”, jointly funded by USAID and AKF, MSRI is implementing three research studies related to food security and food systems within selected broad environmental contexts. These include two projects in GBAO and one in the

Khatlon region. Thus, during 2019, MSRI established a partnership with Pamir Biological Institute (PBI) in Khorog and successfully conducted research on wheat varietal screening at the PBI Research Station in Ishkashim, GBAO. During the growing season, PBI field staff regularly monitored the research plots and collected data on wheat growth and yield in close collaboration with the research lead of PBI. Discussions related to two new research projects focused on food security in progressing with potential partner institutions: one in GBAO and one in Khatlon. By the end of March 2020 MSRI will launch these two projects.



Prof. Roy Sidle

Director

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Disaster Risk Management

In June 2019, MSRI researchers collaborated with geoscience researchers from University of Bern (Switzerland) and University of Natural Resources and Life Sciences (Austria) to present an intense 10-day training on disaster risk management in Tajikistan. Most of the course focused on geohazards, assessing their risk in the Pamirs, and sustainable approaches to disaster risk reduction. Lectures were held in Khorog together with field trips, followed by a 3-day field trip to Muminabad to view watershed action plans being enacted by CARITAS.

Paleoclimate, Environmental Change and Social Interaction in Central Asia (PALESCA)

MSRI in collaboration with German Research Centre for Geosciences (GFZ) organized the second summer school 'Learning Landscapes through Environmental Research and Monitoring' as a part of the Paleoclimate, Environmental Change and Social Interaction in Central Asia (PALESCA) project, funded by the German Federal Ministry for Education and Research (BMBF). Twenty-two undergraduate and master students from Central Asia countries who study environment sciences or conduct scientific research participated in the summer school. Professors and experts of MSRI, GFZ, University of Amsterdam, Naryn State University, Central-Asian Institute for Applied Geosciences, Kyrgyz-Russian Slavic University, Kyrgyz Hydromet and CAMP Alatau introduced students to several interrelated aspects of landscapes research: geology, geomorphology,

paleoclimatology, natural resources management, dendrochronology, wildlife science, socioeconomic aspects of mountain regions development, and related topics. The PALESCA summer school offered a very good opportunity to attend interesting lectures, laboratory exercises, fieldwork, and excursions for students. Additionally, two participants of the summer school had an excellent opportunity to participate in a 2-week internship at GFZ in Germany.

"Leaving something behind" Migration governance and agricultural and rural change in "home" communities

In 2019, MSRI launched new project with support from European Union's Horizon 2020 research and innovation programme entitled "Towards forward-looking migration governance: addressing the challenges, assessing capacities and designing future strategies" (AGRUMIG) in the Batken, Jalal-Abad and Naryn provinces. The AGRUMIG project focuses on the linkages between out-migration and agricultural and rural change in seven countries (Nepal, Thailand, Morocco, China, Ethiopia, Moldova and Kyrgyzstan). The aim is to identify the mechanisms that produce the bewildering diversity of outcomes regarding out-migration and rural change. Based on this comparative analysis, the AGRUMIG project will contribute to the framing of context specific policy at national and global levels that more effectively combines migration and agriculture/rural change.





Japan





Japan



Japan and Oceania

Research Center for Potential Development of Disaster Prevention, Akita University
Asian Disaster Reduction Center (ADRC)
Center for Disaster Management Informatics Research, Ehime University
International Centre for Water Hazard and Risk Management (ICHARM) under the auspices of UNESCO
International Consortium on Landslides (ICL)
Crisis & Security Management Research Center, Kagawa University
Research and Education Center for Natural Hazards, Kagoshima University
Institute of Nature and Environmental Technology, Kanazawa University
Research Center for Social Safety Science, Faculty of Safety Science, Kansai University
Research and Development Center of Fire and Environmental Safety (RDFES), The University of Kita Kyushu
Research Center for Urban Safety and Security (RCUSS), Kobe University
Implementation Research and Education System Center for Reducing Disaster Risk (IRESC), Kumamoto University
Institute of Disaster Area Revitalization, Regrowth and Governance (IDiARRG), Research Institute for Disaster Area Reconstruction, Kwansei Gakuin University
Disaster Prevention Research Institute (DPRI), Kyoto University
Graduate School of Global Environmental Studies (GSGES), Kyoto University
Disaster Risk Reduction Research Center, Faculty of Engineering, Kyushu University
Research Institute for Applied Mechanics (RIAM), Kyushu University
Center of Environmental Science and Disaster Mitigation for Advanced Research (CEDAR), Muroran Institute of Technology
Advanced Disaster Prevention Engineering Center (ADPEC), Nagoya Institute of Technology
Disaster Mitigation Research Center (DMRC), Nagoya University
National Research Institute for Earth Science and Disaster Resilience (NIED)
Research Institute for Natural Hazards & Disaster Recovery, Niigata University
Research Initiative for Natural Disaster Prevention of Oil and Gas Spill in Industrial Parks, Graduate School of Engineering, Osaka University
Graduate School of Human Sciences, Faculty of Human Sciences, Osaka University
Frontier Research Center for Natural Disaster Mitigation, Ritsumeikan University
Institute of Disaster Mitigation for Urban Cultural Heritage (R-DMUCH), Ritsumeikan University
Disaster Prevention Research Center for Island Regions, University of the Ryukyus
International Research Institute of Disaster Science (IRIDeS), Tohoku University
Center for Urban Earthquake Engineering (CUEE), Tokyo Institute of Technology
Earthquake Research Institute (ERI), The University of Tokyo



Asian Disaster Reduction Center (ADRC), Japan

<https://www.adrc.asia>

ADRC Disaster Report on 2019 Typhoon Hagibis (No.1)

1. Overview:

On 12 October 2019, a large and powerful typhoon, Hagibis, locally named as Typhoon No.19 made a landfall in Shizuoka Prefecture, about 100 km southwest of Tokyo, passing through eastern and north-eastern regions until early morning of 13 October. Central and northern parts of the country were severely affected by strong winds and heavy rainfall and subsequent floods and geohazards.

From 24 to 25 October 2019, low pressure passed through western, eastern and northern regions along the Pacific coast, bringing another heavy rainfall in the Pacific coast of Kanto and Tohoku regions, especially Chiba and Fukushima Prefectures. The rainfall resulted in floods and geohazards again, causing human and physical damages to the typhoon-hit areas.

According to the report of the Cabinet Office, as of 20 November 2019, 101 persons were killed or went missing while 481 persons were injured. About 2,400 houses were totally collapsed and over 33,000 houses were damaged. Furthermore, some 50,000 houses were inundated¹.

2. Outline of Typhoon Hagibis:

Typhoon Hagibis was formed on 6 October in the south of Minamitori Island, developing into large and strong typhoon, with its central pressure at 915hPa and maximum sustained winds at 55m/s.

When it landed on Izu Peninsula, Shizuoka Prefecture on 12 October with the strength of 955hPa, maximum 40m/s, categorized as strong in the country, the area within its 600km-radius from the typhoon center was forecast as strong wind.

The typhoon brought about heavy rainfalls in wide areas of Kanto (eastern) and Tohoku (north-eastern) regions of the country, where rainfalls exceeded past records in hourly, daily and total precipitation in more than 120 areas.

¹ The figures include data of the impact of heavy rain on 24-26 October 2019

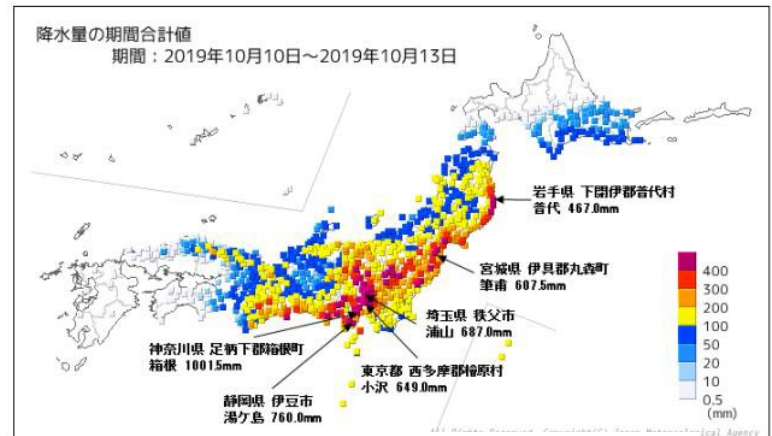


Figure 1. Total Precipitation from 10 – 13 October

(Source: Japan Meteorological Agency)

For example, in Hakone, Kanagawa Prefecture, total precipitation reached 1001.5 mm. Also, record high waves and storm surges were observed mainly in the Pacific coast.

3. Early Warning:

With the typhoon approaching, Japan Meteorological Agency (JMA) started to issue Tropical Cyclone Information, forecast and warning and advisory, as well as information on landslide, inundation, flood etc. Heavy Rain Emergency Warning, its highest alert level was issued to Shizuoka, Kanagawa, Tokyo, Saitama, Gunma, Yamanashi, Nagano, Ibaraki, Tochigi, Niigata, Fukushima, Miyagi and Iwate prefectures on 12 and 13 October.

4. Evacuation:

Followed by JMA's information, municipalities issued Evacuation Order to over 2.1 million people in 11 prefectures and Evacuation Advisory to over 4.3 million people in 16 prefectures.

It is reported that some 219,000 people actually evacuated to evacuation shelters.

Dr. Shiomi Yumi

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Prefecture	Evacuation Order (Urgent)	Evacuated
Iwate	185,918	9,930
Miyagi	983,136	10,104
Fukushima	302,853	3,590
Ibaraki	204,910	19,595
Tochigi	TBC	19,822
Gunma	11,750	5,213
Saitama	TBC	30,147
Chiba	25,195	
Tokyo	196,545	76,235
Kanagawa	0	6,648
Niigata	39,087	3,878
Nagano	134,260	7,435
Shizuoka	47,494	85
Others ²	1,006	
TOTAL	2,105,953	218,883

(Source: CAO, as at 13:00, 13 October 2019)

5. Impacts:

Flooding:

River overflows and damages to embankments and river facilities occurred, causing floods in many areas causing human and physical damages. According to Ministry of Land, Infrastructure, Transport and Tourism (MLIT), river embankments collapsed at 140 areas in 71 rivers. Total inundation area reached 25,000 ha.

Sediment disaster:

Many sediment disasters occurred triggered by heavy rainfall. According to MLIT, 954 cases were reported including 423 debris flows, 44 landslides and 487 slope failures in Iwate, Miyagi, Fukushima, Tochigi, Gunma, Saitama, Chiba, Ibaraki, Tokyo, Kanagawa, Yamanashi, Nagano, Niigata, Shizuoka, Ishikawa, Akita, Aomori, Mie and Wakayama prefectures.

6. Damages:

Typhoon Hagibis and subsequent low pressure caused tremendous damages to human and properties.

-Damages to Human and Houses:

Due to the typhoon 98 persons lost lives and 3 went missing. 40 persons were seriously injured and 441 persons were slightly injured.

As for houses, 2,419 houses were totally collapsed while 16,331 were halfly damaged and another 17,414 were partially damaged.

-Damages to Properties:

Due to the typhoon, many critical infrastructures and lifelines suffered serious damages, causing suspension of services such as loss of electricity in maximum

521,540 houses and suspension of water supply to maximum 167,986 houses.

7. Government Response

At the onset of the disaster, Emergency Disaster Management Headquarters was established on 13 October 2019. Due to the severity of the disaster, Disaster Relief Act was applied to 390 municipalities in 14 prefectures. Also it was designated as disaster of extreme severity under the Act on Special Financial Support to Deal with Designated Disaster of Extreme Severity on 29 October 2019.

References:

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- Japan Meteorological Agency -The Heavy Rain Event by Typhoon Hagibis in October 2019 -Portal -http://www.jma.go.jp/jma/en/201910_Heavyrain/2019_Heavyrain.html
- Geospatial Information Authority of Japan—Aerial photos and estimated inundation area—<https://www.gsi.go.jp/BOUSAI/R1.taihuu19gou.html>
- Ministry of Land, Infrastructure, Transport and Tourism—About Situations by 2019 Typhoon Hagibis - http://www.mlit.go.jp/saigai/saigai_191012.html
- Asian Disaster Reduction Center - <https://www.adrc.asia/>
- Disaster Information - https://www.adrc.asia/view_disaster_en.php NationCode=392&Lang=en&Key=2357

² Others include Aomori (91), Akita (77), Yamagata (300), Ishikawa (4), Yamanashi (343), Gifu (29), Aichi (75), Mie (83), Osaka (2) and Yamaguchi (2).

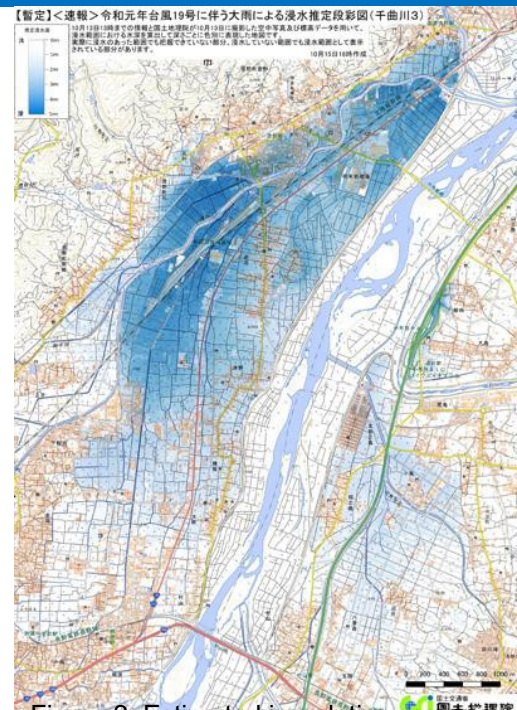


Figure 2. Estimated inundation area of the Chikuma River

(Source: Geospatial Information Authority of Japan)



International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM), Japan

<http://www.icharm.pwri.go.jp/>

International Centre for Water Hazard and Risk Management (ICHARM) under the auspices of UNESCO was established as a UNESCO category II center and a part of the Public Works Research Institute of Japan on 6th March 2006.

The mission is to serve as the Global Centre of Excellence for Water Hazard and Risk

Management by observing and analyzing natural and social phenomena, developing methodologies and tools, building capacities, creating knowledge networks, and disseminating lessons and information in order to help governments and all stakeholders manage risks of water related hazards at global, national, and community levels.

To achieve the mission, ICHARM has conducted various activities based on its three pillars, i) innovative research, ii) effective capacity building, and iii) efficient information networking, including following special topics;

i) Innovative research

The future flood risk associated with climate change in three cities in Vietnam was estimated on the ADB project. For the evaluation, GCMs that more appropriately expresses the climate characteristics of the target area were selected from CMIP5, and the uncertainty of the future results was evaluated by statistically downscaling the selected GCMs. In addition, the results of MRI-AGCM was physically downscaled to create future climate scenario and using RRI (Rainfall runoff and inundation model), the increase in flood area and inundation depth in the future compared to the present condition was evaluated. Establishment of monitoring and forecasting system for agricultural drought in Ceara State, Brazil started on the WB project.



4th United Nations Special Thematic Session on Water and Disasters

ii) Effective capacity building

ICHARM offers a one-year master's degree program, "Water-related Disaster Management Course of Disaster Management Policy Program (JICA Training Program: Flood Disaster Risk Reduction)," in collaboration with JICA and the National Graduate Institute for Policy Studies (GRIPS). This program is targeted at officials of administrative organizations and designed for them to obtain master's degree within a single year. On 11th September 2019, the 12th batch of 7 students from 7 countries graduated, and in the following month, the 13th batch of 11 students entered the program from 6 countries.

And ICHARM also provides a doctoral program in collaboration with GRIPS to produce experts who are capable of making policies on water-related disaster risk management and taking the leadership in implementing them. On 11th September 2019, the 7th batch of 2 students from 2 countries graduated.



Prof. Toshio Koike

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Graduation Ceremony—11th September 2019

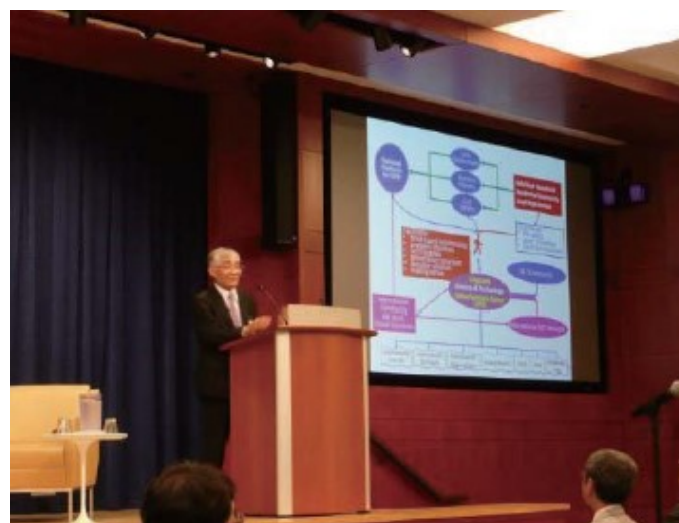
iii) Efficient information networking

The International Flood Initiative (IFI) is a worldwide framework to promote collaboration in flood management among international organizations such as UNESCO, WMO, UNU and UNDRR. As the IFI secretariat, ICHARM proposed the basic action plan of IFI, which was adopted as the Jakarta Statement. Under the IFI, ICHARM supports the establishment of “Platforms on Water Resilience and Disasters” in the Philippines, Myanmar, Sri Lanka, and newly Indonesia from 2019.

At the opportunity of the 12th Asia-Oceania Group on Earth Observations (AOGEO) Symposium, the Asian Water Cycle Initiative (AWCI) session was held on 2-4 November 2019, in Canberra, Australia. The experts and representatives from the IFI implementing countries participated and discussed issues on the promotion of regional cooperation among these countries.

ICHARM is also active in creating and developing the international networking through organizing the sessions and participating in the major global

and regional conferences such as the 51st Annual Session of the Typhoon Committee (TC), a joint intergovernmental body of WMO and UNESCAP, held from 25 February to 2 March 2019, in Guangzhou, China, the 4th United Nations Special Thematic Session on Water and Disasters held on 24 June 2019 at the UN Headquarter in New York, USA, and World BOSAI Forum 2019 held on 9-12 November 2019 in Sendai, Japan, for example.



Japan-World Bank Seminar on water and disasters





Center for Disaster Countermeasures (CDC) The University of Kitakyushu, Japan

<http://www.env.kitakyu-u.ac.jp/ja/shoubou/>

Seminar on environmentally friendly firefighting agent on Sep 27, 2019 held at the University of Kitakyushu



During 2019, the Center for Disaster Countermeasures continued under the international cooperation project in Hai Phong city, Vietnam. We aim to enhance capability of cross-linkage cooperation and coordination across various emergency management teams that deal with natural and man-made hazards. Commonly used training method of emergency responders in Vietnam is drills. Use of table-top and functional exercises is limited in its scope. In this project, we introduce methodology of designing, conducting and evaluating table-top and functional exercises that are intended to improve communication among emergency management teams and upgrade their cooperation/coordination skills. This is a Japan International Cooperation Agency (JICA) funded project. Our counterpart in the city is Hai Phong Firefighting and Prevention Police. This year's largest event was the cross-linkage functional exercise held in Hai Phong International Hospital in November in which we examined information sharing and decision-making capability of various medical, security and firefighting teams.

The Center for Disaster Countermeasures held three professional seminars on the characteristics and usage of environmentally friendly firefighting agent. This agent was invented in Kitakyushu city thanks to the researchers and practitioners in our university, Kitakyushu Fire Department, Shabondama Soap Co., Ltd, and Morita Holdings Co. Researchers and engineers from these organizations acted as teachers of these events. More than 160 participants joined from 39 fire departments



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<http://www.fukkou.net/overview/index.en.html>

Project activities

During 2019, the institute continued to implement following research activities.

- Study on establishment of mid-and long term evacuation plans in nuclear power plant regions.
- Study on upland relocation in the planning of pre-disaster recovery and revitalization for the Nankai trough Mega Earthquake
- International comparative study on disaster recovery and revitalization policies

Various study groups were organized for discussing the above issues. Each study group cooperates with academics, government officers, and NGO/NPO workers for cross sectoral learning.

Policy Advocacy

The institute finalized a draft proposal for a comprehensive act for affected people. It was announced at the press conference on Aug.29, 2019.

An annual network meeting and forum

The institute organized an annual network meeting of disaster-affected areas in Japan from January 12-13, 2019. There are various types of “recovery and revitalization knowledge” which emerge after a disaster. They serve as a useful policy and help us to design a new social system for supporting the affected people who are



struggling in this disaster prone country. These valuable pieces of knowledge, however, tend to be shared only within the affected area, and often fails to transfer to other areas. We organize a network meeting once a year to mutually share these lessons from various disaster affected areas in Japan.

In 2019, The theme was: “Message from Tohoku to the disaster expected places in the future” The first day was a network meeting with the specialists from various disaster-affected areas and the people from disaster expected places by the Nankai Trough Earthquake. The meeting focused what Tohoku learned from the disaster and how the expected cities need to be prepared. The second day was a symposium and panel discussion. There were more than 200 participants at the meeting and forum.



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Atmosphere-Hydrosphere Research Group

Typhoon Disasters in Japan in 2019

By Tetsuya Takemi

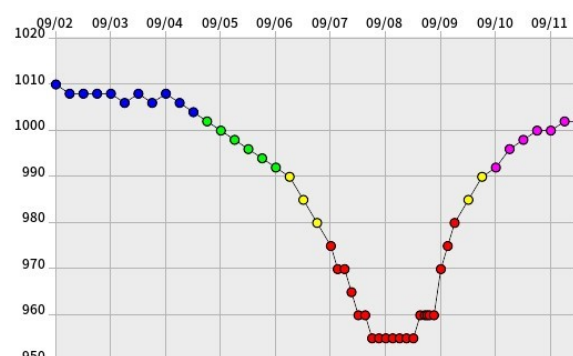
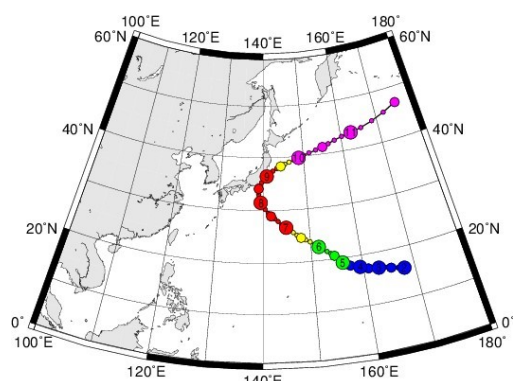


Figure 1: The track (left) and intensity (right) of Typhoon Faxai. Figure obtained from Digital Typhoon (<http://agora.ex.nii.ac.jp/digital-typhoon/summary/wnp/s/201915.html.en>)

1. Overview

In 2019, the number of typhoon occurrences is 29, a little larger than the climatological annual mean (i.e., 25.6). Considering the usual monthly sources, the occurrence of typhoons were above normal average for autumn (September, October, and November). Among the 29 typhoons, 15 typhoons approach closer to the Japanese islands, and 5 typhoons made landfall. There were two major typhoons that made landfall and caused severe disasters: the 15th typhoon (Faxai) and the 19th typhoon (Hagibis), which occurred in September and October, respectively. Because of the severe damages due to these typhoons, Japan Meteorological Agency named them as Reiwa-1 Boso Peninsula Typhoon (Faxai) and Reiwa-1 East Japan Typhoon (Hagibis), according to the regions where the severest damages occurred. The two typhoons caused different aspects of disasters. Faxai generated severe winds in the Kanto region, especially in Chiba Prefecture, and caused wind-induced disasters, while Hagibis produced extreme rainfalls in the Kanto and Tohoku regions and caused widespread floodings and landslides. In this report, some characteristics of Faxai and Hagibis are described.

and intensified up to the minimum surface central pressure of 955 hPa and the maximum surface wind of 45 m/s. It made landfall over the Kanto region with the maximum surface wind of 40 m/s, which is the strongest landfalling typhoon in the Kanto region since 1991, i.e., the time when the observed records are available. Figure 1 shows the track and intensity of Typhoon Faxai.

During this typhoon landfall, the maximum instantaneous surface winds over the Boso Peninsula, which is located in the eastern side of the typhoon center, are 48.4 m/s at Tateyama, 40.8 m/s at Katsuura, 49.0 m/s at Kisarazu, 57.5 m/s at Chiba, 45.8 m/s at Narita, and 40.4 m/s at Choshi. Owing to these strong winds, there were severe damages to houses, trees, forest, power lines, etc.



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2. Typhoon Faxai

Typhoon Faxai, the 15th typhoon in 2019, developed at 0300 JST (Japan Standard Time) 5 September,

The damages to power lines caused power shutdown in widespread regions in Chiba Prefecture and the surrounding areas.

On the western side of the typhoon center, i.e., in the Tokyo metropolitan areas, the maximum instantaneous winds are 31.4 m/s at Tokyo, 43.7 m/s at Haneda, and 36.5 m/s at Edogawa-Rinkai. The Tokyo observation site is located in the Kitanomaru Park, to the north of the Imperial Palace, where natural winds are expected to be recorded. However, within densely built urban districts the instantaneous winds may be severer than those observed in sparsely built, widespread open spaces. For example, the maximum instantaneous winds in the business district of Osaka City during the passage of Typhoon Jebi (2018) were estimated as 60-70 m/s, which was much stronger than the record (47.4 m/s) at the Osaka meteorological observation site. This is due to the turbulent mixing of high momentum at the boundary-layer top towards the surface levels (Takemi et al. 2019). Therefore, the maximum instantaneous winds are considered to be much higher in the densely built urban districts of Tokyo than the observed value of 31.4 m/s. Quantitative estimations of such instantaneous winds can be conducted with building-resolving, high-resolution numerical simulations by a computational fluid dynamics model. The study is currently underway.

3. Typhoon Hagibis

Typhoon Hagibis (2019), which intensified with its lifetime minimum central surface pressure of 915 hPa and made landfall over Japan in October 2019, caused heavy rainfalls and spawned devastating damages in eastern Japan. There were more than 100 dead or missing (Cabinet Office 2019). At the Hakone station, the daily rainfall on 12 October was 922.5 mm, which broke the daily rainfall record in Japan. In contrast to the July 2018 heavy rainfall in central and western Japan, which lasted more than 72 hours, the heavy rainfall by Typhoon Hagibis was mostly concentrated within 24 hours. In other words, this typhoon-induced heavy rainfall is characterized as concentrated rainfall with stronger intensities but shorter duration than found in the July 2018 heavy rainfall. Here we investigate the environmental factors for the occurrence of heavy rainfalls in eastern Japan during the passage of Typhoon Hagibis.

The total amount of rainfall for 5 days including the period of the Typhoon Hagibis landfall, as calculated with hourly radar/rain gauge analysed rainfalls data, is shown in Fig. 2. A large amount of rainfall exceeding 200 mm extends in the eastern part of Japan. During this time period, the maximum amount among observed at surface stations is 1020.5 mm at Hakone, which is about 3 times as large as the October mean and about one third of the annual mean precipitation at that site.

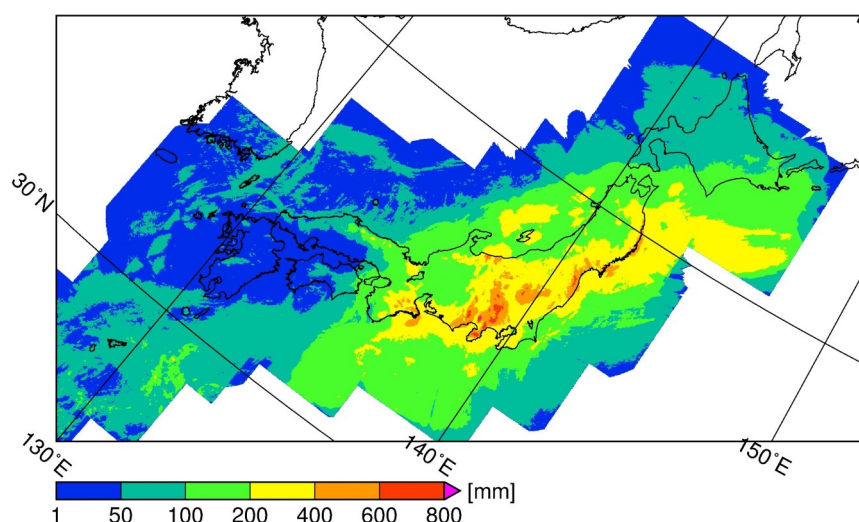


Figure 2: The accumulated rainfall amount (mm) during the period from 0000 JST 10 October to 2400 JST 14 October 2019.

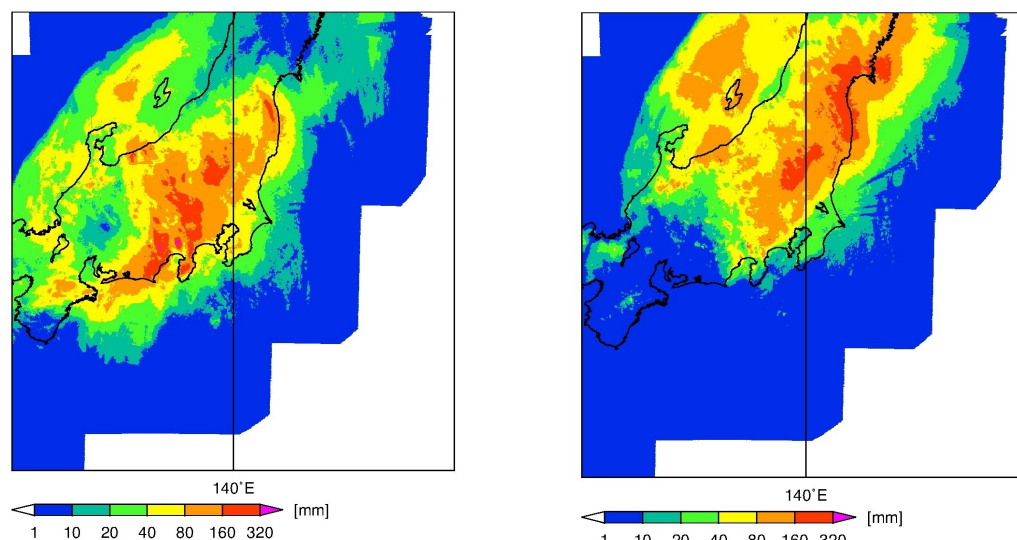


Figure 3: The distribution of 6-hourly rainfall (mm) (left) during 1200 and 1800 JST and (right) during 1800 and 2400 JST on 12 October 2019.

The rainfalls are mainly concentrated on 12 October 2019. Figure 3 shows the spatial patterns of 6-hourly rainfall in the afternoon of 12 October 2019. The area of rainfall greater than 160 mm is seen to spread widely.

Atmospheric environmental indices for diagnosing stability and moisture conditions were examined with the use of gridded atmospheric analysis dataset. From the study of Takemi and Unuma (2020), it was found that the whole troposphere is almost saturated and the column total water vapor content is extremely large. In the lower troposphere we identified layers of moist absolutely unstable states with the thickness deeper than 2 km. Such deep moist absolutely unstable layers as well as abundant moisture content and almost saturated troposphere set a high potential for convective development. Under these favorable environmental conditions, the fact that the heights of the absolutely unstable layers' bottom are comparable to the mountain elevations is considered to be favorable for topographic lifting of unstable, moist air, which will trigger and activate strong convection and hence heavy rainfall. In spite of a moderate amount of convective available potential energy and a nearly moist-adiabatic lapse rate, moist absolute instability, abundant moisture, and high humidity jointly play a key role to increase the potential for generating the present heavy rainfalls.

4. Concluding remarks

The damages due to strong winds and heavy rainfalls from Typhoon Faxai and Hagibis resulted not only from the severity of the typhoon hazards but also from exposure and vulnerability, which elevated the degree of disaster risks. The tracks of the two typhoons are considered to be the worst for the occurrence of strong winds and heavy rainfalls.

References

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- Takemi, T., and T. Unuma, 2020: Environmental factors for the development of heavy rainfall in the eastern part of Japan during Typhoon Hagibis (2019). *SOLA*, **16**, 30-36, doi:10.2151/sola.2020-006.

Takemi, T., T. Yoshida, S. Yamasaki, and K. Hase, 2019: Quantitative estimation of strong winds in an urban district during Typhoon Jebi (2018) by merging mesoscale meteorological and large-eddy simulations. *SOLA*, **15**, 22-27, doi:10.2151/sola.2019-005.



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Integrated Arts and Sciences for Disaster Reduction Research Group

Establishment of The North American Alliance of Hazards and Disaster Research Institutes (NAAHDRI)



Last summer, a group of directors of university-based hazards and disaster laboratories, centers, and institutes voted to adopt a charter for forming the North

American Alliance of Hazards and Disaster Research Institutes (NAAHDRI). On Sunday, July 14, 2019, NAAHDRI held its first official meeting to discuss future priorities for research, education, and policy advocacy.

The meeting was chaired by the newly elected Board of Directors, and over 40 center and institute directors attended. In addition, Prof. Tatano from the Global Alliance of Disaster Research Institutes (GADRI) was present at the meeting. During the meeting, the members of the recently elected Board of Directors were introduced, and new members and contributors were acknowledged and welcomed. The meeting proceeded with a discussion of priorities for year 1, a brainstorming session of longer-term visions for the Alliance, and the establishment of a process for engagement with and communication among NAAHDRI members.

Visit by Federal University of Campina Grande (UFCG), Brazil



Prof. Carlos de Oliveira Galvão from the Federal University of Campina Grande, Brazil visited DPRI, Kyoto University and GADRI Secretariat on 30 May 2019 during

his two-week visit to Kobe University. One agenda item in particular related to increasing GADRI visibility in Brazil and active contributions to support GADRI activities. Prof. Galvão is also an alumni of DPRI, Kyoto University.

of priorities for year 1, a brainstorming session of longer-term visions for the Alliance, and the establishment of a process for engagement with and communication among NAAHDRI members.



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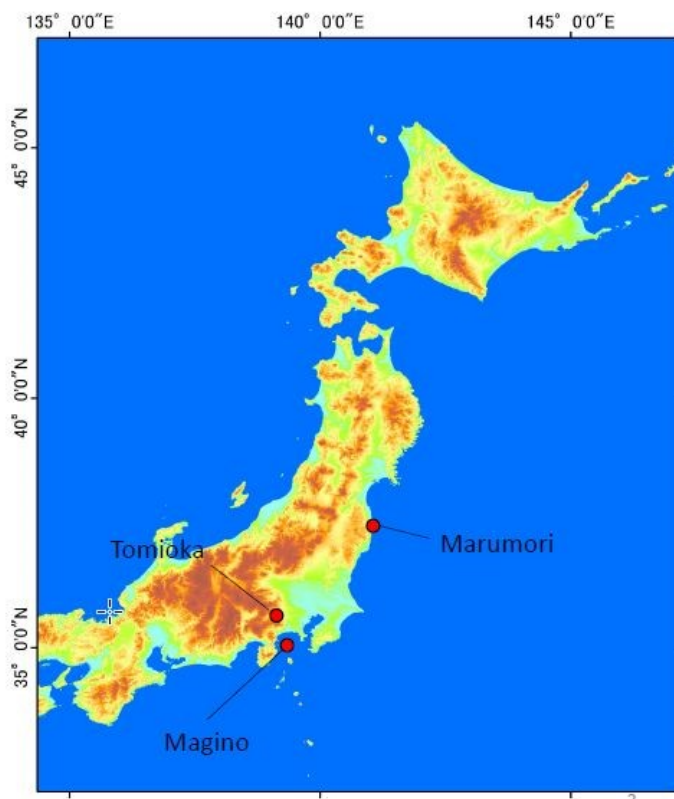


Geohazards Research Group

Landslides Induced by Typhoon Hagibis 2019

By: Chigira et al. (Disaster Prevention Research Institute,
Kyoto University)

- Typhoon Hagibis crossed the Japanese Islands from 12 to 13, October 2019, and brought record breaking rainfall and strong wind.
- This typhoon induced river floods and landslides in eastern Japan and caused tremendous damage with 93 fatalities and 3 missing.
- This paper reports the characteristics of 3 fatal landslide areas, referring to the possibility of their prediction.



Locations of fatal landslides induced by typhoon Hagibis

Tomioka: 4:32 pm 12 Oct

Pyroclastic fall

3 fatalities

Marumori: about 10:30 pm 12 Oct

Weathered granite

4 fatalities

Magino: 9:45 pm 12 Oct

Andesite lava and volcanic soil

2 fatalities



Prof. Masahiro Chigira

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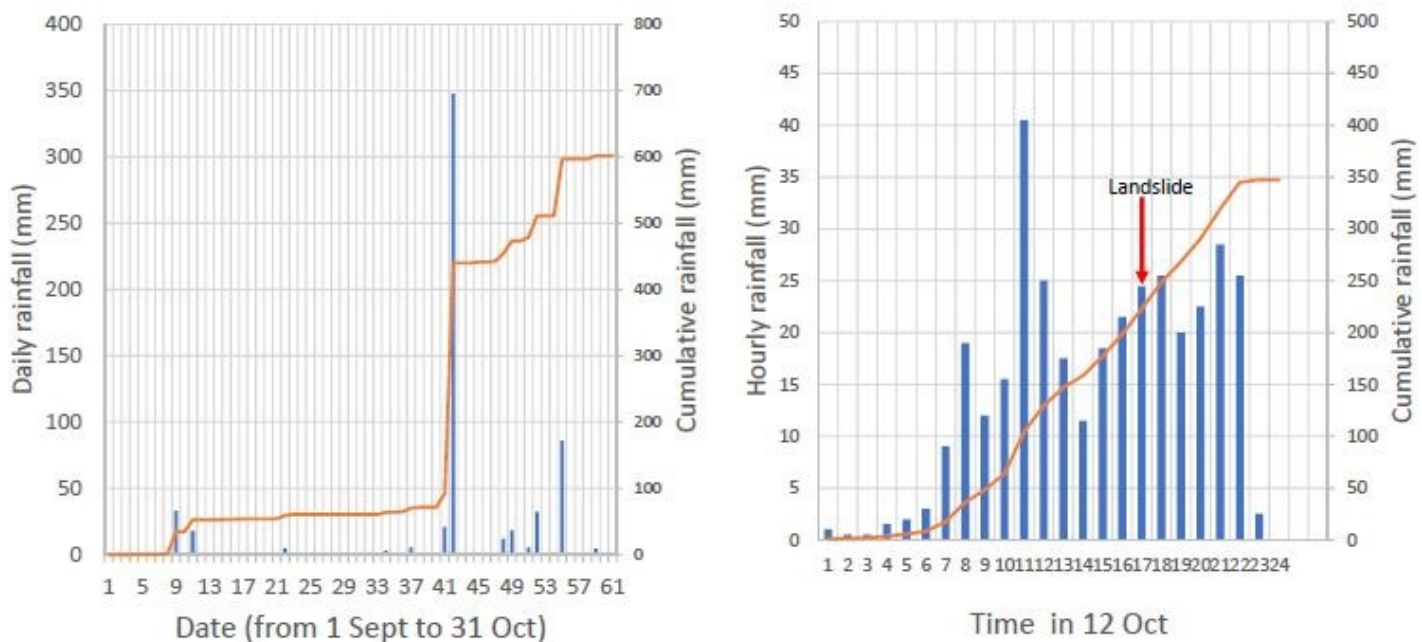
Landslides induced by typhoon Hagibis in Tomioka, Gunma

By: Masahiro Chigira, (Division of Geohazards, DPRI-KU, 19 October 2019)

- Location: Takumi, Tomioka, Gunma Prefecture
- Occurrence: 4:30 pm, 12 October, 2019
- 3 fatalities



Rainfall at Fujioka (AMEDAS) 15 km east of Tomioka

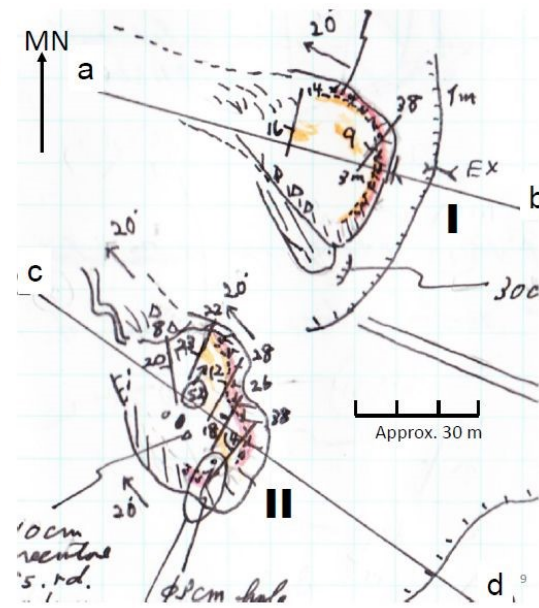


mm at 12 Oct. Before that almost no rain in one month.

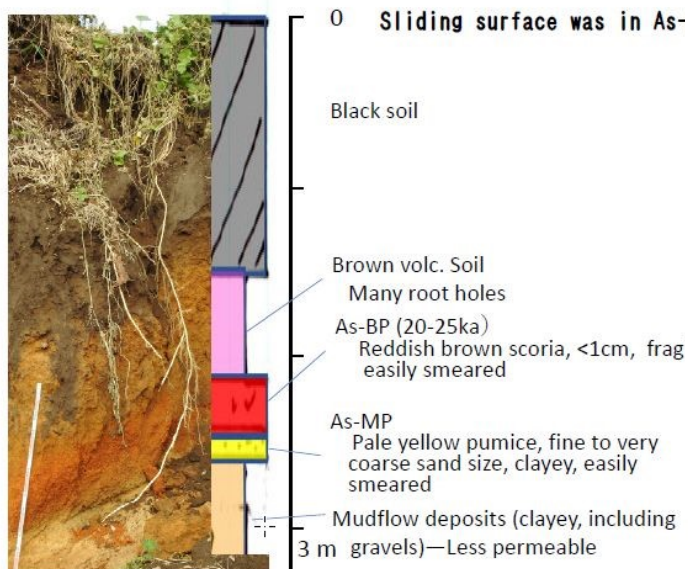
Made from the data of Japan Meteorological Agency (<http://www.data.jma.go.jp/obd/stats/etrn/index.php>)



Plan view

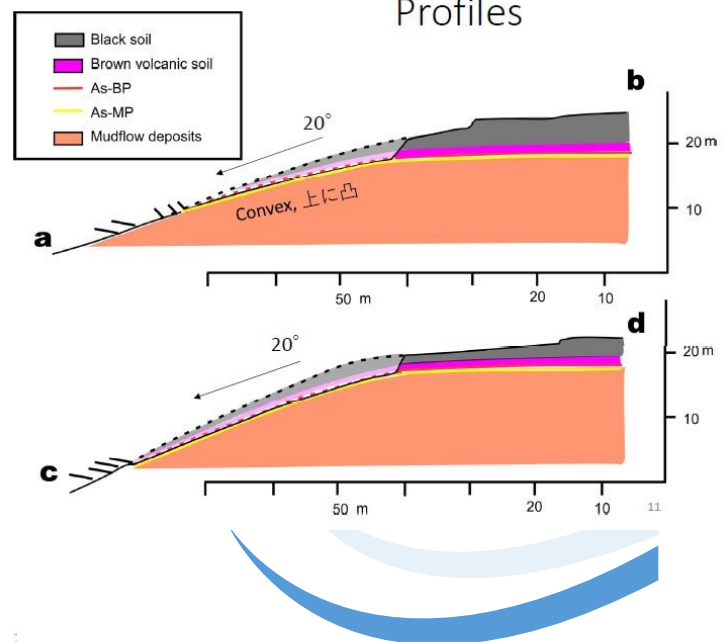


Materials that slid were from the Asama volcano



As-BP, As-MP: Tajikara et al. (2011) Quaternary Research, 50, 21-34.

Profiles





Summary

- Landslide occurred on gentle slopes with 20° angle on a margin of a terrace.
- Slid materials were pyroclastic fall deposits up to 3 m thick on less permeable mudflow deposits.
- Sliding surface was made in the lower part of As-MP (pumice), which was weathered to be clayey materials.
- As-MP layer was eroded underground at the rim of the terrace, where bedding dip becomes steeper toward downslope.
- This underground erosion formed piping holes, where water pressure could have been build-up to trigger the landslides.

Points to be noted

- Slid materials and sliding horizons were of pyroclastic materials from the Asama volcano, which must be distributed around the landslide slopes.
- The reason why only these slopes slid is assumed to be:
 - Beds warped convex upward, steepening downslope.
 - So, the groundwater velocity must have been faster downslope, which facilitated underground erosion.
- The vegetations on the landslide slopes seem to be less than the surrounding.
- The underground erosion we observed suggests that water springs must have been at the foot of the slopes. Behaviour of the spring might have been a key for the landslide prediction.



For the full report, visit the website: https://www.dpri.kyoto-u.ac.jp/disaster_report_en/#13049



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Seismic and Volcanic Hazards Mitigation Research Group

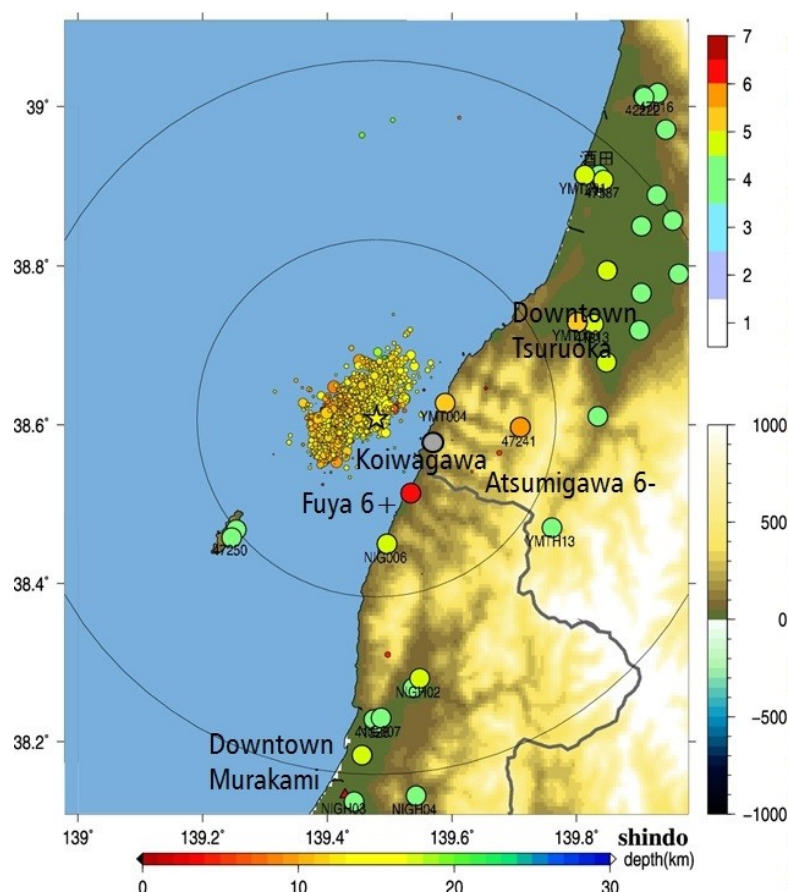
Damage survey report for the 2019 Yamagata Earthquake

By Prof. James Mori and Dr. Masumi Yamada

An earthquake with JMA magnitude of 6.7 occurred off Yamagata Prefecture at 22:22 on June 18, 2019. In addition to recording seismic intensity 6 upper in Murakami City, Niigata Prefecture, and seismic intensity 6 lower in Tsuruoka City, Yamagata Prefecture, strong shaking occurred from Hokkaido to central Japan. The Earthquake Hazards Division performed a field survey in the damaged area, including visual inspection of the building damage, microtremor observations, and photographing of roof damage by a drone.

Building damage was particularly severe in the coastal region near the border between Yamagata and Niigata Prefectures. In Koiwagata, Tsuruoka City, Yamagata Prefecture, tilt of storehouse, fallen roof tiles, fallen tombstones, and fallen mortar walls were observed.

Based on the drone aerial photos, the percentage of houses with damaged roof tiles is about 30%. In the Fuya, Murakami City, Niigata Prefecture, where JMA seismic intensity 6 upper was recorded, we observed only a few percent of buildings with damaged roof tiles, a collapse of a retaining wall embankment, and fallen ceiling panels in a gym.



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Although strong shaking with seismic intensity 6 upper was recorded, we did not observe any collapsed buildings. The improvement of seismic performance of buildings and the relatively short -period ground motion are likely reasons why there were no casualties for this earthquake.

For further details, please visit the website.

<http://www.eqh.dpri.kyoto-u.ac.jp/~masumi/eq/20190618yamagataEQ.pdf>

Conclusion

- Heavily damaged towns
Koiwagawa>Nezugaseki>Ohiwagawa=Fuya(JMA6+)
- Liquefaction and collapse of sumo field are unusual damage in Tsuruoka city. The damage in general was less than coastal towns.
- Damage in Nezugaseki is similar to that in Ibaraki city during 2018 Osaka EQ. The disaster may be more serious if the EQ happens in a large city

Acknowledgement:

We thank JMA and NIED for providing strong motion data. We acknowledge local people for supporting our survey. We used the topographical map provided by Geospatial Information Authority of Japan.



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Integrated Arts and Sciences for Disaster Reduction Research Group

Collaborative Activities

Disaster Prevention Research Institute, Kyoto University (DPRI-KU) has launched a research academic hub for emergency risk management for Aviation under large-scale eruption. Mt. Sakurajima located at the South edge of Kyushu Island, the west of Japan and it is expected that the tremendous volume of volcanic ash will be disseminated and covers the most of territory of Japan if its large-scale eruption occurs. The last large-scale eruption (Taisho eruption) occurred in 1914 after 135 years later of large-scale eruption (An'ei eruption) in 1779. Given the fact that more than 100 years has passed since the last large-scale eruption, a next large-scale eruption is likely to occur in several decades.



Volcanic ash Aircrafts' jet engines are vulnerable to volcanic ash floating in the air. Due to the technical vulnerability of aircraft, the global aviation network, particularly in Europe suffered great disruption in 2010 after the large-scale eruption of Eyjafjallajökull in Iceland. Expected large-scale eruption of Mt. Sakurajima will be the first catastrophic case after the modern aviation network has developed in Japan.

Sakurajima Volcano Observatory of DPRI has continuously promoted academic studies researches to develop technologies for forecasting eruption and dissemination scenario before the eruption.

An international workshop was held from 17 to 18 February 2019 in Kagoshima where Mt. Sakurajima locates, inviting international academics and

experts from Iceland, Indonesia and Taiwan in addition to domestic members. DPRI-KU and associate institutes, organizations including the civil aviation authority and airlines are working closely for setting up an emergency response system utilizing precursors of eruption to minimize the damage on domestic and international aviation transport due to large-scale eruption.

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Frontier Research Center for Natural Disaster Mitigation Ritsumeikan University, Japan

<http://www.ritsumei.ac.jp/file.jsp?id=229345&f=.pdf>



The Frontier Research Center for Natural Disaster Mitigation actively proposes effective natural disaster mitigation measures using interdisciplinary research teams. The Center aims to function as a core center for investigating disasters, etc., in regions recently affected by disasters (such as earthquakes and torrential rains), and as a core center for disaster mitigation education.

In 2019, we engaged in the following activities:

- 18 January 2019: Symposium of Frontier Research Center for Natural Disaster Mitigation “Actual situation of the western Japan heavy rain disaster in 2018”
- 19 July 2019: 1st Seminar of Frontier Research Center for Natural Disaster Mitigation “ICT in disaster prevention”
- 18 October 2019: 2nd Seminar of Frontier Research Center for Natural Disaster Mitigation “Forefront of structures related disaster prevention”
- November and December 2019: Field Survey on natural disasters caused by Typhoon Hagibis 2019



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Institute of Disaster Mitigation for Urban Cultural Heritage (R-DMUCH), Ritsumeikan University Japan

<http://www.r-dmuch.jp/en/>



Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University



Exercise for Emergency Response

The Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University (R-DMUCH) has been acting as a focal point for organizing international research, training and information network in the field of cultural heritage risk management and disaster mitigation.

The UNESCO Chair Programme on Cultural Heritage and Risk Management - 14th International Training Course (ITC) on Disaster Risk Management of Cultural Heritage 2019 was held for 3 weeks from 9 to 30 September 2019 with 12 participants from Argentina, Armenia, Bangladesh, Ecuador, Egypt, Iran, South Africa, Uganda and Italy. Participants were managers of cultural heritage, disaster risk management experts, decision makers and government officials involved in cultural heritage conservation or disaster management.

Just as last year, this year the ITC focused on theme “Towards Integrated Protection of Immovable and Movable Cultural Heritage from Disasters”. During the course, the trainees have deepened an understanding of not only various aspects of disaster risk management of cultural heritage in Japan, but also the distinctive issues and the previous lessons which involve in the field of cultural heritage conservation and the disaster risk management in the world. All the lectures, site visits, exercises and workshops are performed by the worldwide experts.



Prof. Takeyuki Okubo

Director

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This year also Ritsumeikan University cooperated with the Japanese experts. So, the trainees could learn a study of risk management for both immovable and movable cultural heritage from last disasters in Japan and comprehensive countermeasures and approaches. As the details of the course, the trainees learned the disaster risk management of cultural heritage from the various kind of disasters, and the emergency response for movable cultural heritage through the lectures in the institute, the practical exercises in the Kyoto National Museum, and site visits on the temples and the Ponto-cho district in Kyoto. In addition, they learned about the flood disaster occurred in the Takeda, Asago-shi and Hirafuku, Sayo-cho and also a long-term recovery process in Kobe area from the Great

Hanshin-Awaji (Kobe) Earthquake in 1995.

The training course is organized in cooperation with the UNESCO, ICCROM, ICOM, ICOMOS/ICORP and relevant institutions of the government of Japan. We will continue this outreach activities and dissemination of our research outcomes to the international society.

Call for application for the ITC2020 will be announced at our website:

<http://www.r-dmuch.jp/en/project/itc.html>



A Site Visit to Kiyomizu-dera World Heritage Site, Kyoto



Report on the World Bosai Forum 2019



The World Bosai Forum/International Disaster Risk Conference @ Sendai 2019 was successfully convened in Sendai, Japan 9-12 November 2019 with 871 participants from 38 countries and regions. Those who participated in the study tour along with the forum saw the reconstruction of the areas affected by the Great East Japan Earthquake and Tsunami. The total number of participants reached approximately 11,000, including exhibitors and visitors to the simultaneous event "Sendai Bosai Future Forum" "The 10th Earthquake Technology Expo Tohoku" and general public visitors to the World Bosai Forum. As in 2017, the event was a great success.

At the forum, 50 oral sessions, 3 keynote speeches, 47 poster sessions, 33 mini-presentations, and 14 exhibition booths were held to discuss the promotion of "Sendai Framework for Disaster Risk Reduction, 2015 -2030" and in particular the achievement of Global Target E, which was a sub-theme of the forum. Specific solutions to "BOSAI" were shared, and the contents, including lessons learned from the Great

East Japan Earthquake and Tsunami, were suitable for a global forum in terms of both quality and quantity. In particular, there were many sessions in which young people and companies played a key role.

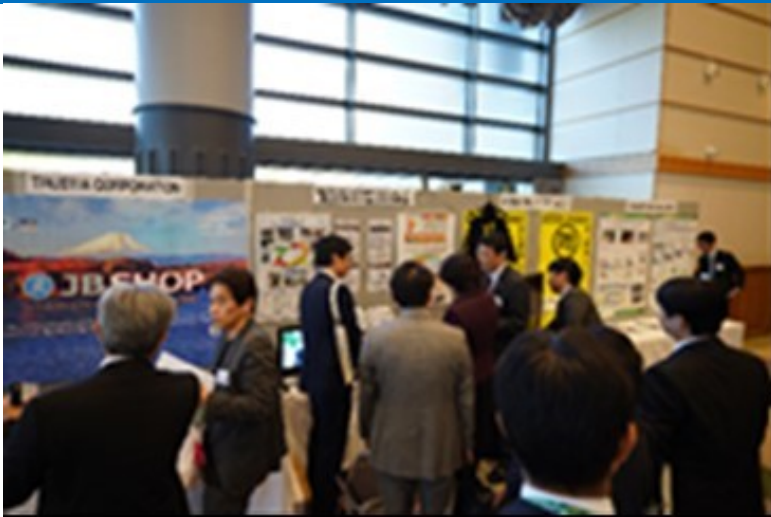
At the closing ceremony, following the presentation of the winners of the poster presentation, the "Chair's Summary" was announced, clarifying the main themes and trends of the discussion at the



Prof. Yuichi Ono

Founder of the World Bosai Forum

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World Disaster Prevention Forum 2019, and stating the issues for the next meeting. The main themes were as follows: (1) Progress and issues regarding the formulation of national and regional disaster risk reduction plans required in the Sendai Framework for Disaster Risk Reduction Target E, (2) Maturation of relatively new disaster risk reduction fields and remaining issues, (3) Changes in risks and uncertainties due to climate change, (4) Importance of the private sector in disaster risk reduction, (5) New technologies and issues related to disaster risk reduction, (6) Importance of the activities and further participation of young and next generation experts, (7) Continuation of disaster memory and awareness, and (8) Possibility of reconstruction. At the Third World Bosai Forum, it was proposed to encourage more active participation of the private sector and young people, and to hold well-planned sessions on interdisciplinary approaches.

Yet, we cannot celebrate the forum's success in the face of frequent disasters. The results of the 2nd World Bosai Forum were presented in dedication to the victims of the Great East Japan Earthquake and Tsunami. As disasters believed to be the effects of climate change occur frequently around the world, the World Bosai Forum intends to communicate concrete solutions to adaptation through dialogues among industry, government, academia and the private sector, while valuing the viewpoints of women and young people.

We would like to hold the 3rd World Bosai Forum in November 2021, 10 years after the Great East Japan Earthquake and Tsunami. We would like to plan a forum that meets this need and we look forward to your continued support and cooperation.



Ono-kun appears casually in the World Bosai Forum.

Ono-kun is a cute stuffed toy knitted with stuffing socks, but the origin of Ono-kun can be traced back to the Great Depression that began in the United States in the 1930s.

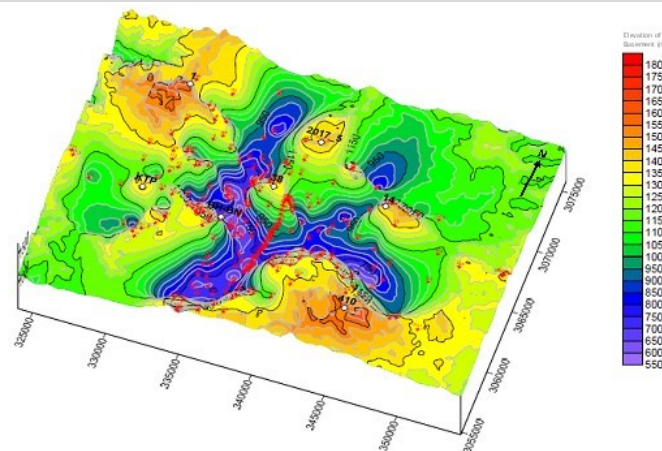
Source: <http://www.worldbosaiforum.com/2019/english/overview/index.html?id=onokun>



Earthquake Research Institute (ERI) The University of Tokyo, Japan

<http://www.eri.u-tokyo.ac.jp/en/>

The mission of Earthquake Research Institute, the University of Tokyo, since its beginning in 1925, is to promote scientific research on earthquakes and volcanic eruptions and to develop methods for mitigating related disasters. To achieve this goal, about 80 faculty members and 40 support staff conduct wide variety of research such as studies on the basis of geophysical observations in Japan and abroad, structure and dynamics of the Earth's interior which drive earthquakes and volcanic eruptions, multidisciplinary research of science and literature on historical earthquakes with Historiographical Institute, real-time delivery and analysis of large amount of seismic data using Science Information Network, earthquake hazard assessment by merging big data and high performance computation.



using high resolution subsurface structure model, forecasts damages of large number of buildings in cities.

As a Joint Usage/Research Center of Japanese universities on earthquake and volcano sciences, ERI organizes various joint research projects and actively conducts collaborative activities. The nationwide “Earthquake and Volcano Hazards Observation and Research Program” involving many universities and research institutes across Japan started a new five-year project in 2019.

Regarding the international collaboration, ERI has signed agreements with about 20 foreign organizations, and conducts or participates collaborative research projects such as International Muography Cooperative Research Organization, Next generation Neutrino Science Organization, international marine geophysical observation networks such as Pacific Array. ERI invites foreign researchers as visiting faculty or researcher, educates graduate or internship students from countries outside Japan, and organizes international summer schools for both undergraduate and graduate students. Every year, more than 100 international researchers and students' study in ERI.

Research highlights in 2019 include the Integrated Research on Great Earthquakes and Disaster Mitigation in Nepal Himalaya, where focusing on a future great earthquake expected in Nepal Himalayas and the highly populated and vulnerable Kathmandu Valley, scientifically advanced seismic hazard information is being provided and fundamentals to mitigate earthquake disaster is being built, by conducting researches on earthquake potential evaluation, ground motion prediction, seismic hazard assessment, earthquake observation system, and education and policies (photo and diagram). Center for Computational Earth Sciences was newly established to promote high-speed analysis of big data. The artificial intelligence (AI) trained with large volumes of high-resolution simulation results, obtained by supercomputers



Prof. Kenji Satake

Director

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Oceania

Australia	Fenner School of Environment & Society, Australian National University (ANU)
Australia	College of Health & Human Sciences, Charles Darwin University
Australia	Humanitarian, Emergency and Disaster Management, College of Indigenous Futures, Arts and Society, Charles Darwin University
Australia	Centre for Disaster Studies, College of Science and Engineering, James Cook University
Australia	Centre for Infrastructure Performance and Reliability, School of Engineering, The University of Newcastle
Australia	Sustainability Research Centre, University of Sunshine Coast
Australia	Science and Engineering Faculty, Queensland University of Technology
Australia	Humanitarian & Development Research Initiative (HADRI), School of Social Sciences and Psychology, Western Sydney University
Australia	School of Earth and Environmental Sciences (SMAH), University of Wollongong
New Zealand	GNS Science



Humanitarian, Emergency and Disaster Management, College of Indigenous Futures, Arts and Society Charles Darwin University, Australia <https://www.cdu.edu.au/indigenous-futures-arts-society>



The Humanitarian, Emergency and Disaster Management program at Charles Darwin University delivers research and training in areas related to humanitarian aid and development, emergency and crisis management, disaster risk reduction and climate change adaption.

A project that examines the experiences and challenges of emergency management volunteers in Australia and Japan was awarded an Australia-Japan Foundation Grant for 2019 - 2020. The research includes fieldwork in the Greater Darwin and Western Japan regions, and seeks to contribute to mutual learning in the emergency management sector.

CDU, alongside the Northern Territory Emergency Services, the Northern Territory Fire and Rescue Service, St John Ambulance, and Bushfires NT, delivered first aid, emergency management and leadership training to Senior Traditional Owners and Indigenous Rangers. The five-day program was supported by the Australian Government's Emergency Management Volunteer Scholarship Fund administered by the Australian Institute of Disaster Resilience. The program contributed to meaningful dialogue to manage disaster risks and build resilience among remote communities.

Researchers from CDU, in collaboration with the Institute of Resource Governance and Social Change and World Vision, conducted fieldwork in Central Sulawesi, Indonesia to better understand the opportunities and constraints around effective humanitarian cash transfers to meet the needs of children affected by disasters. CDU researchers also examined how to sustain child-centred disaster resilience and climate change adaption. The project, which took a longitudinal approach over 11 years from the beginning to the end of the child-centred risk reduction and safe school programs, was supported by Plan International and Predikt Indonesia.



Dr. Akhilesh Surjan

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Researchers concluded that the progress of child-centred disaster reduction has been incremental and that change and (dis) continuity of child-centred resilience disaster risk reduction is best explained by a hybrid approach to institutionalization.

CDU researchers conducted a field study that examined how the Pacific Island states of Fiji, the Solomon Islands and Vanuatu adopt Post-Disaster Needs Assessment (PDNA) and how it translates into long-term disaster recovery. Researchers identified constraints and opportunities for PDNA in the Pacific and how PDNA can be used to inform long-term disaster recovery needs and planning.

Researchers are currently collaborating with Resilience Development Initiatives and UNIEF and the Ministry of Education and Culture to conduct stocktaking research on the implementation of comprehensive safe schools in Indonesia between 2006 and 2020. CDU researchers also began work with the Indonesian Disaster Management Society, supported by the Ministry of Social Affairs and IFRC, to co-develop a national framework to systematically assess transitional shelter in Indonesia. Such an

exercise will be the first in the world as it aims to improve the quality of transitional shelter by non-governmental actors in Indonesia and worldwide.

CDU has created a new bachelor's degree in Humanitarian Aid and Development that enables students to understand and critically analyse concepts of community development, humanitarian practice and development aid and apply these concepts through professional practice. With the support of New Colombo Plan short-term mobility project funding, one student travelled to Timor-Leste and participated in a range of Red Cross Health Department activities, including the design, monitoring and evaluation of humanitarian programs



Humanitarian and Development Research Initiative (HADRI)

Western Sydney University, Australia



[HADRI webpage link](#)



HADRI Adjunct Fellow A/Prof Bob Huish, Dalhousie University, Canada seminar: Disaster management as solidarity and capacity building: The Case of Cuba, 26 April 2019

Director of HADRI, Associate Professor Nichole Georgeou got elected to the board of the *Development Studies Association of Australia* (DSAA), the first professional association for Development Studies in Australia and to have worked on a submission for a separate Field of Research (FOR) code for Development Studies for the Australian Research Council.

and New Caledonia to understand how family farming is adapting to climate change in peri-urban areas and the affects this has on nutrition. HADRI has five scholars involved in the FALAH project and HADRI's Director leads the Australian food security work group.

HADRI recently linked with colleagues in the Pacific Islands, Europe and Australia in a €1.3 million (A\$2 million) European Commission-funded project focusing on **Family farming, Lifestyle and Health (FALAH)** in the Pacific which links food systems to public health outcomes, with a strong focus on research translation, capacity building and nutrition. FALAH will conduct fieldwork in four Pacific countries/territories, Solomon Islands, Vanuatu, Fiji



Assoc Prof. Nichole Georgeou

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PhD candidate Spyros Schismenos presenting HYDRA to academics and industry partners at the Western Sydney University hosted Water Research Symposium, 24 October, 2019



HADRI was contracted by [Research for Development Impact](#) (RDI) Network to develop a practical guide to *Enhancing Research Impact in International Development*. The [Enhancing Research Impact in International Development: a practical guide for practitioners and researchers](#) reflects best practice in development research and contains numerous tools to assist development researchers and practitioners. This guide was launched in February 2020 at the [DSAA conference](#) in Melbourne.

HADRI has published extensively, including contributions to UN reports, across its three main thematic research areas. Thematic areas include: Disaster Preparedness, Response and Management; Migration and Diaspora and

Human Security and Sustainable Development. Publications can be accessed [here](#).

HADRI HDR student Spyros Schismenos secured funding from International Hellenic University for his research project **Hydropower for Disaster Resilience Applications (HYDRA) – Prototype Development in Greece** along with travel funding to field test his project in Greece. Spyros was also the 2019 recipient of SSAP's Research Training Program Scholarship. He is also a top 16 finalist for the [Amplify Ignite 2019](#) awards (Australia's leading business and innovation platform).



HADRI Adjunct Fellow, Madhu Gautam, National Disaster Risk Reduction Centre (NDRC), Nepal public seminar: Climate Change and Disaster Preparedness and Response in Nepal, 15 April, 2019.



Centre for Disaster Studies (CDS) James Cook University, Australia

<https://www.jcu.edu.au/centre-for-disaster-studies>



In late January/February 2019, Townsville and much of North Queensland was inundated with an unprecedented monsoon trough event which brought wide spread flooding and subsequent damage to both communities and property. As the Centre and most of its researchers/staff are located in this region, research in 2019 focused around this event and providing advisory assistance to local community, emergency services and recovery efforts. In addition to conducting a community-based survey and several presentations about this flood event, the Centre also conducted workshops relating to impact assessment and undertaking disaster fieldwork. In October 2019 the Centre drafted a Memorandum of Understanding with Institute for Research and Community Services, Universitas Negeri Malang, Malang Indonesia for future research and collaboration.

- Gurtner, Y (2019) February 2019 – Townsville Monsoon Flood Event Review. Online survey and report (unpublished)

- **Gurtner, Y (2019)** “Understanding Crisis Management for Local Disasters”. *Townsville Knowledge Exchange Series*. Townsville Enterprise 26 March 2019, Townsville.
- **Gurtner, Y (2019)** “Evolving the utility and potential of social media in social impact assessment”. *IAIA19: International Association of Impact Assessment Conference*, 29 April - 2 May 2019, Brisbane
- **Gurtner, Y (2019)** “The Challenges of Disaster Risk Reduction in Indonesia” and “Disaster Research Workshop”, International Seminar, Plenary and Workshop Universitas Negeri Malang (**Keynote**) 2-3 October, 2019 Malang, Indonesia



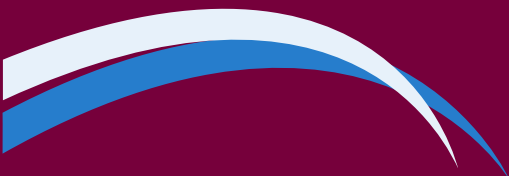
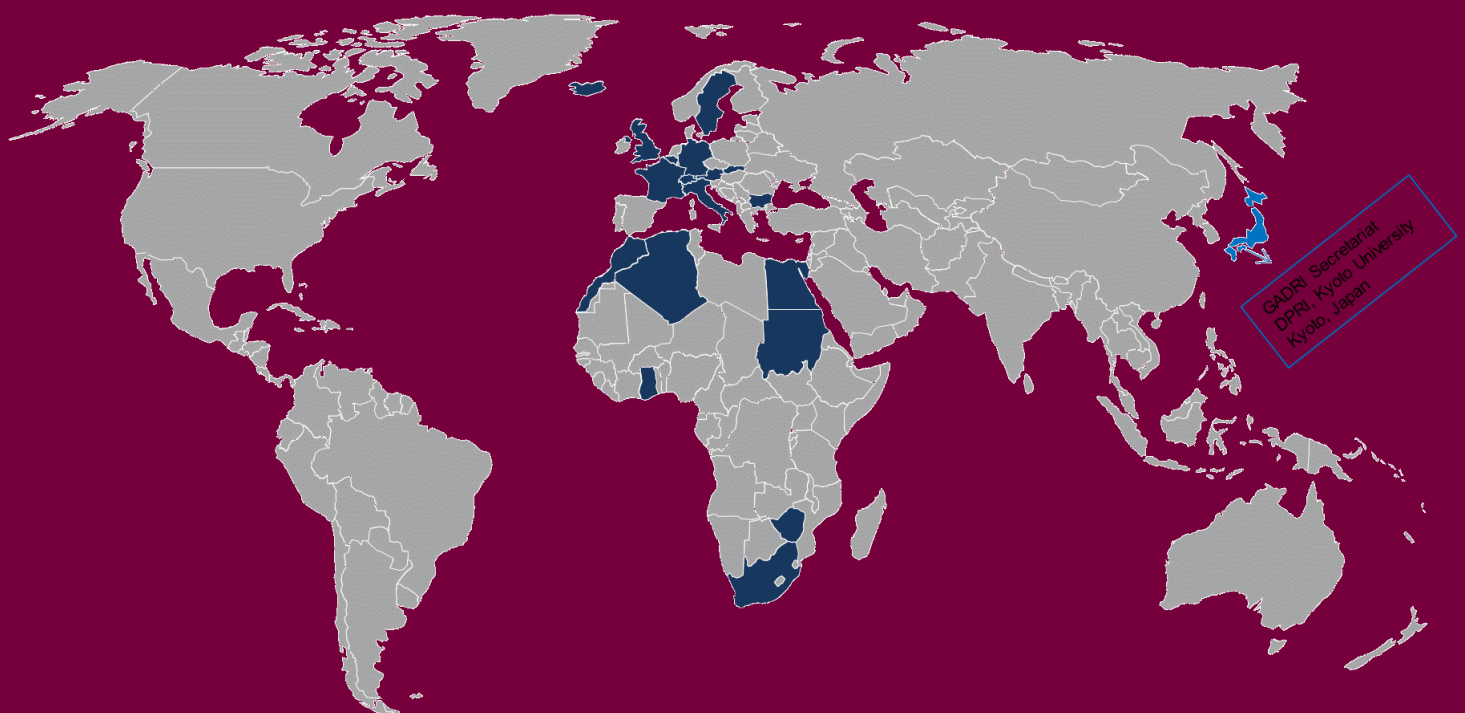
Dr. Yetta Gurtner

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Europe

Africa





Europe Africa



Austria	Center for Digital Safety and Security, Austrian Institute of Technology (AIT)
Austria	Disaster Competence Network Austria (DCNA)
Austria	International Institute for Applied Systems Analysis, (IIASA)
Belgium	One Health Platform
Bulgaria	Department of Information Technologies and Communications, University of National and World Economy (UNWE)
France	BRGM (Bureau de Recherches Geologiques et Minieres)
France	Council of Europe
France	Institut Des Sciences de la Terre (ISTerre), Grenoble University
Germany	Center for Disaster Management and Risk Reduction Technology (CEDIM)
Germany	Disaster Research Unit, Department of Social and Political Sciences, Freie University Berlin
Germany	Institute for Advanced Sustainability Studies (IASS)
Germany	United Nations University, Institute for Environment and Human Security (UNU-EHS)
Iceland	Earthquake Engineering Research Centre, University of Iceland
Italy	European Commission, Joint Research Centre (JRC)
Italy	Department of Earth Sciences, University of Florence (Universita degli Studi di Firenze)
Italy	GEM Foundation
Slovakia	Faculty of Security Engineering, University of Zilina
Sweden	Stockholm Environment Institute (SEI)
Sweden	Risk and Crisis Research Centre (RCRC), Mid Sweden University
Switzerland	Global Risk Forum GRF Davos
Switzerland	Faculty of Geosciences and the Environment, University of Lausanne
UK	Bournemouth University Disaster Management Centre (BUDMC)
UK	British Geological Survey
UK	Cabot Institute, University of Bristol
UK	Evidence Aid
UK	School of Business, Dept. Management, Innovation and Technology Division, University of Leicester
UK	Institute for Risk and Disaster Reduction (IRDR), University College of London
UK	Loughborough Water Engineering Group (LWEG), School of Architecture, Building and Civil Engineering, Loughborough University
UK	Global Disaster Resilience Centre, School of Art Design and Architecture, University of Huddersfield
UK	Disaster and Development Network (DDN), Department of Geography, Northumbria University
UK	Overseas Development Institute (ODI)
UK	Global Public Health, Public Health England (PHE)
UK	Centre for Disaster Resilience, University of Salford
UK	Swansea University





Disaster Competence Network Austria (DCNA) Austria <http://dcna.at/>

In 2019 DCNA organized the Austrian Disaster Research Days (ADRD19) with a focus on preparedness for and prevention of crisis by implementing scientific findings from disaster risk reduction research. The conference took place from 14th to 15th October 2019 at Technical University Graz. It brought together stakeholders from public and private sector, science as well as humanitarian agencies. Several parallel sessions were organized, covering the following topics: (1) meteorological hazards, including weather warning systems, flood forecast and the influence of climate change. (2) Critical infrastructure with the scope on challenges in protection, safety analysis and strategies how to prepare and act in crisis. (3) Systematic perspectives of risks and (4) floods. Contributions on the second day of the event referred to scientific findings from a multidisciplinary field covering landslides, avalanches, earthquakes and the safety of critical infrastructure. The second parallel session of this day focused on the impact of natural disasters and digital attacks on the industrial environment seen from the scientific point of view as well as the experience with industry insurance. DCNA welcomed about 165 people at the Austrian Disaster Research Days 2019 in Graz. In 2020 the event will be organised internationally (Disaster Research Days 2020) with a call of abstracts.



Austrian Disaster Research Days 2019 (source: DCNA)

Another focus of DCNA activities in 2019 was the work within the five working groups: (1) Mass movements and earthquakes, (2) Floods, (3) Extreme weather conditions, (4) Critical infrastructure and industrial hazards and (5) Socio-economic disaster aspects. Two meetings were organized by DCNA. At the first one in spring, the priorities were on defining a program for national research project calls, preparing session contents for the ADRD19 and defining a pool of experts and resources for disaster events. The contents of the second meeting in autumn were preparing for the call of abstracts for the Disaster Research Days 2020 and networking for currently open project calls.



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University of National and World Economy (UNWE) Bulgaria

<http://www.unwe.bg/en/>



4th IFIP ITDRR-2019, Kyiv National University of Culture and Arts, Kyiv, Ukraine, October 9 – 10th, 2019 - <http://itdrr.unwe.bg/>

The ITDRR 2019 Conference

The Science Research Center for Disaster Risk Reduction (SRCDRR) co-organized the **4th IFIP Conference on Information Technology in Disaster Risk Reduction (ITDRR 2019)**, October 9 – 10th, 2019, Kyiv National University of Culture and Arts, Kyiv, Ukraine, <http://itdrr.unwe.bg/>.

ITDRR-2019 provided an international forum for researchers and practitioners to present their latest R&D findings and innovations. The conference was focused on the various IT aspects and challenges of coping with disaster risk reduction. ITDRR-2019 invited experts, researchers, academicians and all other, interested to disseminate their work. The conference continues to establish an academic environment that fosters the

exchange of ideas and dialogue between different levels of academic, research, business and public communities.

The conference emphasized on topics, such as: Advanced ICT and disasters, Big Data and disasters, Climate change and disaster risk, Communications in disasters, Crowdsourcing and emergency management, Disaster information processing, Disaster prevention and mitigation, Disaster relief, resilience and research, Disaster risk management capability assessment, Emergency preparedness, Hazard vulnerability and risk mapping, etc.

The Program Committee received 63 paper submissions, out of which 21 research papers were finally accepted and presented at the conference. The ITDRR -2019 Proceedings will be published by Springer, as the previous three volumes.

Ongoing R&D project

The **SCRDRR** continues its activity on the R&D university project titled: “Research on the Applicability of Virtual Reality in Education and Training”, with a 2017-2019 time frame. Special focus of the project in 2019 is Augmented reality (AR) and Virtual reality (VR) in Disaster Preparedness Training using drones. Artificial Intelligence in disaster risk reduction is considered for implementation



Prof. Dimitar Velev

Director

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Image from the INSeaPTION global user workshop on climate services, September 25th and 26th 2018, Haarlem, Netherlands.

BRGM is a French public institution in Earth Science, employing over 700 engineers and researchers. BRGM research brings practical responses to the major challenges facing society and arising in particular from climate change, increasing mineral resource scarcity, new energy needs, natural risks and soil and water pollution.

This year 2019, BRGM was involved in several ongoing projects concerning risk reduction. Among them, BRGM coordinates INSeaPTION. This research project focuses on the consequences of sea level rise due to global warming for coastal areas (increasing marine submersions, worsening of erosion and salinization). INSeaPTION aims to co-develop climate services with European coastal adaptation actors and vulnerable islands in the Pacific and Indian Oceans (French Polynesia, Maldives). This project is supported by ERANET-ERA4CS and involves the Global Climate Forum (Germany), Universities of the Balearic Islands (Spain), La Rochelle (France) and Utrecht (Netherlands), CREOCEAN (France) and some

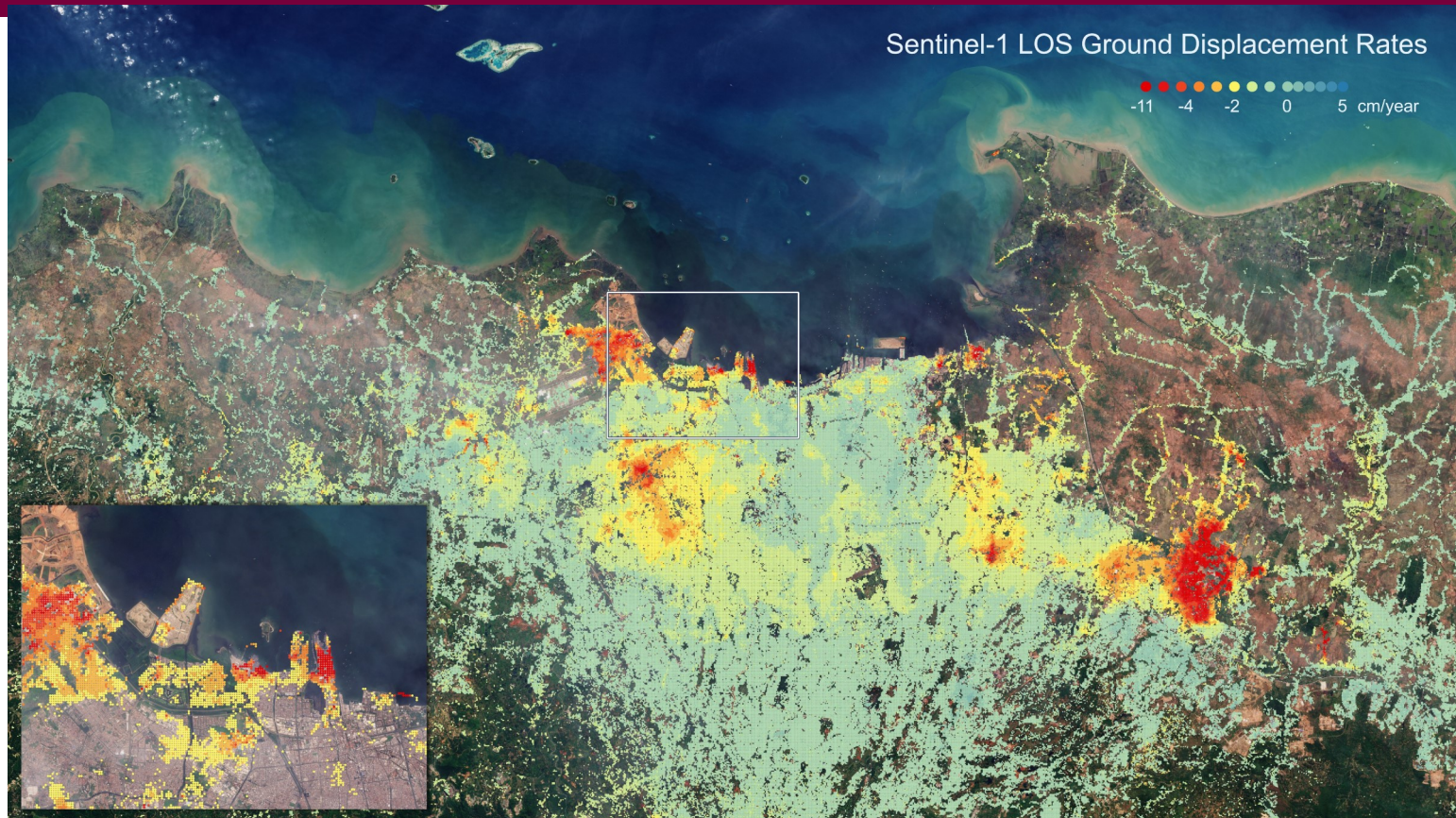
other local partners. Intermediate results of the project (user workshop reports, articles ...) are available on the website of the project: www.inseaption.eu

Another ongoing project of BRGM is Geohazard Lab, financed by ESA and CNES. As part of this project, BRGM is responsible for promoting and organizing a Copernicus satellite mission data community for the study of natural hazards.



Dr. LEVY Clara

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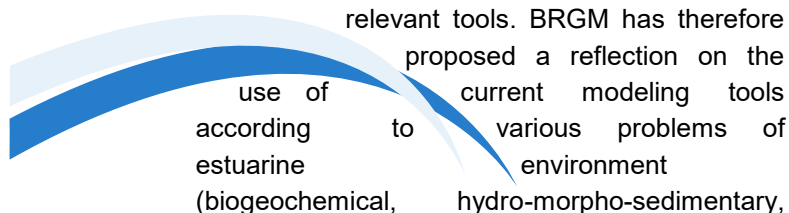
Earth displacement map based on the multi-temporal interferometric processing of ESA's Geohazards Exploitation Platform (GEP). Copyright: Contains modified Copernicus Sentinel data (2019), processed by ESA GEP, CNR-IREA & BRGM.

The first published works have shown the interest of these results for research on land subsidence in Jakarta (Indonesia), cavities in Rome, and for the study of volcanic mechanisms on Santorini. See also: http://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-1/Using_satellite_information_to_help_rebuild_after_a_disaster

One of BRGM's roles is to provide decision-makers with diagnostic and decision-making tools to support risk prevention and sustainable rural and urban planning. As such, BRGM initiated work on mobilizable tools for ecological restoration in estuarine environment. This approach was motivated by the failures of many ecological restoration projects along the Channel-Atlantic coast, whose feedback has shown that it is essential to predict the development and maintenance of ecosystems by mobilizing relevant tools. BRGM has therefore proposed a reflection on the use of current modeling tools according to various problems of estuarine environment (biogeochemical, hydro-morpho-sedimentary,

trophic and targeting particular species) in order to support project managers and institutional to design restoration process. The main productions of the project are: 1) a technical report on modeling tools to predict the effects of restoration on several compartments of estuarine ecosystems, 2)

a guide proposing methods and recipes for restoration practitioners. This project was financed by AFB, and involved AFB, GIP Seine-Aval, GIP Loire-Estuaire, the university of Rouen, and of Caen IRSTEA, IFREMER, the French water agencies Loire-Bretagne and Seine-Normandie.





Risk Reduction Technology (CEDIM), Germany

<http://www.cedim.de/english>

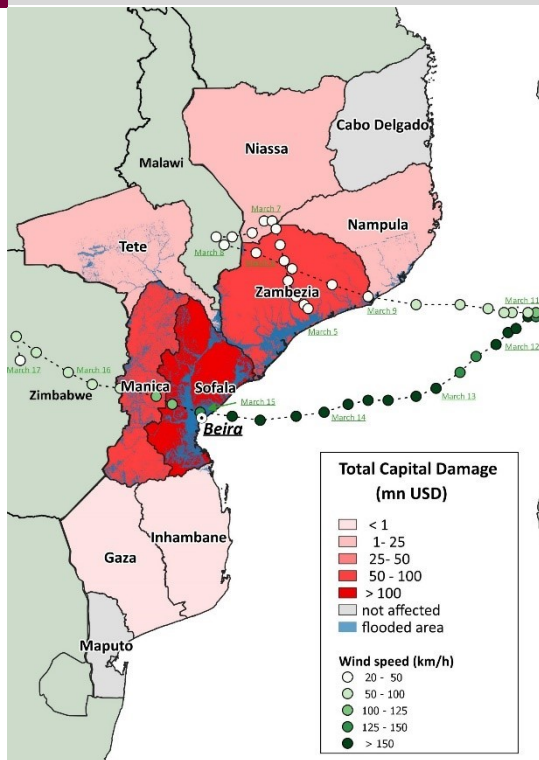


Fig: Preliminary estimates of losses and footprints in the three countries from World Bank (Mühr, B. et al., 2019: CEDIM Forensic Disaster Analysis „Tropical Storm IDAI“ Report, Center for Disaster Management and Risk Reduction Technology, Karlsruhe, Germany, doi:10.13140/RG.2.2. 21518.61769).

The **Center for Disaster Management and Risk Reduction Technology (CEDIM)** is an interdisciplinary research center in the field of disaster and resilience research. By synergistically combining competences from different disciplines, CEDIM develops new models and concepts for novel solutions in the fields of natural disasters, hazards and resilience. Within the current research focus on **near-real time Forensic Disaster Analysis (FDA)**, CEDIM investigates the dynamics and interrelations of disasters, identifies major risk drivers, estimates the impact as fast as possible, and infers implications for disaster mitigation.

In 2019, CEDIM produced an FDA report about the tropical Cyclone Idai (Southeast Africa; see Figure) and several FDA short reports about heavy rain in Germany, a series of severe thunderstorms with very large hailstones (also Germany), the Flooding in Venice (Italy), and the Earthquake sequence in southeastern Europe.

Within the scope of the FDA activities, CEDIM has established a co-operation with the World

Bank as part of its Global Rapid post-disaster Damage Estimation (GRADE) initiative. GRADE is an approach that rapidly estimates physical post-disaster damage incurred in key sectors within two weeks of the disaster. The first common reports were issued for tropical storm IDAI, Hurricane Dorian and the Earthquake sequence in southeastern Europe. A special focus for CEDIM is on disasters affecting Africa.

Own CEDIM R&D projects of the current funding phase end in 2019. The next funding phase will focus on effects of heatwaves and droughts in Central Europe regarding society, economy and ecology. Research in that topic is urgently needed given the large adverse effects heat waves and droughts have also in industrialized areas such as Europe. Additional knowledge will help to increase resilience and to develop appropriate adaptation measures. The funding phase will start in summer next year.



Prof. Michael Kunz

CEDIM Spokesman

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Disaster Research Unit (DRU) Freie Universität Berlin, Germany

<http://polsoz.fu-berlin.de/dru>



The Disaster Research Unit (DRU) conducts inter- and transdisciplinary disaster risk research with particular focus on the socio-cultural contexts of crises. Research topics include, among others, perceptions of safety, risk and disaster, risk reduction and disaster prevention, preparedness and warning, human behaviour and coping in extreme situations, vulnerability and resilience, and sustainable post-disaster reconstruction. The working areas of the DRU encompass the entire “disaster cycle” from a disaster’s onset, through its progression looking at conditions for dealing with crises and disasters, all the way to sustainability-oriented social development.

For the DRU, the year of 2019 started off with a series of field visits: As part of a fact-finding mission by the German Federal Ministry of Education and Research to Indonesia, Prof. Martin Voss joined an expert delegation to enquire gaps and research needs related to the tsunami warning system based on the deadly tsunami disasters on 28th September and 22nd December 2018. Second, the team of the project WAKE (Migration-Related Knowledge Management for Civil Protection of the Future) travelled to Greece to interview locally based actors involved in refugee logics and relief works and visit refugee camps. The third field visit comprised an extended research and guest stay at the Indian Institute of Technology Bombay (IITB), India, in the context of a doctoral project on local disaster risk preparedness.

Looking at some key achievements in terms of project work, the project WAKE conducted a quick-response study on the forest fires near Lübtheen, Germany, where four villages had to be evacuated – extended forest fires are for the German context an unusual phenomenon and pose particular



Visit of the Meteorological, Climatological, and Geophysical Agency BMKG in Jakarta during a Fact Finding Mission by the German Ministry of Education and Research in Indonesia

challenges, among others, due to the contamination of grounds by old ammunition. Within the project WEXICOM III (Weather warnings: from EXtreme event Information to COMunication and action), the class module “Interdisciplinary Hazard Risk Research” has been developed as a juncture between cutting-edge project work and teaching. Graduate students are invited to dive into interdisciplinary research perspectives, opportunities, and scopes surrounding weather warnings. Furthermore, the DRU was able to secure funding to participate in the Grand Challenge of the Berlin University Alliance with the multi-disciplinary definition project “Social Cohesion in Times of Climate Change”. In a pre-phase, the consortium currently prepares a proposal on the physical and social impacts of climate change, which takes cohesive and erosive societal forces and dynamics into account and explores opportunities for climate adaptation.



Prof. Martin Voss

Head

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Institute for Advanced Sustainability
Studies (IASS), Germany
<https://www.iass-potsdam.de/en>



Source: <https://enb.iisd.org/climate/cop25/side-events/4dec.html#event-3>

Group photo at the end of the event (L-R): **Mara Gomez**, IASS COBENEFITS project; **Asmau Jibril**, Federal Ministry of Environment, Nigeria; **Mark Lawrence**, Director, IASS; **Yerima Peter Tarfa**, Director, Department of Climate Change, Nigeria; **Shareen Yawanarajah**, International Policy Manager, Energy Program, EDF; **María Amparo Martínez Arroyo**, Director General, Instituto Nacional de Ecología y Cambio Climático (INECC), Mexico;

Moderator **Kathleen Anne Mar**, IASS; **Bala Bappa**, Federal Ministry of Environment, Nigeria; **Charlotte Unger**, IASS; and **Dan McDougall**, Climate and Clean Air Coalition (CCAC)

Following highlights a few of the activities IASS engaged in during 2019:

- From 6 – 8 March 2019: *Climate and Clean Air Coalition (CCAC) 2019 Working Group Meeting* - IASS co-organised event at World Agroforestry Centre (ICRAF), UN Campus, Nairobi, Kenya; on the margins of UNEA-4
- *Integrating Climate Action, Sustainable Development, and Clean Air: African Action Plans to Reduce Short-lived Climate Pollutants* on 13 March 2019 - IASS co-organised event at "Green Tent" at UNEA-4, the fourth session of the UN Environment Assembly in Nairobi, Kenya
- *Perspectives on the Air Pollution-Climate-Health Nexus* on 20 May 2019 - German-Thai Exchange on Health and Climate Change Adaptation at Robert Koch Institute, Berlin, Germany
- *Climate Change Adaptation and Health: pressing issues, cooperation and cross-sector action* on 20 May 2019 - German-Thai Exchange on Health and Climate Change Adaptation at Robert-Koch Institute, Berlin, Germany
- *Does Climate Engineering pose Systemic Risks?* on 25 June 2019 - Talk at Society for Risk Analysis, Potsdam, Germany
- *Planetary health: interests at the intersection of climate and air quality* on 29 August 2019 - Talk at the Wissenschaftsetage in the Bildungsforum, Potsdam, Germany.
- *UNFCCC Side Event at COP25* on 4 December 2019: *Strengthening climate promises: action on air quality to enhance NDCs*, IASS co-organised event at UNFCCC COP25, Madrid, Spain (Kathleen Mar, Charlotte Unger, Mara Gomez); <https://enb.iisd.org/climate/cop25/side-events/4dec.html#event-3>



Prof. Ortwin Renn
Scientific Director

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European Commission Joint Research Centre Italy

<https://ec.europa.eu/jrc>
<https://drmkc.jrc.ec.europa.eu/>

The Joint Research Centre (JRC) is the European Commission's science and knowledge service which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy. The mission of the JRC's Disaster Risk Management Unit is to strengthen the EU's resilience to crises and disasters and the EU's aim to promote stability and peace through its research in crisis management technologies and analysis.

In 2019, the **Copernicus Emergency Management Service** renewed its **Risk & Recovery Mapping** module, featuring more standard products. It was also activated 75 times to produce **rapid maps** after disasters, and saved lives and property with the early warnings and monitoring for **floods (EFAS)**, **wildfires (EFFIS)** and **droughts (EDO)**. The unique statistics on forest fires were much quoted in relation to major fires in Siberia and Brazil. See <https://emergency.copernicus.eu/>

The **Disaster Risk Management Knowledge Centre** published the first ever **Recommendations on National Risk Assessment** summarizing the science and practice across natural and technological hazards. It also developed the **Risk Data Hub** to help Member States and the European Commission collect loss and risk data. In its annual seminar, the DRMKC gathered the European science-policy community around four topics: climate change adaptation, hybrid threats, the Risk Data Hub, and the new RescEU legislation and its Knowledge Network. See <https://drmkc.jrc.ec.europa.eu/>

The Unit published the **Atlas of the Human Planet 2019**, which presents key human settlements and urbanisation statistics for 239 countries based on the progress made towards the development of a people-based global harmonised definition of cities and rural areas. Figures and statistics presented in the Atlas 2019 are the result of massive automatic big data processing in the framework of the **Global Human Settlement Layer**

(GHSL) combining satellite imagery and census

information to map settlements, understand their characteristics, and report about their changes over 40 years' time (1975 – 2015). See <https://ghsl.jrc.ec.europa.eu/>



The Disaster Risk Management Knowledge Centre is a key science-driven initiative in the European Commission to bridge gaps between science and policy, break silos across scientific disciplines and foster an all-policy approach to disaster risk management in the European Union.

JRC made significant progress on tools for situation awareness and risk assessment to support Member States and EU authorities, including the **Global Disaster Alert and Coordination System** (multi-hazard alerts globally), **RAPID-N** (for Natech hazards), **ADAM** (accident damage analysis). See <https://gdacs.org/>, <https://rapidn.jrc.ec.europa.eu/>, <https://adam.jrc.ec.europa.eu/>.

In the field of conflict risk, the JRC published the Science for Peace portal, integrating expertise from three domains (risk modelling, remote sensing and open-source data) and applying it synergetically for conflict prevention, early warning, crisis monitoring and post-conflict assessment.

See <https://science4peace.jrc.ec.europa.eu/>

Finally, the JRC produced new analysis of climate change impacts in the **PESETA 4** study, providing a solid evidence base to the new policies on climate change in the EU.



Dr. Alessandra Zampieri

Head of Unit

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Department of Earth Sciences University of Florence, Italy <https://www.unescogeohazards.unifi.it>

The Department of Earth Sciences of the University of Florence (DST-UNIFI, <https://www.dst.unifi.it/changelang-eng.html>) is a recognized center for international research and higher training in Italy with an Engineering Geology group counting almost over than 60 persons among professors, researchers, technicians, post-doc fellows, PhD students, collaborators and visiting fellows.

In 2019, the activities of Civil Protection Centre (<https://www.protezionecivile.unifi.it>), operating at DST-UNIFI, has realized a series of scientific initiatives in support of the security of the academic activities in the University of Florence, such as the idealization and drafting of the University's Civil Protection plan, inserted in the broader context of the national legislative system, as well as the organization of dissemination and training events. During 2019 it has been also involved by the National Civil Protection Service in several emergency operational activities for the technical support in the geo-hydrological hazards treating human life and infrastructures up to the return of safe conditions.

The research activities carried out in 2019 focused on the use of innovative multi-sensor technologies (i.e., Ground-based SAR interferometry, UAV, Laser Scanner) for analysis of risk scenarios to support emergencies situations, landslide monitoring and early warning and on the exploitation of the available EO (Earth Observation) technology to detect, map, monitor and forecast ground deformations. Coupling data from both activities with those obtained from more traditional ones a reliable regional landslide forecasting models have been developed. The

research activities have been carried out in the framework of national and international projects in different scales of activity and temporal extension. The main scientific outcomes and the relative description of useful products in the technical field have been published in about 50 published papers in peer-reviewed scientific journals, winning the Best Paper Award 2019 of the Remote Sensing journal.

After the appointment of the DST-UNIFI as a UNESCO chair on *Prevention and Sustainable Management of Geo-Hydrological Hazards* (<https://www.unesco-geohazards.unifi.it>), several national and international missions have been performed in collaboration with UNESCO and official partners. In 2019 the UNESCO chair actively supported the protection of many World's cultural heritage threatened by geo-hydrological hazards, some of which are part of the UNESCO World Heritage list. A special attention was devoted to less developed countries. The Chair has continued to manage the International Academic Master's Degree (in English language) on "Geoengineering" (<http://www.ing-gem.unifi.it>), with the joint competences of the all core members of the Chair in the field of geo-hydrological risks. Several lectures and seminars have been hosted by the Chair, aiming at promoting a knowledge sharing network, through capacity building and dissemination towards different actors.



Prof. Nicola Casigli

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As member of the International Consortium on Landslides (ICL) the DST-UNIFI is signatory of the ISDR- ICL Sendai Partnership 2015-2025. On September 18, 2019, at the UNESCO Headquarters in Paris, the DST-UNIFI has signed the Kyoto 2020 Commitment for global promotion of understanding and reducing landslide disaster risk. The Kyoto 2020 Commitment is a duty to the

Sendai Landslide Partnerships 2015-2025, the Sendai Framework for Disaster Risk Reduction 2015-2030, the 2030 Agenda Sustainable Development Goals, the New Urban Agenda and the Paris Climate Agreement.



**The First Group of Signatories of
the Kyoto Landslide Commitment 2020**
18 September 2019, UNESCO, Paris

Picture of the First Group of 58 Signatories of Kyoto Landslide Commitment 2020 (KLC2020), for Global Promotion of Understanding and Reducing Landslide Disaster Risk (18 September 2019, UNESCO Headquarters, Paris).

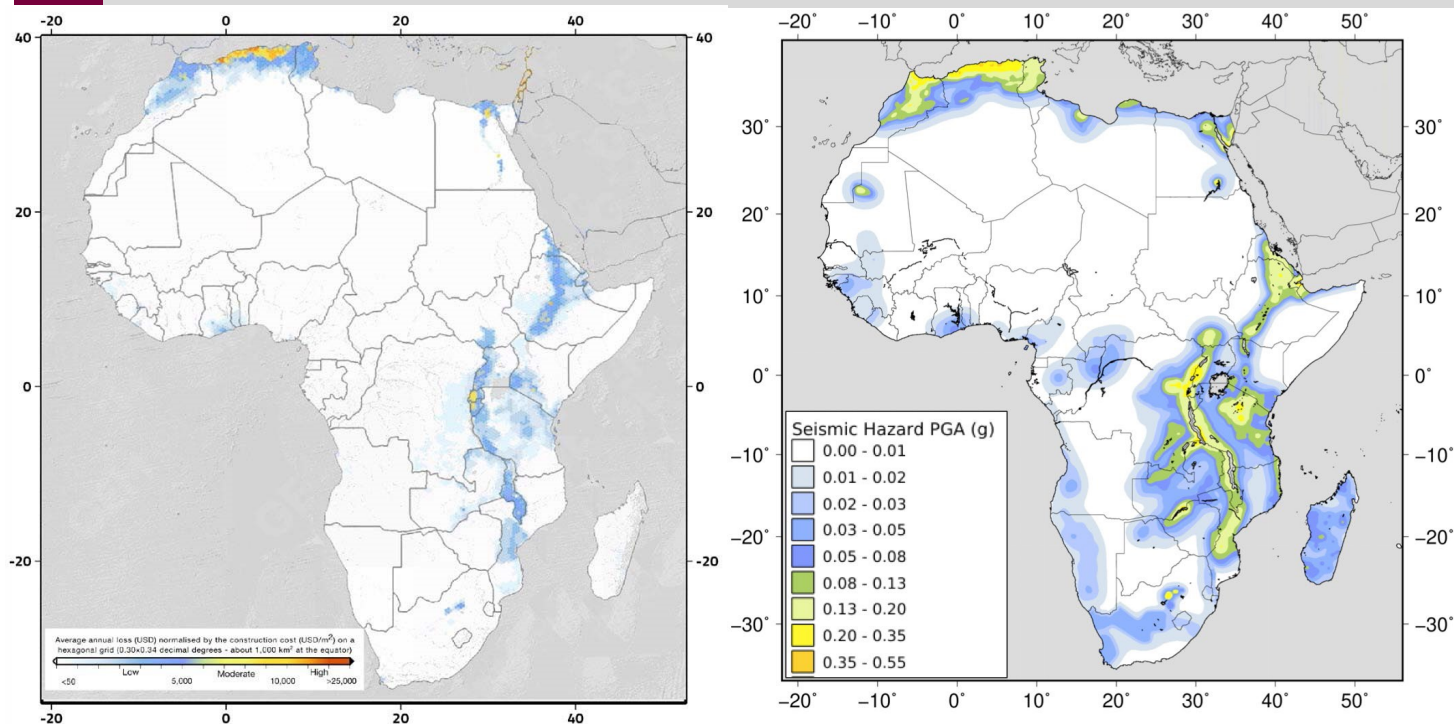
UN & International Organizations (UNESCO, UNU, IRDR, WFEO, GRF Davos, IGS), Government Organizations and ICL members have joined the signing ceremony, including the Department of Earth Sciences, University of Florence.





Global Earthquake Model (GEM) Foundation, Italy

<https://www.globalquakemodel.org>



GEM Africa Earthquake Model released at UNDRR's Global Platform for Disaster Risk Reduction 2019 Forum in Switzerland. (Left) Africa Earthquake Risk (Right) Africa Earthquake Hazard

The year 2019 was a record-breaking year in terms of the number of DRR professionals that we have trained in the use of GEM's OpenQuake software for seismic hazard and risk assessment, and in terms of new partnerships.

The year 2019 was also special because of several activities: the launch of two revamped and improved websites - GEM and the OQ Platform; the release of OpenQuake with a capability to assess volcanic risk; start of the USAID-OFDA Training and Communication for Earthquake Risk Assessment (TREQ) project; and the presentation of the Social Vulnerability maps - a relatively unexplored area of modelling and a pioneering initiative that GEM is committed to complete in 2020.

More than 340 scientists, researchers, modelers and DRR professionals were trained on OpenQuake from Asia, Europe, North and South America, increasing the knowledge and

skills of national and local professionals in seismic hazard and risk assessment. GEM engaged in new partnerships with USGS and several companies from the private sector to help enhance global earthquake loss modeling efforts, and exchange of scientific and technical knowledge on earthquake hazard and risk.



Prof. John Schneider
Secretary-General

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Vitor Silva, GEM Risk Coordinator at the International OpenQuake workshop in Indonesia, 2019.

In addition to our capacity development efforts and partner engagements, GEM also released the Africa Earthquake Hazard and Risk model on 15 May 2019 in recognition of UNDRR's Global Platform for Disaster Risk Reduction 2019 Forum in Switzerland. The Africa Earthquake model underpins the African portion of GEM's global maps released in December 2018.

In addition, UNDRR's Global Risk Assessment Framework (GRAF), where GEM co-chaired a key component: Mapping and Data Gaps Analysis working group, was also launched during the event. GRAF aims to develop a comprehensive framework for understanding risks and informing decision making in support of the Sendai Framework, Paris Agreement and Sustainable Development Goals through worldwide multi-stakeholder collaboration.

Anirudh Rao, GEM Seismic Risk Engineer and Scientist trains 78 participants, 28 of which joined online, on the use of OpenQuake software for seismic hazard and risk assessment at Western University, London, Ontario, Canada in November 2019.





Szkoła Główna
Służby Pożarniczej

The Main School of Fire (SGSP) Poland

<https://www.sgsp.edu.pl/>



New simulator for internal fires at the Base of Field Exercises and Rescue Innovation of SGSP—Source: <https://www.facebook.com/sgsp.edu/posts/nowy-symulator-na-teren-bazy-szkolenia-poligonowego-i-innowacji-ratownictwa-sg/1533057006816210/>

The Main School of Fire Service—Source: <https://bip.sgsp.edu.pl/>

The Main School of Fire Service (Szkoła Główna Służby Pożarniczej, SGSP) has been participating in the GADRI for last days of 2019 as the university and the State Fire Service authorities had seen a great chance in the cooperation for sharing knowledge and development of solutions in disaster risk reduction. Additionally, in 2019 SGSP was restructured as a result of adaptation to new law of science and higher education in Poland. Currently, in accordance to the core domain of the university, it is comprised by two research institutes (the Institute of Safety Engineering and the Institute of Internal Security), one didactic faculty (Faculty of Safety Engineering

and Civil Protection) and two specialist centres (the Centre of Social Safety and the Centre of Research and Analysis of Antiterrorist Safety). SGSP is also an organizational unit of the State Fire Service, participating in national and international emergency operations. Mentioning the direct access to two exercise fields, these state unique chances for development of scientific and educational potential of the university.



Prof. Paweł Gromek

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In reported period SGSP carried out research in following international projects related to disaster risk reduction aspects:

1. Improving Disaster Risk Reduction in Transcarpathian Region, Ukraine — ImProDiReT, EU Civil Protection Mechanism.
2. Community Safety Action for Supporting Climate Adaptation and Development (CASCADE).
3. DRiving InnoVation in crisis management for European Resilience (DRIVER+), 7th Framework Programme.
4. SAFEGuard of Critical heAlth infrastructure (SafeCare), Horizon 2020.
5. European Sensor System for CBRN Applications (EU-SENSE), Horizon 2020.

Additional activities, which are worth to be highlighted in analyzed context, were:

1. Cooperation agreement with the Polish Centre for International Aid,
2. Cooperation agreement with the Polish Red Cross in knowledge sharing, R+B activities and didactics,
3. Cooperation agreement with the Caritas Poland in education, humanitarian aid, R+B activities and other initiatives.

The scientific activeness was reflected by doctoral dissertations initiated in security studies (in social sciences) and in environmental engineering, mining and power engineering (in technical sciences).

Final demonstration of DRIVER+ project in SGSP (November 2019)





Faculty of Security Engineering, University of Žilina Slovakia

<http://fbi.uniza.sk/en/>



The Faculty also organised the first year of the summer school “Young Little Rescuer” for children from 6 to 12 years of age. During four days the children became fire-fighters, rescuers, specialist in the civil defence area and detectives. Step by step they learned the work of the professionals and acquired a lot of knowledge and skills.

The tenth year of the competition TEAM RESCUER verified the linkage of the theoretical knowledge achieved during the study with practical activities of the students during the

The Faculty of Security Engineering is oriented towards the managerial and technological studies in the security and safety area. In 2019 there were accredited 5 study programmes at the Faculty: Crisis Management, Security Management, Emergency Services, Industrial Safety, Critical Infrastructure Protection.

In 2019 a new study programme was accredited – it will be offered to the students in 2020 and will be realised in English. Based on the acquired financial means we have completed the labs and purchased devices for all study programmes that



competition of the fire fighting disciplines and physical capabilities.

The students and educating young people is our absolute priority in the framework of security and safety because it can significantly influence our future.

Our faculty is also active in various project consortiums and our young team is dynamic and ready to solve new challenges.

will be utilised in the teaching process.

In February the Faculty organised a big Open Day in cooperation with all local rescue services encompassing very dynamic and interesting programme for students at all levels of study and also for the public. This activity was awarded as one of the most interesting Open Days of the faculties organised in 2019.



Dr. Katarina Holla
Associate Professor

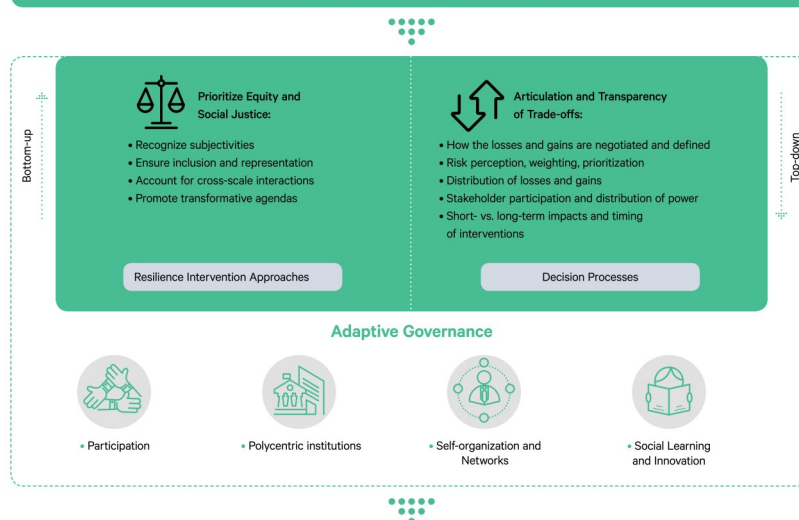
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Stockholm Environment Institute (SEI) Initiative on Transforming Development and Disaster Risk (TDDR) Development is vital for reducing disaster risk, yet current unsustainable development models are driving and creating disaster risks, for example, in the removal of natural storm-surge protection barriers including mangrove forests in favour of aquaculture farms or beachfront properties. At the same time, disasters can destroy development gains, but existing disaster risk reduction (DRR) approaches are not sufficiently contributing to sustainable development. Transformation is increasingly understood and considered as a legitimate and necessary pathway for moving from current development patterns that increase, create or unfairly distribute risks, towards more equitable, resilient and sustainable development. The SEI Initiative on Transforming Development and Disaster Risk (TDDR) has been working to advance scientific knowledge and support policy and practice to enact transformations in disaster risk reduction (DRR) and sustainable development towards more equitable, resilient and sustainable societies. To learn more please visit <https://www.sei.org/projects-and-tools/projects/sei-initiative-on-transforming-development-and-disaster-risk/>

International Center of excellence on Transforming Development and Disaster Risk (ICoE-TDDR) Hosted by SEI and supported by the Integrated Research on Disaster Risk (IRDR) programme, the International Centre of Excellence on Transforming Development and Disaster Risk (ICoE-TDDR) seeks to transform the relationship between development and DRR. We work with academic, policy, development and private sector partners at global, regional and sub-national levels to advance scientific knowledge and support policy and practice to enact transformations towards more equitable, resilient and sustainable societies, in line with the Sendai Framework for

DRR and the Sustainable Development Goals (SDGs). Our focus on transformation highlights the need for systemic change from social and political systems that create and perpetuate risk, and lead to socially unjust and

Transformative Development Pathways



Equitable, Resilient and Sustainable Development

unsustainable development outcomes, to systems where sustainable development and DRR work in unison to address the root causes of risk. To learn more please visit <https://www.sei.org/publications/transforming-development-and-disaster-risk/>

weTRANSFORM is a collaborative platform on transformation for equitable, resilient and sustainable development and disaster risk reduction (DRR), powered by the SEI weADAPT platform. It is a new global meeting place for development and disaster risk researchers, practitioners and decision-makers and their partners. The platform invites researchers and other disaster risk reduction experts and stakeholders to share their knowledge, perspectives and news on the weTRANSFORM site. To learn more please visit

<https://www.sei.org/projects-and-tools/tools/wetransform/>



Dr. Guoyi Han

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Bournemouth University

Disaster Management Centre (BUDMC)

United Kingdom

<http://www.bournemouth.ac.uk>



Henry Bang at the 4th Global Summit, DPRI, Kyoto University, Japan

In 2019, BUDMC engaged in the following activities:

Academics

- First three BUDMC PhD completions.
- First graduated

cohorts of UK and overseas MSc Disaster Management (DM) students; Over 10 fully registered PhD students; Appointment of two Senior Lecturers.

Research

- Empirical data collection in Sierra Leone under the auspices of the AFRICAB project; Empirical data collection in the Caribbean under the auspices of the PINPOINT project; Generation of a 2 impact case studies in African and Caribbean DM.

Peer Reviewed Academic Publications and Book Chapters

- Bang, H. Miles, L. and Gordon, R. (2019) Disaster risk reduction in Cameroon: are contemporary disaster management frameworks accommodating the Sendai framework agenda 2030? *International Journal of Disaster Risk Science*. 10, 462-277.
- Bang, H., Miles, L. and Gordon, R. (2019) Evaluating local vulnerability and organisational resilience to frequent flooding in Africa: the case of Northern Cameroon. *Foresight*, 21 (2), 266-284.
- Bang, H., Miles, L. and Gordon, R. (2019) Hurricane occurrence and seasonal activity: an analysis of the 2017 Atlantic Hurricane Season, *American Journal of Climate Change*, 8, 454-481.
- Baker-Beall, C. (2019) The threat of the 'returning foreign fighter': The securitization of EU migration and border control policy. *Security Dialogue*, 50(5), 437-453.
- Shipway, R. and Miles, L. (2019) Bouncing

back and jumping forward: scoping the resilience landscape of international sports events and implications for events and festivals. *Event Management*, 24 (1), 1-33.

- Shipway, R. and Miles, L. (2019) Reputation and perceived resilience in developing countries bidding for major sports events. In: Walters, G. and Mair, J., eds. *Reputation and Image Recovery for the Tourism Industry*. Good Fellow Publishers: Oxford, 148-164.

Conferences

- Bang, H., Miles, L., Gordon, R. 4th Global Summit of Research Institutes for Disaster Risk Reduction, *Disaster risk reduction in West Africa: are contemporary disaster management frameworks accommodating the Sendai framework agenda 2030?*, 13 Mar 2019, Kyoto, Japan
- Bang, H. UK Alliance for Disaster Research, *Viewing Community Resilience in the South through the "eyes" of Mega Storms: A Conceptual Analysis*, 17 Jul 2019, Northumbria University, Newcastle, UK.
- Bang, H. and Miles, L. National Platform for Disaster Risk Reduction (NPDRR) - Coordination Conference Meeting on Preparedness for the Rains, AFRICAB Preliminary Results: *Driving African Disaster Management Capacity-Building in Sierra Leone*, 23 May 2019, Office of National Security (ONS) Building, Freetown, Sierra Leone

Further details on our activities can be found at our website.



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Evidence Aid, United Kingdom

<https://www.evidenceaid.org/>



The 1st Core Group Meeting of WHO Thematic Platform for Health Emergency and Disaster Risk Management Research Network, 17-18 October 2019
WKC Forum for Health-EDRM, 18 October 2019, Kobe, Japan

collection 'Prevention and treatment of acute malnutrition in humanitarian emergencies' (Allen C, Jansen J, Naude C, et al. (2019) *Prevention and treatment of acute malnutrition in humanitarian emergencies: A multi-organisation collaboration to increase access to synthesized evidence*. Journal of International Humanitarian Action.) In

During 2019, our main focus has been on expanding and our evidence collections. In 2018, we launched the expanded evidence collection 'The health of refugees and asylum seekers' to include oral health: during 2019, we combined the Cochrane systematic reviews (originally in a separate collection) to this collection and have ensured that all summaries of these reviews are published in French and Spanish as well as in English. A similar exercise related to the collection 'Prevention and treatment of acute malnutrition in emergencies and humanitarian crises' is being undertaken and is partially complete. We employed an intern, Jiewon Lim to update our collection on 'Ebola' and she presented the work at two conferences which took place in the UK and Ireland.

All the summaries of the systematic reviews in the collections have been translated into French and Spanish, which continues to result in a greatly increased number of both Spanish and French speakers to our site.

Following the successful launch of 'Research Evidence in the Humanitarian Sector: a practice guide, in 2018, we have translated the text into French and Spanish. Hard copies have been posted as far afield as India and

South Korea, and all 3

language versions

are available free of charge from our website.

We were published in the Journal of Humanitarian Action describing the process of our evidence

addition, we published our findings of a policy delphi study in BMC Health Services Research (Jillson I, Clarke M, Allen C, et al.) Improving the science and evidence base of disaster response: a policy research study. BMC Health Services Research (2019) 19:274 <https://doi.org/10.1186/s12913-019-4102-5>

We increased the flexibility and usability of the search function on our Resources page (<https://www.evidenceaid.org/resources/>) to allow users to search both by key word and through the categories and tags.

We spent time building partnerships and submitted funding bids as part of various consortia.

We also took part in various speaking events including the University of Westminster and EBM Live, and our CEO chaired a panel at the WHO Health EDRM Research Network in Kobe, Japan



Ms. Claire Allen

Operations Manager

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Important Achievements during 2019:

Dr Nibedita Ray-Bennett presented the Avoidable Deaths Network on the IGNITE Stage at the Global Platform for Disaster Risk Reduction in Geneva, Switzerland on the 17th of May 2019. <https://www.unisdr.org/conference/2019/globalplatform/programme/ignite-stage/view?id=1069>

Avoidable Deaths Network released its first Newsletter in December 2019: <https://www.avoidable-deaths.net/adn-publications/>

Avoidable Deaths Network's latest publication: Ray-Bennett, N.S. Mendez, D. Alam, E. and Morgner, C. 2020. Inter-Agency Collaboration in Natural Hazard Management in Developed Countries. In Gerber, B. (ed.) *Oxford Encyclopedia of Natural Hazards Governance*, New York: Oxford University Press.

<https://oxfordre.com/naturalhazardscience/view/10.1093/acrefore/9780199389407.001.0001/acrefore-9780199389407-e-176>

Funded by ESRC Dr Nibedita Ray-Bennett showcased her research project: 'Exploring the Challenges and Opportunities Around Reproductive Health in Disasters in Bangladesh' at the ESRC Festival of Social Sciences at the University of Leicester on 7 November 2019.

Awards

Sep 2020-Aug 2020: £82,175. Project Title: Life Changing Scholarships for Human Development. Funded by the Commonwealth Scholarship Commission in the UK/DFID. Five scholarships will be offered to five meritorious students from five Commonwealth Nations to study the MSc in Risk, Crisis and Disaster Management. Start date: 1st October 2020. Further details of the MSc Risk, Crisis and Disaster Management: <https://le.ac.uk/courses/risk-crisis-and-disaster-management-msc-dl/2020>

Nov 2019-Jul 2020: £5,000. Project Title: *Strengthening Avoidable Deaths Network*. Funded by the Leicester Institute of Advanced Studies (LIAS) Tiger Team Funding, and Global Challenge Research Fund.

Investigators: Dr Nibedita S. Ray-Bennett (PI); Dr Hideyuki Shiroshita (Kansai University); Mrs Denise Corsel and Dr Christian Morgner (University of Leicester); and Dr Pedro Rodriguez-Veiga (National Centre for Earth Observation).



Dr. Nibedita Ray-Bennett

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In collaboration with the Prime Minister's Office in Uganda, Makerere University, Chittagong University, Tata Steel, Orissa State Volunteers and Social Workers Association, ICDDR,B-Chakaria, Dhaka University, the research team is establishing three ADN HUBs in India, Bangladesh and Uganda. The HUBs will promote research and enterprise activities to realise the Sendai Framework for Disaster Risk Reductions' Global Targets A and B (reduce disaster deaths and injuries by 2030).

Nov 2019-Jul 2020: £7,153.25. Project Title: *Reproductive Health in Disasters: Raising Visibility for Future Collaborations for Development*. Funded by ESRC-Impact Acceleration Account. Investigators: Dr Nibedita Ray-Bennett (PI), Dr Iqbal Kabir (Director of Research and Planning, Ministry of Health and Family Welfare, the Government of Bangladesh), Dr Fariha Haseen (Bangabandhu Sheikh Mujib Medical University), Mr Maqbul Bhuiyan (Data Management Aid), and Mrs Nimisha Goswami and Dr Ataur Rahman (International Planned Parenthood Federation-South Asia Region Office).

This is an advocacy project, aiming to upscale the intervention package **RHCC**(UNFPA's **Reproductive Health Kit 8** prior to a flood; **Capacity building**; **Community awareness**), and the facility assessment tools developed by Dr Nibedita Ray-Bennett and Mrs Denise Corsel from the University of Leicester, Mrs Nimisha Goswami from IPPF-SARO and Mr Maqbul Bhuiyana from Data Management Aid between 2015 and 2018. <https://www.ippf.org/resource/improving-quality-and-availability-post-abortion-care-humanitarian-crisis>





Institute for Risk and Disaster Reduction (IRDR) University College of London, United Kingdom

<http://www.ucl.ac.uk/rdr>

The UCL Institute for Risk and Disaster Reduction (IRDR) leads transdisciplinary research, advanced teaching, policy engagement and knowledge exchange with industry and humanitarian agencies, in risk and disaster reduction.

This year has seen some important developments, including the launch of the IRDR Centre for Digital Public Health in Emergencies, led by Professor Patty Kostkova. The Centre links existing work and collaborations in global health with the Institute's expertise in emergency and crisis planning and management in the new digital age of big data.

The IRDR also developed a new undergraduate programme, the Global Humanitarian Studies BSc, which will prepare graduates for employment, training and research in the humanitarian sector, and provide transferable skills that will equip them for a wide range of professional employment outside the field.

Research achievements

In the last year, IRDR researchers have produced more than 70 peer-reviewed publications, presented at leading international conferences, been invited to speak at prestigious academic institutions, organised international meetings and conferences and have won distinguished awards and substantial research funding.

New research funding awards include:

- Dr Robert Wicks, was awarded funding for himself and a PDRA by STFC on the UCL consolidated grant to study space plasma physics. Dr Wicks was also part of the team involved in ESA mission proposal success for the ESA Fast Mission Phase 1 call.
- Professor Patty Kostkova, won two EPSRC Impact Accelerator Awards: £100k for 'A deployment of ZIKA: a mobile mosquito surveillance app to combat zika virus in Brazil' and a separate award of £15,000.
- Professor Peter Sammonds and Dr Bayes Ahmed were awarded £500k by the Royal Society for a Resilient Futures Challenge-Led Grant entitled 'Resilient Futures for the Rohingya Refugees'.

- The IRDR Centre for Gender and Disaster won a GCRF £4.7 million network proposal, 'Gender Responsive Resilience and Intersectionality in Policy and Practice', led by Professor Maureen Fordham and Dr Punam Yadav.
- Dr Gianluca Pescaroli won a STFC Impact Accelerator award, with Professor Lucie Green (MSSL, Co-I) on 'Increasing the Resilience to Global Navigation Satellite System (GNSS) failures in London'. Dr Pescaroli also won a British Academy/Leverhulme small research grant (£10,000) and a United Nations International Strategy for Disaster Reduction Secretariat consultancy award to develop a decision-making support tool to stress test risk management capabilities towards hybrid risks.
- Dr Laila Kadiwal (UCL Institute of Education) and Professor Peter Sammonds, won a grant (£7,000) from UCL's Grand Challenges programme for Cultural Understanding, on 'De-weaponizing identities and education in armed conflict and disaster'.
- IRDR PhD student, Mohamed Alwahedi, won the Inoue Masaru Scholarship (UCL 1863 Japan Scholarships) (£3,000), which supports UCL students in the collection of research material and leads to improved Anglo-Japanese understanding.



Prof. Peter Sammonds

Director

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Resilient Futures for Rohingya refugees

Events

The IRDR continues to run an extensive public events calendar. Highlights this year include the first anniversary event for the Centre for Gender and Disaster and the 2019 Humanitarian Summit. Led by

the IRDR's Humanitarian Institute, the summit discussed gender, disaster risk reduction and conflict; working in challenging environments and conflict zones; infectious disease outbreaks; and undergraduate humanitarian teaching.





Water Engineering and Development Centre (WEDC) Loughborough University United Kingdom

<https://www.lboro.ac.uk/research/wedc/>

Hydro-geological Hazards and Resilient Urban Growth

14~17 September 2019
Xin · China



Opening of the UK-China Researcher Links Workshop on Hydro-Geohazards and Resilient Urban Growth

During 2019, the Water Engineering and Development Centre (WEDC) of Loughborough University has led and participated in several projects funded by UK government on disaster-related research projects. In these research projects, the Loughborough University researchers work in international and multi-disciplinary teams to build resilience to disasters and achieve sustainable development.

- The NERC funded 'River basins as 'living laboratories' for achieving sustainable development goals across national and sub-national scales' project (February 2019-January 2021) Total £400,000 (£130,000 for Loughborough) [involving Qiuhua Liang, Lee Bosher, Xilin Xia, Huili Chen and Jiaheng Zhao]
- The NERC funded 'Valuing the benefits of blue/green infrastructure for flood resilience, natural capital and urban development in Vietnam' project (January 2019-July 2021) Total £500,000 (£185,000 for Loughborough) [involving Lee Bosher, Qiuhua Liang and Jiaheng Zhao]
- The NERC funded 'FUTURE-DRAINAGE: Ensemble climate change rainfall estimates for sustainable drainage' project (February 2019 – February 2020) Total £280,000 (£138,000 for Loughborough) [involving Qiuhua Liang and Xilin Xia]
- The UK Met Office funded 'Weather and Climate Science for Service Programme: Building a Flood Impact Model for India' project (September 2019 – April 2021) Total £585K (£185k for Loughborough) [involving Xilin Xia and Qiuhua Liang] Total
- The 'Gender Responsive Resilience and Intersectionality in Policy and Practice (GRRIPP) - Networking Plus Partnering for Resilience' (UKRI-GCRF, Total: £4.8mIn, led by Prof Maureen Fordham, UCL)



Prof. Qiuhua Liang

E-mail: q.liang@lboro.ac.uk



Inception meeting in Vietnam for the funded 'Valuing the benefits of blue/green infrastructure for flood resilience, natural capital and urban development in Vietnam' project

WEDC has also received awards, co-organised several international meetings and public engagement events, and co-authored a UN paper on disaster risk and resilience

- 2019 Emerald Literati Award - Outstanding Reviewer for Disaster Prevention and Management: An International Journal
- Launch of the 'Disasters: Deconstructed' podcast (co-hosted with Dr Jason von Meding, University of Florida): <https://disastersdecon.podbean.com/>
- Co-organising the iRec 2019 conference 'Disrupting the Status Quo' (with Dr Jason von Meding, Dr Emmanuel Raju and Dr Giuseppe Forrino; University of Florida, June 2019).
- Co-organising a Photography exhibition at the 9th (i-Rec) Conference on 'Disrupting the status quo: Reconstruction, recovery and resisting disaster risk creation, July, University of Florida, USA (exhibited photos can be seen online here <https://www.flickr.com/photos/leebosher/albums/72157709051171431>)
- Co-organising the UK-China Researcher Links Workshop on Hydro-Geohazards and Resilient Urban Growth (September 2019, Xi'An) [involving Tom Dijkstra, Xilin Xia, Graham Sander and Qiuhua Liang]
- Co-authoring UNDRR working paper, 'Language Matters: Dangers of the 'Natural Disaster' Misnomer.' for the Global Assessment Report 2019 on Disaster Risk Reduction, UNDRR, Geneva, Switzerland [Ksenia Chmutina and Lee Bosher with Dr Jason Von Meding]





Global Disaster Resilience Centre (GDRC) University of Huddersfield, United Kingdom

<http://www.hud.ac.uk/gdrc>

In 2019, academics at the Global Disaster Resilience Centre, University of Huddersfield, UK have been successful in receiving key international grants, awards, esteemed positions and with key publications:

Winners of the Prestigious 2019 Newton Prize

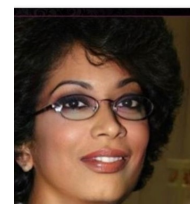
(with Harkunti Rahayu from ITB, Indonesia. We are the winning team amongst 150+ projects, where delivery partners were : Royal academy of engineering, medical research council, UKRI, ESRC, British Council , EPSRC etc. Newton Prize recognises the best research and innovation projects which create an impact socially and economically, between Indonesia and the United Kingdom from 2016 to 2019. Newton Prize is supported by the UK's Department for Business, Energy and Industrial Strategy (BEIS), Newton Fund and Global Challenges Research Fund (GCRF). Our winning entry was based on our "Mainstreaming Integrated Disaster Risk Reduction and Climate Change Adaptation into Coastal Urban Agglomeration Policy" project and our new proposal which looks into "Developing and harmonising local tsunami early warning".

Professor Dilanthi Amaratunga was appointed as a **Steering Committee Member** of Royal Academy of Engineering with specific input to guide the Frontiers of Development programme, from April 2019, which is a programme across the four UK academies (The Royal Academy of Engineering, The Academy of Medical Sciences, The British Academy and The Royal Society).

GDRC has been successful with the following funded project during 2019:

- **Developing and harmonising local capacities for tsunami early warning;**
Funded by: Newton Prize; **Value:** £ 200,000;
Partner country: Indonesia

- **Localising tsunami early warning systems;**
Funded by: QR/GCRF; **Value:** £ 48,000;
Partners in this initiative include: UNESCO (IOC-UNESCO) ICG/IOTWMS WG 1 on Tsunami Risk, Community Awareness and Preparedness; ITB, Indonesia; Ministry of Public Administration and Disaster Management, Sri Lanka; Disaster Management Centre, Sri Lanka; National University of Maldives, Maldives; National Disaster Management Center (NDMC), and Maldives Meteorological Services, Maldives; University of Yangon, Myanmar; National Disaster Management Agency and the Department of Meteorology and Hydrology (DMH), Myanmar; Asian Disaster Preparedness Center, Thailand.
- **Building Resilience in Tropical Agro-Ecosystems (BRITAE);** **Value:** € 910,000;
Scheme: European Commission Erasmus+ CBHE; **Partnership:** University of Central Lancashire, UK; University of Huddersfield, UK; Tallinn University of Technology, Estonia; VGTU, Lithuania; University of Ruhuna (leading), University of Sri Jayewardenepura, Sabaragamuwa University, University of Peradeniya, University of Colombo, University of Moratuwa from Sri Lanka



Prof. Dilanthi Amaratunga
Head

E-mail: d.amaratunga@hud.ac.uk



Celebrating winning the Newton Prize, At Great Hall in Westminster, London - with Richard Haigh and Harkunti Rahayu ! The Newton Prize is £1 million investment by the UK Government's Department for Business, Energy & Industrial Strategy (BEIS) in the best science and development partnerships between the UK rest of the world. Our Prize celebrates excellent innovation, research and knowledge-sharing demonstrating tangible impact on global challenges on DRR. Scientific collaboration needs nurturing. Our Newton Prize will strengthen partnerships and will allow the best research to thrive, improving the quality of life for people living in Indonesia and beyond.

- Professors Dilanthi Amaratunga and Richard Haigh were invited international expert, the UNESCO IOC Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) Intersessional Meeting of Task Team on Tsunami Preparedness for a Near Field Tsunami Threat (TT-Near Field). July 2019. One of the core functions of the Task Team is to Assist Member States (24 of them) threatened by near-field tsunami threat to adapt and integrate their national warning chains and SOPs, particularly in relation to community preparedness for self-evacuation.
- Prof. Dilanthi Amaratunga, Prof. Richard Haigh & Georgina Clegg **ASCENT festival - International Conference on Capacity Building for Research & Innovation in Disaster Resilience**, 14 – 18 January 2019, Colombo, Sri Lanka. International conference with 300+ participants representing academia, research, policy, practice and the third sector





**Northumbria
University**
NEWCASTLE

Disaster and Development Network (DDN) Northumbria University Newcastle, United Kingdom

<https://www.northumbria.ac.uk>

#TakeOnTomorrow



During the year 2019, Northumbria recruited several new staff who will expand our activities in this field. We have further interlinked disasters facing research across the institution, most recently formalizing further links with groups focused in other Faculties working in the fields of International Development and Environmental Justice. This is coalescing around a University drive to identify Sustainable Development as an overarching Multidisciplinary Research Theme. Disaster and Development studies at Northumbria was formally set up in 2000, as the first academic programme, centre and network of its type anywhere, and this year we celebrated the arrival of its 20th anniversary, reflecting on the many hundreds of post-graduates, staff and affiliates that are now all around the world following their time with us, often pioneering further innovation and impact in this field both within and without academia.

Projects this year included our conclusion of another phase of engaging people centred risk communication initiatives with a UK based NGO working in East Africa and Bangladesh; getting underway our role as a Co-I institution of a five year £20 million Global Challenges Research Fund (GCRF) hub on 'Multi-hazard Urban Risk Transitions' known as "Tomorrows Cities"; and revisiting an array of our partners for former projects in Mozambique and Zimbabwe. This analysed and rekindled impact from research projects that had been instrumental in championing the people centred approach to DRR, variously through health and well-being and rights based orientations of the subject area.

We were honoured to confer on Andrew Maskrey, the author of successive Global Assessment Reports, the title of Dr of Philosophy following his successful publication of a PhD thesis on "From Exogenous Disasters to Endogenous Risks". We are also pleased to be progressing our roles with new PhD research studies related to resilience in urban Zimbabwe, research in Myanmar and on risk and well-being in high density parts of Nairobi. We look forward to soon reporting outcomes from two ongoing studies on climate change perception and infectious disease risk within the UK.



Prof. Andrew Collins
Leader

E-mail: andrew.collins@northumbria.ac.uk

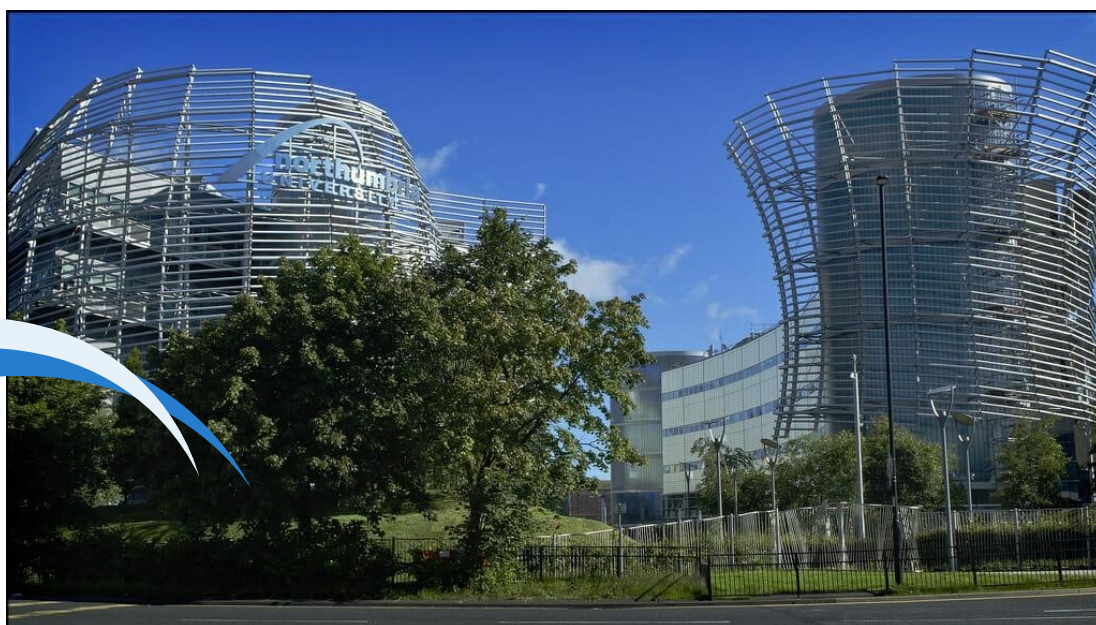


There have been multiple events including our organization and leadership of Dealing with Disasters-GCRF-UKADR-DRG-UKCDR international conference on 'New points of departure in transitioning disaster reduction and sustainability challenges', 17th -19th July. Other events included chairing, session delivery and/or keynotes for: Disasters Research Group 10th Anniversary Conference, 'New Partnerships for Delivery of the Wider 2030 Agenda', Wellcome Trust, London, November; IDRIM Conference, Nice, September; European Society for Risk Assessment, Institute for Advanced Sustainability Studies (IASS), Potsdam, June; GCRF 'Tomorrow's Cities', Hub, Edinburgh, June; Transcom Conference, High Tatra, University of Zilina, Slovakia, May; UNDRR Session leadership of, 'Science and Policy

Dialogue: the Case for Better Data', Science and Policy Forum, UNISDR STAG, Palais des Nations, Geneva; and 4th Global Summit of Research Institutes for Disaster Risk Reduction – GADRI, Kyoto, 13th – 15th March 2019.

Amongst various outputs released this year is the following book carried out in collaboration with the International Peace Research Association (IPRA).

- Brauch, H.G., Oswald Spring, U., Collins, A.E. and Serrano Oswald, S.E. (Eds.) (2019) *Climate Change, Disasters, Sustainability Transition and Peace in the Anthropocene*, Springer.





Overseas Development Institute, United Kingdom
<https://www.odi.org/>



ODI's Risk and Resilience Programme published a range of reports and working papers in 2019, notably:

- **Risk informed development, transboundary climate risk, resilience to low-carbon development**
- **Inclusion and intersectional approaches to vulnerability reduction and resilience-building**
- **When disasters and conflict collide**
- **Forecast-based early action and early warning system service delivery**
- **Climate finance**
- **Financial inclusion and social protection**

The Risk and Resilience programme have hosted a number of high-level events, including: a Roundtable on 'Investing in financial inclusion for climate change risk and resilience: Exploring the role of Islamic financial services'; 'Transboundary Climate Risks', an event in collaboration with Wilton Park; hosting Mami Mizutori (Special Representative of the Secretary-General for Disaster Risk Reduction); a public event on 'Disasters: impact on child poverty and development'; a workshop on Regional Forecast-based Early Action in the OECS; and the

launch of the new Adaptation Without Borders Initiative.

ODI convened and spoke at nine high-level sessions at the **Global Platform on Disaster Risk Reduction**. Katie Peters launched ODI's latest long-form feature and accompanying podcasts on disaster and conflict, Emily Wilkinson moderated and spoke at a technical session on 'Unlocking the resilience dividend', the theme of the Platform, and Emma Lovell organised one of the official side events and launched her research on intersectional approaches for reducing resilience and vulnerability.



Ms. Emma Lovell

E-mail: e.lovell@odi.org.uk

Sara Pantuliano chaired a high-level briefing for heads of delegation from over 25 countries, where Katie Peters presented insights from the project *'When disasters and conflict collide'* to an audience including the German State Secretary and the SR for Disaster Risk Reduction, Ms Mami Mizutori, who endorsed the research. Emma Lovell also presented on the panel of a thematic session at the **World Reconstruction Conference 4: Inclusion for Resilient Recovery** on Building back better (BBB) in infrastructure: making it stronger and accessible to everyone.

The Risk and Resilience team participated in the **Asia Pacific Climate Week**, in which alongside BRACED partners Asia Disaster Preparedness Center (ADPC) and the Red Cross Red Crescent Climate Centre (RCCC), they convened seven sessions, and Emma Lovell spoke at or facilitated five events. The team were also involved in the **UN Climate Change Summit** held in New York in September. In particular, BRACED was engaged in the Global Resilience Partnership's 'Building a Resilient Future' event and also co-organised an event with ENDA on 'Building Resilience in the Sahel'.

ODI researchers have taken part in several high-level meetings in 2019, including the **UNFCCC Climate Change Conference** in Bonn, University of Hiroshima's **Sustainability and Peace Dialogue Forum**.

Media highlights

- Rebecca Nadin featured on the BBC World Service's Business Daily programme on rebuilding economies and communities after disasters.
- Katie Peters launched a long-form feature and accompanying podcasts on disaster and conflict
- Emma Lovell was interviewed by the World Bank on The Self-Recovery of Communities, and was included in the World Reconstruction Conference 4 Closing video and highlights
- Emma Lovell was interviewed by Voice of America on the impact of climate change and disasters on children and youth over their lifecourse.
- Further and full details of our activities can be found at our website.





University of
Salford
MANCHESTER

THINK Lab, The University of Salford United Kingdom

<http://www.salford.ac.uk/thinklab>



The University of Salford's THINKlab donate their MOBILISE digital platform to partners.

In November 2019, after intensive R&D, the THINKlab released the first interactive digital platform to disaster management centres in Colombo, Sri Lanka and Peshawar, Pakistan. The donation included the MOBILISE digital platform which runs on a state-of-the-art multi-touch screen driven by a high-performance computer. Agencies have the choice to use a web-based interface or a 3D virtual reality interface to develop their risk reduction and disaster response strategies. The software combines seven main data categories (including built and natural environment, social information, land characteristics, hazards, real-time and remote sensory data) which segment a further 60 data layers and attributes.

Prof. Fernando presents keynote at Sri Lanka's prestigious NBRO Annual Research Symposium.

Prof. Fernando was invited by Sri Lanka's National Building Research Organisation (NBRO) to make a keynote speech at their 10th Annual Research Symposium on Equitable Resilience. The two-day event took place at Colombo's Hotel Galadari and was attended by more than 400 delegates. Senior dignitaries included Major General Kamal Gunaratne, Secretary to the Ministry of Defence and Trine Jørnli Eskedal, the Ambassador for the Royal Norwegian Embassy.

Prof. Fernando's keynote highlighted the importance of 'Technology Enhanced Adaptive Governance to Support Equitable Resilience.'

TRANSCEND Project Launch.

'Technology Enhanced Stakeholder Collaboration for Supporting Risk-Sensitive Sustainable Urban Development'

The **TRANSCEND** project was officially launched at the at Columbo's Mount Lavinia Hotel. Funded by the **UKRI (ESRC)** and **Global Challenges Research Fund**, the partners planned the strategy which will investigate the socio-technical systems required for enabling a transition towards a more risk-sensitive and transformative urban development approach in Sri Lanka, Pakistan and Malaysia.

The project aims to promote a participatory approach that supports the transparent and democratic involvement of all the relevant stakeholders (including local authorities, disaster management authorities, developers, poor and vulnerable communities, and humanitarian organisations) in analysing, forecasting, visualising and debating disaster-risk trade-offs, and in choosing development plans that ensure sustainability and equitable resilience, giving consideration to climate change adaptation.



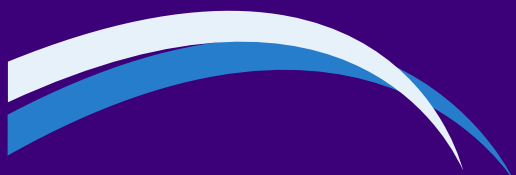
Prof. Terrence Fernando
Director

E-mail: T.Fernando@salford.ac.uk



Africa

Algeria	Faculty of Civil Engineering, Built Environment Research Laboratory (LBE), University of Science & Technology Houari Boumediene (USTHB)
Egypt	Faculty of Engineering, Alexandria University
Egypt	Geology Department, Faculty of Science, Assiut University
Egypt	German University in Cairo (GUC)
Egypt	Water Resources Research Institute (WRI), National Water Research Center (NWRC), Ministry of Water Resources and Irrigation
Ghana	University for Development Studies (UDS)
Ghana	Department of Geography & Resource Development, University of Ghana
Ghana	Hydrology and Water Resource Engineering, Water Research Institute, Council for Scientific and Industrial Research (CSIR)
Morocco	Faculty of Sciences and Technics of Mohammedia, University of Hassan II of Casablanca
South Africa	Disaster Management Training and Education Centre for Africa (DiMTEC), University of the Free State
Sudan	UNESCO Chair in Water Resources
Zimbabwe	Geography Department, Bindura University of Science Education African Alliance of Disaster Research Institutes (AADRI)





University for Development Studies (UDS)

Ghana

<http://www.uds.edu.gh>



The University for Development Studies (UDS)-Kazuhiko Takeuchi Centre for Sustainability and Resilience continued with dissemination engagements with various stakeholders on strategies for enhancing resilience against climate and ecosystem changes in Africa through workshops and peer review journal article publications:

- In collaboration with University of Utrecht, Netherlands, we have completed arrangements for student exchange between the Ghanaian and Dutch side of exchange of knowledge and research ideas. Three students are expected in Ghana shortly to work with Masters and PhD students in the Department of Ecotourism and Environmental Management (DEEM) student projects in DRR and Climate and Trans mobilities research.
- The Centre has placed a call for student's research projects in flood mitigation projects in arid and semi-arid landscapes where trans-boundary dams over flow to cause flooding upstream. Best plausible proposals will be assessed and awarded with a cash prize for piloting of the idea/approach in DRR. The idea is expected to be rigorously tested for possible upscaling.

Research Theme 1: Biodiversity, Ecosystems and Agro ecological Systems

Undertaking research within the larger context of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) framework at the local level by deepening the understanding of biodiversity and ecosystem service inter-linkages especially through local knowledge. Addressing the disruptive changes in agricultural systems by

focusing on the understanding of drivers of change, impact assessments, adaptation management and value chain management.

Research Theme 2: Water Systems Management and Disaster Risk Reduction

Focusing on research geared towards the holistic understanding of climate risks and adaptation planning.

Water-Energy-Food Nexus: Addressing the complexities, material flows, inter-linkages, synergies and trade-offs among water, energy and food sectors in both rural and urban areas of Africa.

Seeking funding support for research into coping measures for annual flooding of the Volta River Basin for recommendation to Government of Ghana and local communities.

Research Theme 3: Capacity Development and Policy Research

Undertake policy driven research on Sustainable Development Goals and capacity development (i.e. through trainings and short courses) tailored to the human resource needs of the African continent. This thematic group is also working on a postgraduate program in Disaster Risks Reduction (DRR)



Dr. Godfred Jasaw

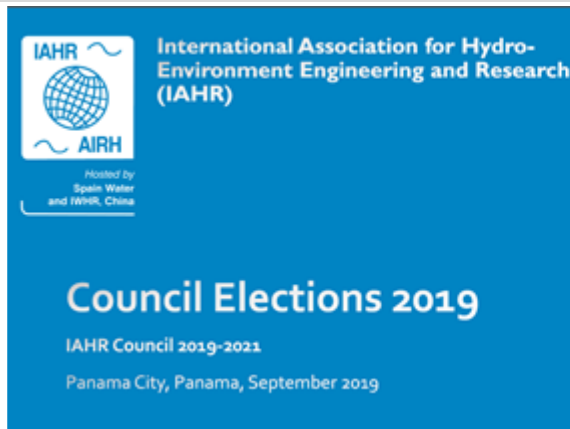
Director

Email: gjasaw@uds.edu.gh



Faculty of Sciences and Technics of Mohamadia, University of Hassan II of Casablanca, Morocco

<https://www.fstm.ac.ma/>



Highlights of 2019:

Prof. Dalila Loudyi was elected as a Council member for MENA/India subcontinent Region at the International Association of Hydro-environment engineering and Research (IAHR), 2019-2021.

- Participative water management contracts in Morocco for scarcity alleviation: the groundwater contract model, D. Loudyi, A. El Haddari & A. Fekri, Hydrolink n°3, 2019
- Work on editing a Special Issue on the 4th International Symposium on Flash Floods 2018 in the Urban Water Journal.

2- Articles publication:

- Modelling of rainwater urban drainage network at local scale: Case study of Sidi Bernoussi district-Casablanca, Morocco, L. Ennajem, D. Loudyi, The International Journal Of Climate Change: Impacts And Responses, 2019, (accepted).
- Downscaling climate projections and hydrologic responses for regional water resources assessment: case of the Oum Er Rbia river basin, Morocco, International Journal of Engineering Research and Applications, ISSN : 2248-9622 Vol. 9, Issue 7 (Series -I) July 2019, pp 49-58.



Prof. Dalila Loudyi

Email: Loudyi.d@gmail.com



Africa Alliance for Disaster Risk Institutions (AADRI), Bindura University, Zimbabwe

<https://www.aadri.org.zw/>



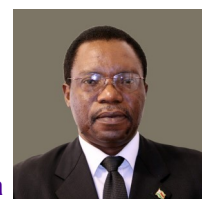
Representation as President of AADRI (Prof. Manatsa in the middle) at the 4th Global Summit of Research Institutes for DRR organized by GADRI at Kyoto University, Japan in March 2019

The Africa Alliance for Disaster Risk Institutes is a regional alliance of Disaster related institutions from across Africa. It is a member of GADRI. The following are the activities and projects related to AADRI during the reporting period:

- After the most devastating tropical cyclone over southern Africa, Tropical Cyclone Idai in March 2019, AADRI is now coordinating the regional research in building regional resilience to Tropical Cyclones. Five regional universities and local NGOs are participating in the research.
- AADRI is participating in the revisiting the Zimbabwe Agro-Ecological Zones whose traditional boundaries have been shifted by climate change.
- GADRI facilitated the attendance to the 2019 International Training Workshop for Natural Disaster Reduction from the 25th to the 27th June 2019 held in Taiwan for Dr. Lucy Sakala, an AADRI member.
- Prof Desmond Manatsa attended to the 4th Global Summit of Research Institutes for DRR that was organized by GADRI at Kyoto University in Japan from the 12th to the 15th of March 2019.



Participatory Community Flood Mapping
Exercise coordinated by AADRI in
Muzarabani in Zimbabwe



Prof. Desmond Manatsa

Email: dmanatsa@gmail.com

Disaster Report on Tropical Cyclone Idai : Lessons learned and the way forward for Africa Alliance for Disaster Research Institutions (AADRI)

By Prof. Desmond Manatsa

Chair, AADRI; and Dean of the Faculty of Science and Engineering

Bindura University of Science



The once thriving Kopa Business Centre that was completely destroyed by Cyclone Idai

Several months have passed since Tropical Cyclone Idai hit Zimbabwe and leaving behind a trail of destruction and casualties unprecedented of any natural disaster in Zimbabwe or even in southern Africa's modern history. The number of those dead and the devastation it inflicted on property and the environment was far more than what the cyclone caused in Mozambique where it made landfall when it still retained much higher destructive power from the Indian Ocean. Then what could be the reason that exposed our nation to such a precarious state to this cyclone? Media and various platforms proposed many theories, stories have been told both of natural and supernatural nature to try to explain the possible causes which led to this catastrophe. The human's most sharpened talent of apportioning blame whilst proffering little or no solution was also not spared. However, what is important to the people of Chimanimani and Zimbabwe at large is to remove the fear that this calamity might happen again in future. The most essential undertaking at this juncture is to systematically extract lessons from the cyclone's impacts that can catapult us to a state where we can live in harmony with this natural hazard while harnessing the 'positives' and reducing the associated risks. Though not exhaustive, here we examine the lessons which could be derived from Cyclone Idai's extraordinary impact before examining the way forward from a national action research perspective under the banner of the Africa Alliance for Disaster Research Institutions (AADRI).

Physical Vulnerabilities associated with Tropical Cyclone Idai

The tropical cyclone made landfall over the Mozambique coast, more than 200km away from the eastern border with Zimbabwe, on the 14th of March 2019, before slowly moving to hit Chimanimani at about 7:00 pm the following day on Friday. As expected with tropical cyclones when they make land fall, their potential destructive force in terms wind speed and amount of deposited rainfall is severely curtailed as it moves inland due to decrease in 'fuel input to the cyclone engine'. The enhanced smoothness and evaporation from the sea surface waters offer conducive environment for the cyclone to increase in strength while the land surface friction and reduced surface evaporation from the relatively dry land tend to suffocate the cyclone thereby killing it gradually. But despite more lead time to prepare for the cyclone and reduced force of potential damage we still see that Mozambique had far less casualties, environmental and infrastructure destruction than Zimbabwe. The possible factors which can be attributed to this rather unfortunate scenario is the level of disaster preparedness of Zimbabwe, the fragile environment that was offered by the predominant mountainous landscape and the relatively slow speed of the cyclone which enabled it to damp a lot of rainfall per unit time. This could have been compounded by the time when the disaster came, which was in the dark of the night hence reducing visibility to assess evacuation options for the victims and, severely limited the search and rescue processes.

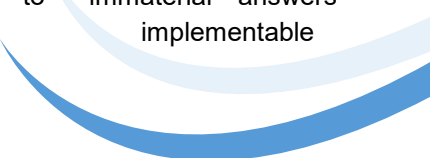
The general Preparedness and the issuing of the Tropical Cyclone Warning

The number of people affected by a hazard are in direct proportion to the preparedness of the community to the impending disaster. If I may quote from one of the victims, *“No one knows where this water came from, it took us by surprise”*, clearly testifies to the fact that most of the communities affected had not been fore warned about the impending floods. While the Meteorological Services can be applauded for having given the warning a least 2 days before the cyclone, can we learn something from how the forecast was issued. My few lessons on disaster warnings which I had some decades back tells me that when one is more confident of an impending disaster, the frequency of the warnings should not only be increased with time but also updated to suit the changing circumstances as the hazard characteristics unfold. We are told that that the Met Office stuck to their 8:00 pm News slot to disseminate the warning instead of soliciting for more slots both on the TV and radio to conscientize the people of the impending disaster. At the same time, the TV and radio could also have allowed unscheduled warnings to be flighted. Unless the Met Forecasters themselves were not sure of the magnitude of the expected cyclone impact, I am confident that the more they had exposed the people to the warnings by increasing the issuing frequency and updates, the more they were going to be taken more seriously by the related stakeholders responsible for evacuating the communities who were at risk. On the other hand, even if a warning is issued timeously and, with the required frequency and mode of dissemination which reaches down to the communities, these people also need to know what to do when a warning has been issued. Their prior coordinated response is key to ensure predictable community behavior when the hazard strikes. It is a welcome development that Chimanimani Rural District Council is one of the few districts in the country to have adopted the District Climate Change and Watershed Management Policy. But were the local communities trained on what to do when flood warnings are issued? At the same time, evacuation needs resources both to carry out the process and providing safe havens, endowed with food and other necessities. Were these readily available to execute the process? We understand that the contents of the tropical cyclone warning itself advised people to move to high ground. Was this the correct advice to give to Chimanimani in the face of rock and mudslides which made these high places riskier, especially that the disaster struck at night when most people were indoors and

preparing to sleep? These are some of the preparedness questions we need to ask ourselves as we take introspect of the lessons derived from the Tropical Cyclone Idai preparedness and warning.

Fragility and Vulnerability of Settlements in the Mountainous Environment of Chimanimani.

Tropical Cyclone Idai brought to the fore the high degree of exposure of settlements and how fragile the mountainous environments are. The cyclone came after the region has been exposed to a prolonged drought which removed the capacity of the vegetation left to hold the soil intact. The accelerated land degradation and frequent fires which characterize periods of drought removed vegetation and hence limited root depths, thereby increasing the landslide hazard. It was then easy for the loose waterlogged soil to flow downslope and with it, imbedded rocks which then choked the normal flow of the water thereby exacerbating the flooding spatial extent and intensity. As such, the blocked rivers reopened old paths which had for the past decades been converted to settlements. A case in point is the Kopa Business Center which was raised to the ground and leaving behind little or no shred of evidence that buildings, with thriving businesses, were once predominant in the area as the river repossessed its former route. This means that old river paths remain unsafe for settlements as at some point in time the river may still rejuvenate its former paths. Therefore, careful planning for resettlement sites needs to take into consideration the possibility of changing river course characteristics. On the other hand, the prevailing superstitions surrounding the presence of the large rock boulders which were left in the river channels by the flowing mud from the mountain slopes owes a scientific explanation. It was the large and uneven multi-tone rocks which were hitting against the slope surfaces as they were rolling downslope which were wrongly interpreted as an earthquake that accompanied the tropical cyclone. This was corroborated by the Meteorological Services which confirmed not recording any seismic activity in the area during the cyclone. Explaining this phenomenon to the affected communities assists in focusing on the real causes whilst getting rid of superstitious beliefs which usually lead to wrong attribution to the causes of the disaster. Dwelling on superstitious beliefs has the danger of diverting the community's attention to immaterial answers rather than providing scientifically backed implementable solutions.





Large boulders and mud that was carried downslope and destroying houses in their path during Cyclone Idai.

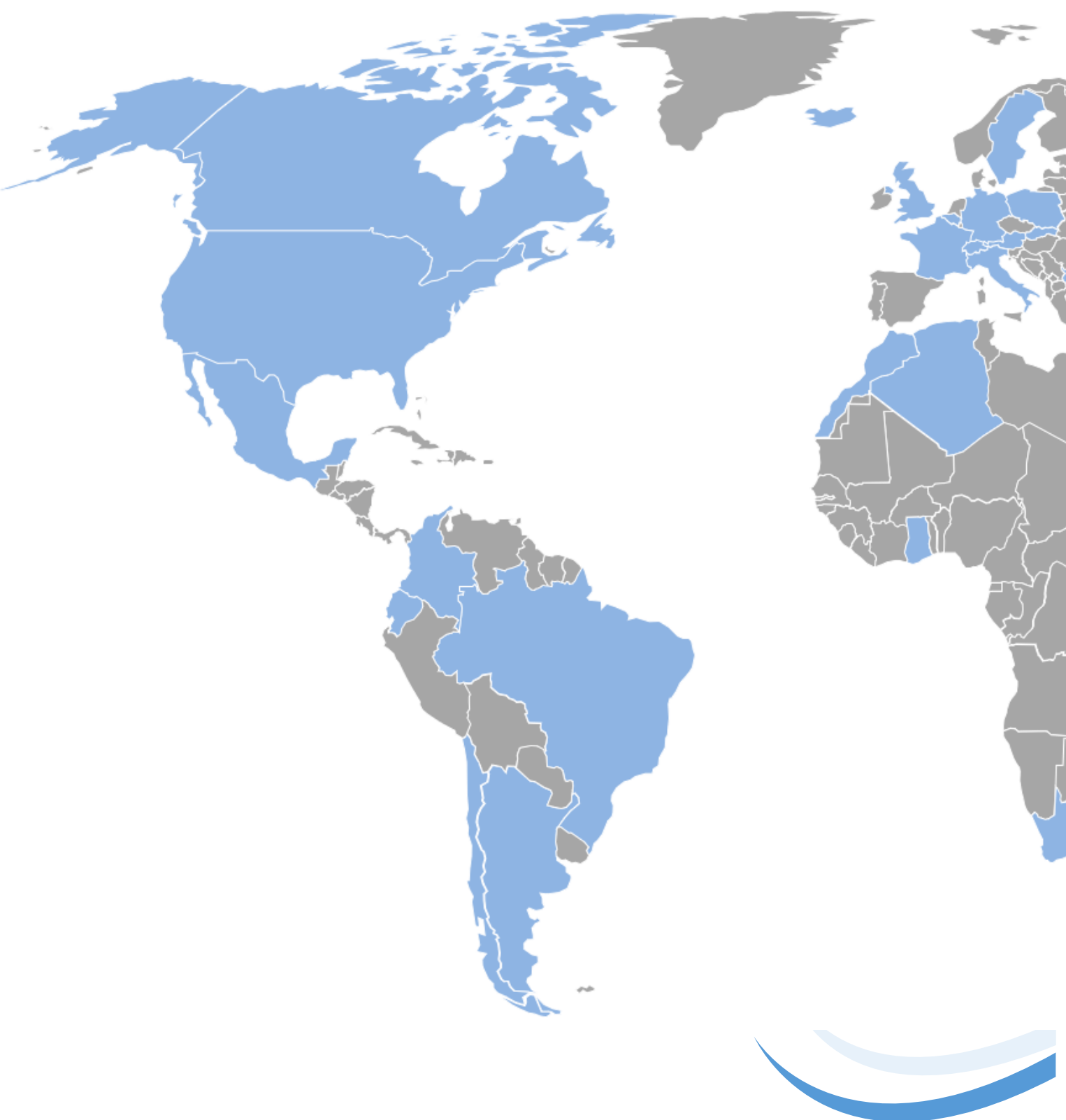
The way Forward under AADRI

With the advent of climate change, tropical cyclones are not going 'anywhere', rather they are poised to become more frequent and accompanied by increased intensity. In this regard, it is inevitable that we find ways to live with them whilst preventing the metamorphosis process from being just a mere meteorological hazard to becoming an unmanageable national disaster. This is 'doable' as Islands like Mauritius that lie in the path of more intense tropical cyclones and are hit directly more than once in every cyclone season, are now nearing the zero target casualty. At the same time, it is more than welcome that the general shock from the devastating impacts of Tropical Cyclone Idai have once again united the nation through unprecedented donations towards the victims' recovery. It has also spontaneously given birth to a strong desire from national disaster research institutions, to learn from this disaster in the bid to understand why this phenomenon happened with such dire consequences.

In research terms, Chimanimani provides a conducive operational background and a well defined geographical area, which could provide for feasible action orientated research that could inform policy and action in other areas within Zimbabwe and beyond. The fact that the region has all the five Agroecological Regions of the

country makes the results derived from the research to be relevantly replicated in any other part of the country. In this regard, Bindura University of Science Education under AADRI with its vast experience in disaster risk reduction research is coordinating a consortium of other state universities to properly document, in a scientifically informed way, the lessons learnt from tropical Cyclone Idai. This national action orientated research, which is yet to source for funding, is poised to pave way for a future situation that would allow the communities within Zimbabwe to be better prepared and become more resilient in the face of potentially recurring Climate Change related events such as Cyclone Idai. The strategy is to ride upon the shock that is currently vividly present within Zimbabwe and beyond to bring sustainable policy initiatives and practices in view of various interests that could provide for learning and dedicated action in Chimanimani and other nationally comparable situations. The objective of the research is to 'Build National Resilience to Tropical Cyclones through deriving lesson from Tropical Cyclone Idai'. Preliminary work to enable scouting for solid funding for this noble action research was conducted at a workshop in Harare that was facilitated by TSURO Trust, a community-based NGO in Chimanimani that was actively involved in Cyclone Idai relief and recovery.

Geographical Distribution of



Members of GADRI as of 31 December 2019





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