



UCL Institute for Risk  
and Disaster Reduction

## Annual Report 2018

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[www.ucl.ac.uk/rdr/](http://www.ucl.ac.uk/rdr/)



## From the Director

The UCL Institute for Risk and Disaster Reduction (IRDR) is a young and growing institute with a mission from the Provost to lead transdisciplinary research, advanced teaching and knowledge exchange in London, the UK and internationally.

As an institute in central London, we work to support business and community resilience for instance by developing practical benchmarking tools, contributing to emergency planning and working with the GLA London Resilience and the business organisation Resilience First. The 14th of June is the anniversary of the devastating fire in the 24-storey Grenfell Tower in west London which claimed the lives of 72 people, left many homeless and a community traumatised. With a disaster on our doorstep, it raises the question how can academic work be directly useful to people on the ground - our neighbours. But

as academics, we can recognise the fire as a cascading crisis which we can connect to experiences and realities we have seen elsewhere, and so provide a 'road map' to eventualities that helps understand situations and predict needs.

This year we have started working on one of the greatest humanitarian crisis of our time: the forced Rohingya Exodus from Myanmar. This research has developed from, on the one hand our interdisciplinary work across physical, social and historical sciences on the complex and difficult issue of increasing resilience in conflict zones, and on the other, our growing collaboration with the UCL Institute for Global Health (IGH) and involvement with the UCL-Lancet Commission on Migration and Health. As we commented in our joint article in the Lancet Global Health, the Rohingya refugees are confronting impending natural hazards and worsening public health crises.

But what links a technological disaster in the UK with pending natural hazard and health crises driven by conflict in a developing country? Surely it is an understanding of disaster risk creation, of how social capital is undermined by the decisions of government, and the heightened risks of the marginalised. One of the cross-cutting principals for the UN Sustainable Development Goals is 'no-one should be left behind'. This principal should be equally valid for increasing resilience in London. The IRDR is outward facing and we do welcome engagement with the public, practitioners and researchers. We hold frequent public events and masterclasses for practitioners. We aim to build a global university champion for London and the UK in humanitarian response and disaster risk reduction. If this vision appeals to you, we invite you to join with us.

**Peter Sammonds**

**Director, UCL Institute for Risk and Disaster Reduction**

## Contents

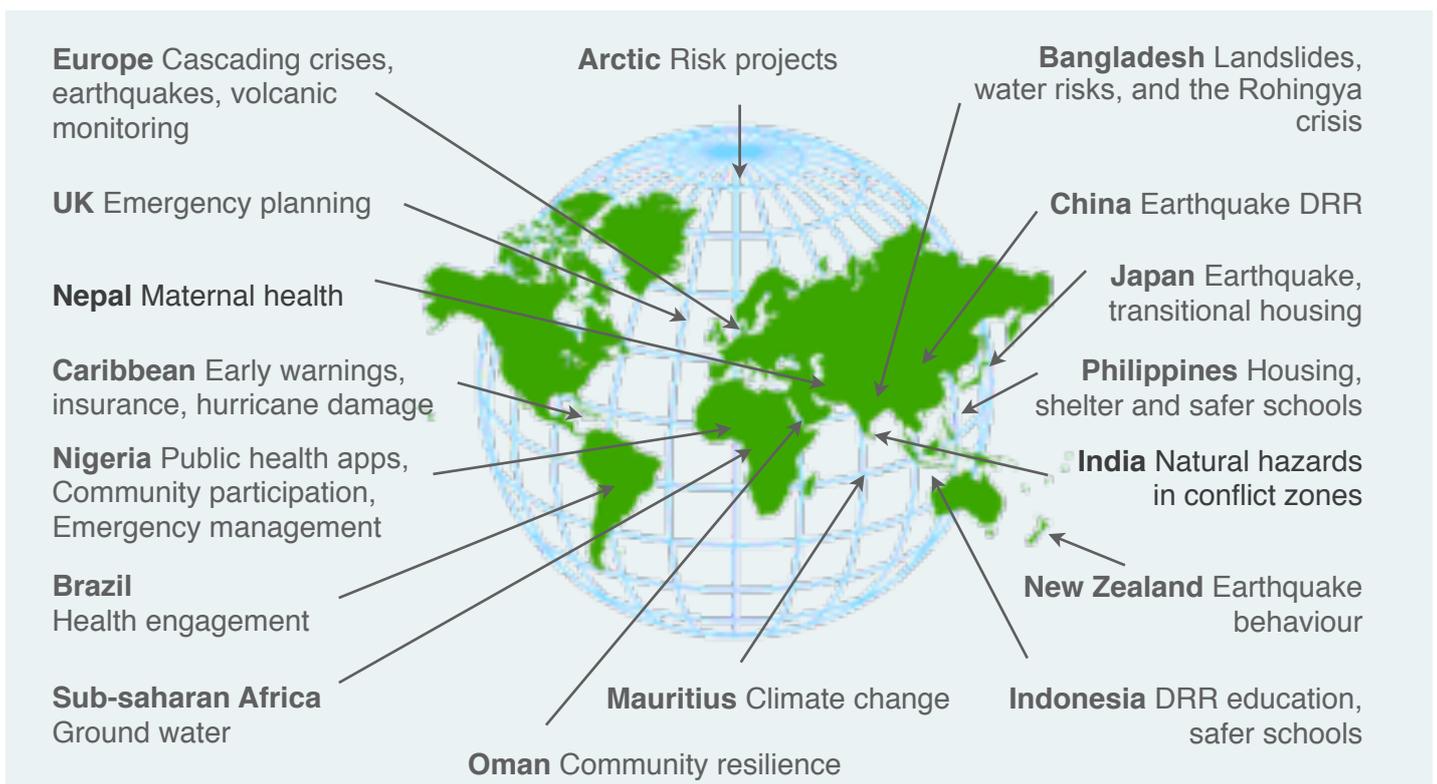
02	<b>From the Director</b>	08	<b>Doctoral Research Centre</b>
03	<b>IRDR at a Glance in 2018</b> IRDR - Global Reach	09	<b>Graduate Teaching</b>
04	<b>Public Engagement</b> Public Events in 2017-18	11	<b>Research Achievements</b>
05	<b>Making Impact</b> Media Engagement	12	<b>Academic and Research Staff</b>
06	<b>Enterprise and Innovation</b>	17	<b>PhD Research Students</b>
07	<b>Humanitarian Institute</b>	21	<b>Publications 2017-18</b>
08	<b>Centre for Gender and Disaster</b>	26	<b>Calendar 2018-19</b>
		27	<b>IRDR People</b>

# IRDR at a Glance in 2018

Below we highlight some of the developments and achievements within the IRDR during 2017-18:

- ❑ Launched the IRDR Centre for Gender and Disaster in March and appointed Punam Yadav as research fellow.
- ❑ Welcomed the appointments of Patty Kostkova as Senior Lecturer in Digital Health and Emergencies, and of Katerina Stavrianaki as Lecturer in Risk Analysis (appointed jointly with Dept Statistical Sci).
- ❑ Welcomed Shanshan Zhou as IRDR Enterprise Manager; Caroline Wood, Nurmala Nurdin, Delphine Soriano, Juan Beltran, Andy Boscar, Alexandra Tsioulou as research staff; and Jukka Tuhkuri and Hui Zhang as academic visitors.
- ❑ Congratulated Bayes Ahmed, Zoe Mildon, Katerina Stavrianaki, Gianluca Pescaroli and Danielle Charlton on graduating with PhDs, while welcoming Kimon Pantelides, Helen Church, Sarah Alawadhi, David Gregory and Claudia Sgambato as new IRDR research students.
- ❑ PhD student Gianluca Pescaroli's research featured by UNISDR PreventionWeb.
- ❑ Launched the new MSc Space Risk and Disaster Reduction jointly with the Department of Space and Climate Physics.
- ❑ Launched the new Risk and Disaster Management masters pathway with options from the UCL School of Management.
- ❑ Won Commonwealth Scholarships and set up IRDR scholarships for masters students.
- ❑ 700 participants attended IRDR events.
- ❑ Joined the UCL-Lancet Commission on Migration and Health with Inst. Global Health.
- ❑ Undertook fieldwork in the UK, Italy, Svalbard, Japan, China, India, Indonesia, Nepal, Bangladesh, Oman, Nigeria, New Zealand, Brazil, Chile and the Caribbean.
- ❑ Our masters and PhD students joined a research visit to Fukushima, Japan at the invitation of the Governor of Fukushima.
- ❑ Published over 80 academic papers and book chapters in 2017-18.

## IRDR Global Reach



# Public Engagement

A key aim of the IRDR is to engage in public debate on issues in risk and disaster reduction, creating a space for academic discourse in the public policy and political arenas, and raising the profile of UCL. To achieve this we organise discussion meetings, lectures and symposia open to the UCL community and the general public, as well as participating in external public engagement events. Here are some highlights.

Catastrophe risk models have long been used in the insurance industry to better cope with the volatility of catastrophe impacts. In our first public event of the 2017/18 academic year, Dr Robert Muir-Wood of RMS Head of Research and IRDR Honorary Professor argued that this approach should also be used to independently audit progress on disaster risk reduction and effectiveness of policy.

At a public launch event for the new IRDR Centre for Gender and Disaster, supported by UN Women and with an international expert panel, Centre Director Professor Maureen

Fordham argued many are still marginalised in disasters because of their gender.

With the Humanitarian Institute we launched an evening conference series on the UN Sustainable Development Goals.

Many staff and students give public lectures. PhD student Amy Chadderton was social media co-ordinator for the 500 Women Scientists London Pod, and PhD student Gianluca Pescaroli has been a guest speaker for UNISDR webinars.



*Public discussion meeting on Migration and Health at the Humanitarian Summit*

## Public Events in 2017-18

**June 2017:** *IRDR Seventh Annual Conference*, attended by over 150 people, with a keynote speech by Andre Heller Perache, Head of Programmes, MSF UK. Other sessions included disaster law and human rights, and safer schools.

**June 2017:** *Disaster in Japan 2011: The Latest Research*, focussed on the triple disaster of 2011; the Tohoku earthquake, tsunami and nuclear release.

**July 2017:** IRDR co-sponsored a 2-day International Workshop on *Increasing Resilience to Environmental Hazards in Border Conflict Zones*, in Leh, Ladakh, with the University of Jammu. It was attended by policymakers, practitioners, researchers and members of the public.

**September 2017:** IRDR co-sponsored a conference on *Building Resilience to Geohazards in the Face of Uncertainty* at the Geological Society, London.

**October 2017:** IRDR Special Seminar on *The Future of Risk Auditing: Catastrophe Models in Disaster Risk Reduction* by Dr Robert Muir-Wood, RMS.

**February 2018:** *IRDR Careers and Opportunities Fair* with exhibitors from the public and private sector and attended by over 120 graduates and students.

**March 2018:** For the *Launch of the UCL IRDR Centre for Gender and Disaster*, attended by over 100 people.

We also had a programme of public events for the Humanitarian Institute, see page 7.



*International Workshop, Ladakh, India*

## Making Impact

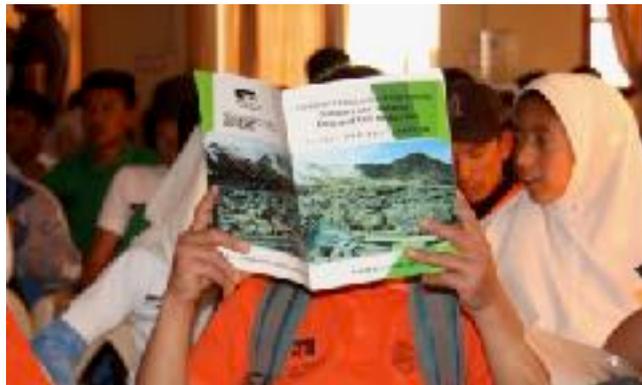
In the IRDR, we aim not only for our research to advance understanding and knowledge in the area of risk and disaster reduction, but also for those findings to have an impact on reducing those disaster risks in the real world.

Patty Kostkova's digital health team has been applying user-driven to real-world international health projects. Through her research, the international Resource for Infection Control, serving over a million users from 159 countries, is providing a mobile game decision support for antimicrobial stewardship and policy compliance in hospitals in Nigeria. Patty's ZIKA initiative delivers mobile training and app-based surveillance for healthcare agents to combat the zika virus in Brazil and provides real-time data for early warning systems to inform public health authorities about upcoming levels of mosquito populations.



Led by Maureen Fordham and Patty, the Mantra project developed a mobile serious game app to increase knowledge and resilience of perinatal women in rural Nepal before, during and after disasters. The project was shortlisted for the

Diversity Project of the Year by the Computing Women in IT Excellence Awards 2017.



*Schools' Education Programme in Turtuk, India by the Line of Control with Pakistan, in collaboration with University of Jammu*

David Alexander and Gianluca Pescaroli have worked on engagement of the scientific community, policy makers and the community of end users through contributing to a series of policy reports such as the UNISDR Guidelines on National Risk Assessment. In particular, the guidelines and the gap analysis developed with London Resilience were extensively used by policy makers in the UK, while the IRDR report "Cascading impacts and escalations in wide-area power failures: A summary for emergency planners" has been featured on [www.preventionweb.net](http://www.preventionweb.net) and was highlighted as the key document to support California Wildfires Response & Recovery by the US National Library of Medicine.

## Media Engagement

The IRDR maintains a high-profile media strategy, providing both immediate comment during disasters, and features for documentaries and magazines.

During and following Hurricane Harvey in August 2017, Dr Ilan Kelman provided extensive media commentary on why this hurricane was so damaging. He controversially argued that it was people's vulnerability which was the principal component of the disaster and not climate change.

Our experts have also been interviewed for broadcast TV, including Peter Sammonds on the Kilauea and Fuego volcanic eruptions;

Joanna Faure Walker and Omar Velazquez Ortiz on the September 2017 Mexico earthquake; Bayes Ahmed on Bangladesh landslides; and David Alexander has provided commentary on current disasters.



At IRDR Enterprise and Innovation we are motivated by our passion for bridging the gap between practice and academia.

In 2018, we appointed Dr Shanshan Zhou as Enterprise and Promotion Manager. IRDR Enterprise focuses on:

- Promotion of the IRDR globally
- Consulting to governments and business
- Partnerships with industry and NGOs
- Sponsorships for students
- Philanthropy
- Short courses for practitioners

We aim to exchange our knowledge of Risk and Disaster Reduction with industries, NGOs and governments to create real-world impact nationally and globally, through partnering with governments, companies and NGOs to support resilience building.

## Consultancy: Reducing Disaster Risks in Bangladesh

Working with the International Centre for Collaborative Research on Disaster Risk Reduction, China, Ilan Kelman undertook consultancy addressing "extreme climatic



CUET field trip, Bangladesh

disasters and food security in Bangladesh" with local partner universities. It focused on adaptive capacity of local communities to flooding, drought, cyclones and flash-flooding.

## Partnership: Reducing Disaster Risks in London

IRDR MSc student Christopher Thompson is working with London First to support building community resilience in the Fitzrovia area, London for his dissertation project. This is a thriving mixed community of businesses and residents in the heart of London.



The IRDR is supporting the launch of Resilience First, an initiative to strengthen business resilience so that local urban communities can become more agile and able to adapt to overcome future challenges.

## Short courses

Dr Rob Wicks has developed a short course for industry and government on the response to space weather, together with Prof Lucie Green of the Department of Space and Climate Physics. This has been supported by a UCL Innovation award.

## Enterprise for IRDR Students

The new IRDR Enterprise Manager is developing a seminar series for IRDR MSc and PhD students to develop their enterprise skills, especially aimed at those interested in portfolio careers. Watch this space!

The Humanitarian Institute is UCL Provost's Strategic Initiative, launched at the 2017 UCL Humanitarian Summit. Its mission is to mobilise UCL's research, expertise and teaching to impact global humanitarian challenges and to promote education for global citizenship.

It is led by Professor Peter Sammonds and Dr Rosanna Smith. Dr Bayes Ahmed was appointed as a research fellow in 2017.

[www.ucl.ac.uk/humanitarian](http://www.ucl.ac.uk/humanitarian)

## Aims:

- Coordinate and conduct research on humanitarian issues across UCL
- Establish teaching on integrated responses to humanitarian issues
- Scope technological solutions
- Develop humanitarian themes and networks across the UCL community

## Approach

We want to try new ways of doing things and engaging with partners, such as through the Humanitarian Tech Hub initiative and the Masterclass and Conference series where the knowledge built in the developing world is brought to UCL. Regular research forums aim to bring together the UCL community to address humanitarian issues, and build teams who can in particular respond to global challenge funding calls.

## Research

The Rohingya Exodus is one of the biggest global humanitarian crises of today. We are conducting research, funded by the British Academy, into the implications of this crisis for stability for stability, security and peace in South Asia. We are also working with UCL IGH and UCL IRDR Centre for Gender and Disaster to consider natural hazards, public



Rohingya Refugee Camp, Bangladesh

health, gendered violence and disaster risk perception for the Rohingya refugees.

## Teaching

We are mapping existing UCL teaching on humanitarian issues, to identify strengths and the gaps, and then develop undergraduate modules available to all students.

We launched the Masterclass series to deliver 1-day practical programmes for students, staff and practitioners delivered by UCL researchers and our partners in developing countries. The programme so far:

- Masterclass on *Delivering a Schools Programme for Building Resilience*, took place in October 2017
- Masterclass on *Public Health and Digital Disaster Response*, is on 21 June 2018.



- Masterclass on *Safer Schools*, will take place on 19 October 2018.

## Humanitarian Tech Hub

At the 2017 Humanitarian Summit, we held a workshop on technology to address humanitarian challenges, led by Prof Alan Smith, UCL Space Domain. At the 2018 Summit, the technology workshop will focus on post-disaster housing. These workshops are starting blocks to build the UCL Humanitarian Tech Hub, which will find innovative solutions for humanitarian contexts.

## Humanitarian Public Events

We run public events with the aim of providing a platform to develop humanitarian themes and networks:

- UCL Humanitarian Summit, June 2017
- Evening Conference on Sustainable Development in the Himalaya, October 2017
- Evening Conference on South-South Humanitarianism: New Aims, May 2018
- UCL Humanitarian Summit, June 2018

## Centre for Gender and Disaster

The IRDR Centre for Gender and Disaster was launched in March 2018 with the aim of advancing the understanding of gender in Disaster Risk Reduction (DRR) and humanitarian fields.

The launch event highlighted the need for gender sensitivity in policy, practice, decision and design. The Centre is unique in aiming to bridge the gap between 'hard' and 'soft' sciences by developing awareness of, and responsiveness to, gender for risks and disasters, and humanitarian contexts through excellence in research and teaching. The Centre has identified five pillars as its initial focus: *Social Justice, Equality and Equity; Engineering & Infrastructure; Transformative Technologies; Collection and Analysis of Disaggregated Data; and Health & Wellbeing.*

The Centre will reach out locally, nationally and internationally to develop partnerships, sponsorships and associations; to offer mentoring opportunities; and ways to meet diverse research and policy development needs.



Professor Maureen Fordham, Centre Director

## Doctoral Research Centre

The IRDR has a well-established and respected Doctoral Research Centre, with over 25 PhD research students who conduct interdisciplinary, wide-ranging, and international research.

From arctic risks to sustainable tourism, and from emergency management to statistical seismicity, this work has had extensive and positive societal impact. Our PhD programme in Risk and Disaster Reduction is in its second year, generating extensive interest, especially from international students, with all doctoral candidates contributing to the vibrancy of IRDR life and supporting IRDR's mission. Many of our PhD students have supervisors from different disciplines and from different London universities, extending their knowledge, networks, and contributions. Some work part-time for government, NGOs, or the private sector.

Our PhD training programme - including participation in the IRDR Student

Forum, Spring Academy, and Annual Conference - fosters a new type of graduate student who is comfortable working across sectors, around the world, and through public engagement as well as top scientific journals.

If you are interested in pursuing a PhD in the IRDR, the first step is to identify a supervisor who shares your research interest and get in touch. Our students are funded from diverse sources, including UK research councils, governments internationally, business etc.



Spring Academy 2018

## Graduate Teaching

Teaching risk and disaster reduction are part of the core mission of the IRDR and have established this an integrated discipline at UCL. Over 30 masters students will graduate from the IRDR in 2018.

This academic year we welcomed students on our MSc Space Risk and Disaster Science for the first time. This programme aims to provide future world leaders in space risks – note that space weather was added to the UK National Risk Register in 2012. Our MSc Risk Disaster and Resilience and MSc Risk and Disaster Science programmes saw the addition of a module in Digital Public Health, Epidemics and Emergencies, and one in Risk Analysis for Disaster Science focussing on geophysical risks. In addition, all masters students were invited to join the new Risk Assessment 3-day field course to Southwest England.

For students arriving in the 2018-2019 academic year, we have a number of new initiatives:

- ❑ MRes Risk and Disaster Reduction students will be able to choose from a wider range of options from all IRDR modules.
- ❑ Students joining the MSc Risk and Disaster Science programme will be able to take optional modules taught by the UCL School of Management, subject to timetabling. We are also adding a new module on Catastrophe Risk Modelling.

## Graduate Careers

We are proud to see so many of our masters students prospering in careers relating to risk and disaster reduction. Graduates from the 2016-17 cohort have found jobs in companies such as KPMG and RMS, NGOs such as Rescue Global and World Bicycle Relief, while others have gone on to further study including for a PhD in Territory, Risk and Public Policies at the University of Lisbon, and at the University of Edinburgh in glaciology. We are pleased that one of our IRDR Masters Prize winners has had an academic paper based their independent project published in the prestigious International Journal of Disaster Risk Reduction which is quite an achievement.

- ❑ We now offer flexible learning on the MSc and PGDip Risk, Disaster and Resilience, so that those who cannot commit to full or part-time study can take single modules.

We are delighted that a number of our current masters students won scholarships.

Noteworthy, is a student who won the Arcus Travelling Scholarship, through the University of Sydney. We welcomed two students on Motorola Foundation Scholarships that were open to public safety professionals.

We are delighted to be offering IRDR and Commonwealth Scholarships for the upcoming academic year.



*IRDR masters students' research visit at the invitation of the Governor of Fukushima reported in the press*

To support our students and alumni in developing their careers, we hold an annual *Careers and Opportunities Fair*, specifically targeted at opportunities in Risk and Disaster Reduction. Recruiters, students and alumni alike find this event useful for finding the employers/ employees they are looking for!



*IRDR 2018 Careers and Opportunities Fair*

Our graduates can benefit from the core themes taught across all our programmes as well as the programme-specific topics across our taught postgraduate courses.

## All of the IRDR Masters Programmes cover four central themes:

### Understanding Vulnerability

Covering topics from fragility curves describing damage of buildings to social vulnerability of individuals and society.

### Quantifying Risk

- What is risk and how do we measure it?
- Components of risk: exposure, hazard, vulnerability.

### Multidisciplinary Holistic Approaches: Theory to Practice

- Integrating scientific knowledge into disaster risk reduction research, policy and practice.
- Communicating with stakeholders.

### Managing Disasters

- How to apply plans to manage real emergencies.



## Our programme-specific themes cover a range of additional topics:

### **MRes Risk and Disaster Reduction:**

- Evidence-based research.
- Identify current questions in the field of risk and disaster reduction.
- Learn how to conduct research.
- Develop detailed studies to propose solutions.

### **MSc Risk, Disaster and Resilience:**

#### Physical and Social Science of Natural and Anthropogenic Hazards

- What is known and unknown.
- Current research and uncertainties.

#### Building Resilience

- What are the barriers to risk and disaster reduction and how do we overcome them?
- Developing a common language to communicate complex concepts in an accessible way.

### **MSc Risk and Disaster Science:**

#### Science of Earth and Space Hazards

- Analysing different hazard risks: seismic and triggered events, space weather, epidemics, conflict and climate.
- Scenarios and case studies drawn globally providing breadth of experience.

#### Statistical and Modelling Tools

- Statistical treatment of risk.
- Bringing together data and theory.
- School of Management optional topics.

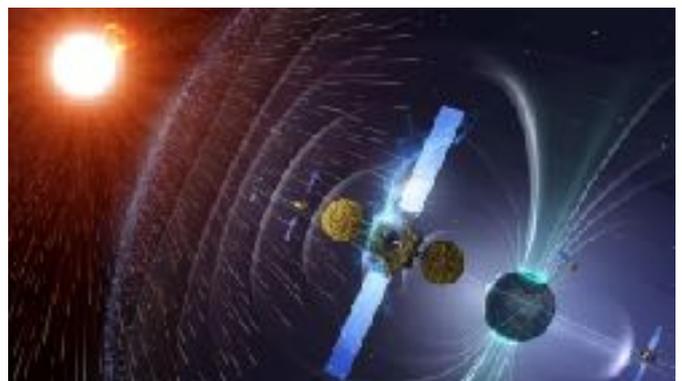
### **MSc Space Risk and Disaster Reduction:**

#### Hazards of Outer Space

- Space weather, radiation, debris.
- Emerging risks and the future of disaster monitoring.

#### Satellite Design and Operations in Space

- Learn how to design and operate a satellite from the largest university space science department in the UK.



# Research Achievements

Our public engagement, research impact and graduate teaching are underpinned by excellent academic research. In the last 12 months, IRDR researchers have produced over 80 peer reviewed research publications, presented research at leading international conferences, been invited speak at prestigious academic institutions, organised international meetings and conference sessions and have won distinguished awards and substantial research funding.

During the period from June 2017 until May 2018, UCL IRDR academic and research staff have won the following new research funding awards:

- The Rohingya Exodus: Issues and Implications for Stability, Security and Peace in South Asia. Peter Sammonds, Bayes Ahmed. British Academy
- INSPIRE: Indonesia School Programme to Increase Resilience. Carmine Galasso, Peter Sammonds, Bayes Ahmed, Nurmala Nurdin. British Council Institutional Links, Newton Fund
- NERC CIAF Facilities Grant, Active normal faulting in Athens, Greece: 36-CI constraints on fault slip-rate, earthquake recurrence, elapsed time and recurrence variability, PI Joanna Faure Walker
- NERC Urgency Scheme grant on Hurricane Maria and Dominica, PI R Teeuw (University of Portsmouth), Co-I Simon Day
- NSF/NERC joint project on “Caldera-forming eruption-generated tsunamis”, UK PI D Tappin (BGS), Co-I Simon Day

We have also continued research on existing funding awards from ESRC, EPSRC, SAMCoT, the NERC/ESRC/AHRC GCRF Building Resilience Programme awards, and the British Council.

The MANTRA project, one of our Building Resilience Programme Awards, was shortlisted for the Diversity project of the Year Award and for the Digital Health Innovation Award at the DH 2018 conference.

Dr Patty Kostkova was the General and Scientific Chair of the 7th International Digital Health Conference in London in July 2017, and for the 8th International Digital Health

Conference in April 2018. Proceedings of these events highlight cutting edge advances in this field, and leadership of this annual event places Dr Kostkova and the IRDR at the forefront of this field of research.



David Alexander has been elected member of the Board of Directors of the International Society for Integrated Disaster Risk Management (IDRiM, Japan) and the Scientific Committee of the International School of Landslide Assessment and Mitigation (Salerno, Italy).

Our academic staff have also received the following recognition for their research publications and teaching:

- Dr Ilan Kelman co-authored paper given Special Commendation for the best paper published in the INOGO action 2014-2018.
- Dr Ilan Kelman made the Roll of Honour for the 2017 Student Choice Teaching Awards from UCLU for Teaching and for Personal Support.
- Dr Robert Wicks achieved “Fellow of the Higher Education Academy” status as recognition for teaching standards in higher education.

Our academic staff have delivered several invited keynote addresses, and our research staff and PhD students frequently present their research at major international conferences. Our students have won external funding, including full travel grants awarded to Gianluca Pescaroli and Saqar Al Zaabi to attend a Cascading Hazards workshop in Hanoi, awarded by the British Geological Survey and the British Council, respectively; and CNDS travel grants to attend a summer school in Uppsala awarded to Nurmalahayati Nurdin and Gianluca Pescaroli.

**Professor Peter Sammonds** is professor of Geophysics and in challenge-led and impact focused research, is currently working on increasing resilience to environmental hazards in conflict zones. This year he is working on joint projects between the natural, social and historical sciences in Kashmir (on



hazards, vulnerabilities and social relations of communities in Ladakh) and on the forced Rohingya Exodus from Myanmar (on hazard and health crises off refugees). He is also active in natural hazards research including on earthquake, volcano and arctic hazard risks, where is takes a combined laboratory, field and modelling approach. He is a commissioner on the UCL-Lancet Commission on Migration and Health, working closely with the UCL Institute for Global Health, and is Strategic Advisor to UK research councils on increasing resilience to environmental hazards for projects in China, Central Asia and South-Central America and the Caribbean.

**Professor David Alexander** is currently writing a two new books. The first, entitled "How to Manage an Emergency or Disaster", is a companion to his recently published volume "How to Write an Emergency Plan". The second, with co-author Professor Ian Davis, is a study of popular culture and disaster, building upon the work of the late



Professor Henry Quarantelli. David and his student Gianluca Pescaroli have recently published several papers on the theory of cascading disasters, in particular from the point of view of vulnerability analysis. In one new article, David proposed a magnitude scale for cascading disasters. The IRDR Cascading Disasters Research Group has been collaborating with the British and London emergency management authorities on complex and cascading crises. With Prof. Ian Davis, David is about to publish a pedagogical study of the PhD examination process, as both authors have been heavily involved in such work. Finally, David Alexander has continued his research on the aftermath of recent earthquakes in central Italy, and the response of the Italian civil protection system. Articles will shortly appear in disaster management and political science journals.

**Dr Ilan Kelman** is a Reader appointed 50:50 between IRDR and UCL Institute for Global Health. His research programme combines disaster research and health research, including the integration of climate change challenges and opportunities into both topics. Two main case studies are priorities: island and archipelago communities, and the poles, so the Arctic and the Antarctic. Specific research questions relate to three main areas. First, disaster diplomacy and health diplomacy. Second, the intersection between health status and disaster risk reduction initiatives plus disaster survival. Third, how climate change will impact physical, mental, and environmental health. Much of the work relates to the Many Strong Voices programme <http://www.manystrongvoices.org> working with Arctic and island communities to address climate change in the context of wider development and sustainability challenges. Intersections occur with island studies, tourism research, livelihoods, gender studies, and disability studies amongst other topics. Future work will focus on bringing together different fields and disciplines while better connecting research, policy, and practice. Significant separation remains amongst all the areas which my research covers.

**Patty Kostkova** is a Senior Lecturer in Global health and emergencies. Her research investigates mobile digital health interventions and Big Data surveillance, early-warning and prediction for outbreaks and emergencies. Patty's current research investigates mobile training and crowdsourcing for community engagement to combat the zika virus in Brazil, increasing resilience and disaster preparedness in perinatal women in Nepal and strengthening antibiotic stewardship using game-based training in Nigeria, and the use of big data for outbreak preparedness with MSF in the Middle East. Patty was shortlisted for the Woman of the Year Award in IT Excellence Awards. She chaired the 8th DH 2018 in Lyon, France in April 2018 ([www.acm-digitalhealth.org](http://www.acm-digitalhealth.org)) with focus on public health and emergencies in the age of Big Data. She is Editor in Chief of Frontiers Digital Health.



**Dr Joanna Faure Walker** is a Senior Lecturer. Her research focus is on continental settings that are experiencing extension, in particular the Italian Apennines. Through improved understanding of fault behaviour, we can improve quantification of earthquake hazard. Joanna investigates relationships between variability in fault geometry, earthquake slip and fault interaction both during individual earthquakes and over long time periods covering multiple earthquake cycles and how this affects seismic hazard calculations. She leads the central Apennines laboratory of the Fault2SHA ESC Working Group. The laboratory is a collaboration between scientists from Italy, France and the UK, including those who work for civil protection. Joanna has further research

relating to early warning systems, shelter and temporary housing with current projects in Japan and the Philippines. As Co-investigator on the PRISMH project (Philippines Resilience of Schools to Multi-Hazard), Joanna is investigating the relative suitability of different schools as evacuation shelters and distribution hubs following natural disasters in the Philippines.

**Dr Robert Wicks** is a Lecturer in Space Weather and Risk. Space weather is the changing conditions in outer space that impact the Earth. The Sun is the source of the solar wind, coronal mass ejections, and solar flares, which all produce different effects if they hit the Earth. These impacts can include increased radiation levels, disruption to radio communications, disruption of operations, damage of satellites, and the generation of electrical currents on the ground that can damage or disrupt the operation of critical infrastructure. In one project, Rob investigated where the solar wind comes from and how it is generated in the solar corona by using data recorded by spacecraft to investigate the link between the elemental composition of the solar wind and its temperature. In a second project he showed for the first time that more than 50% of the solar wind shows evidence of direct heating of the plasma by the interaction of magnetic field waves with the particles. Closer to Earth, Rob is part of a team of IRDR researchers studying the impacts of space weather on critical infrastructure and cascading disasters.



**Dr Katerina Stavrianaki** is Lecturer in Risk Analysis, jointly appointed with Dept. Statistical Science. The last several decades of seismology research have demonstrated that earthquakes tend to be clustered in space and time to a greater degree than would be expected for a purely random process. However, the clustering of earthquake magnitudes remains an open question. When studying seismic hazard and preparing for major events, it is necessary to know not only the expected number of aftershocks, but also their likely magnitudes. Katerina works on the statistical analysis of earthquakes using the Epidemic Type Aftershock Sequence (ETAS) model and more specifically she proposes a new methodology to study the clustering in earthquake magnitudes which demonstrated their existence. She also studies acoustic emissions generated during laboratory deformation of sandstone samples, which can be used as a proxy for natural processes such as earthquakes. The motivation is to improve forecasting and seismic hazard approaches. She is interested in the modelling of spatiotemporal point processes, hazard and risk analysis, short term magnitude incompleteness and forecasting.

**Professor Maureen Fordham** is a Professorial Research Associate at the IRDR. She is currently leading the MANTRA (Maternal and Newborn Technology for Resilience in rural Areas) project, investigating hazard and risk perception and building women's resilience by improving access to information and communications before, during and after disasters arising from geohazards. It developed a prototype mobile application to support and expand existing public health interventions and social protection mechanisms, especially in rural areas of Nepal. It also covered day-to-day exposure to hazard - living and working in hazard-prone terrain. The MANTRA initiative depended upon a transdisciplinary, gender-responsive, participatory and culturally-rooted approach to Disaster Risk Reduction (DRR), and maternal and child health. It combined

geoscience and gendered DRR with participatory visual and textual maternal and child health care communications.



**Dr Caroline Wood** is a Senior Research Associate and Project Coordinator. Her research interests focus on the evidence-based development and evaluation of digital and non-digital interventions to change behaviour. She is working on a Gamified Anti-microbial Stewardship decision support app for prescribing behaviour change in Nigeria.

**Dr Simon Day** is a Research Associate. His recent work focusses on the effects of major hurricanes upon small islands that can be catastrophic, long-lasting and even permanent, by changing the landscape of the islands and making them more prone to damage in future storms. To study these effects, and post-hurricane recovery, baseline data sets must be collected soon after the initial events. His project has achieved this for Dominica, struck by Hurricane Maria in September 2017. It has characterised environmental changes that may make Dominica more prone to landslides and river overbank floods; investigated the role of tree debris and boulders in river floods in increasing building and infrastructure damage; and studied the experiences of Dominicans both during the hurricane and in the evolving disaster that followed. He identified deforestation and loss of slope integrity as the causes of ongoing landslide activity and flaws in bridge designs that greatly increased flood damage to both them and to surrounding structures.



**Dr Punam Yadav** joined the IRDR in April 2018 as a Research Fellow for the Centre for Gender and Disaster. Prior to this, Dr Yadav was a Research Fellow at the LSE Centre for Women, Peace and Security and Teaching Fellow at the LSE Department of Gender Studies. She has worked for over ten years with different development organisations in Nepal, UK and Australia. She has recently been appointed as a General Secretary of the Britain - Nepal Academic Council. Her research interests include: gender and disaster, gender and armed conflict, Women, Peace and Security, development; social transformation, conflict related sexual violence; transitional justice; conflict-induced



internal displacement, gender planning and mainstreaming, women's reproductive health and rights; sex-selective abortion, and abortion rights and South Asia.

**Dr Juan Beltrán** is a Research Associate working on big data analysis and machine learning modelling to forecast epidemic outbreaks in the Americas, funded by the British Council Newton Fund. His research aims to develop a novel comprehensive framework that combines mobile technologies to empower health agents in their surveillance and use that data to forecast the occurrence and distribution of the Zika virus and its vectors in real-time. This alert system will help governmental institutions to make fast decisions and use their resources more efficiently to stop the spread of the Zika virus.

**Delphine Soriano** is a Research Associate in the IRDR, a game artist and a researcher on

video games and mobile phone applications. In 2017, she worked on the design of a serious game for health for illiterate women in Nepal (MANTRA). In 2018, she is working on a persuasive gamified mobile application for two hospitals in Nigeria to encourage behaviour change on the antibiotic prescription (GASDA). In addition to this research, she contributed to field tests in Nepal in 2017, improved the game design and produced the graphics. Her research question relates to graphic design process that takes into account the players engagement, persuasive mechanics using character design and Art. Her major contribution to game research is in how to improve graphic design methodologies or models for video games or serious games.

**Prof Jukka Tuhkuri** is a Professor at Aalto University in Finland, and was a visitor to the IRDR during 2017-2018. Global warming is changing the marine traffic in the Arctic. Even ships without any ice-strengthening are entering areas with decreasing, but yet significant, ice coverage. This trend includes major human and environmental risks that need to be properly addressed. Jukka's research interests focus on sea ice loads on ships and marine structures, and on understanding the ice loads through experimental studies on the deformation and fracture processes of ice. This can be understood by considering the Reh binder effect for ice, which Jukka is doing through conducting ice fracture experiments in air and in saline water using the facilities in the UCL Rock and Ice Physics Laboratory.



**Alexandra Tsioulou:** “Simulated ground motions for catastrophe risk engineering” (Start: Sept 2014)

Funding: UCL Department of Civil, Environmental and Geomatic Engineering

There has been an increasing interest in recent years in the use of synthetic ground motions for loss estimation. The aim of this research is to develop a ground motion simulation methodology and incorporate it in a seismic risk assessment framework.



**Amy Chadderton:** “The Influence of Temperature on Permeability Evolution in Volcán Chaitén Rhyolite” (Start: April 2013)

Funding: UCL-IRDR-Earth Science Studentship

The permeability of fracture networks that act as fluid flow pathways is key in understanding eruptive behaviour at silicic volcanoes. Experimental results from this project indicate a complex permeability evolution that includes a reduction in permeability with increasing temperature.



**Ching-Eye Rhea Leung:** “Mitigation and Disaster Preparedness Measures Enacted in Remote Mountainous Areas Affected by Earthquake-Triggered Geohazards” (Start: October 2014)

Funding: Self-funded

The 2008 Wenchuan earthquake has triggered numerous geohazard risks in Sichuan Province, China. The main objectives of this research are to investigate the post-earthquake geohazard risks and to evaluate the effectiveness of the subsequent mitigation and disaster preparedness measures.



**Claudia Sgambato:** “Variations in Fault Parameters and Seismic Hazard in the Central and Southern Italian Apennines” (Start: September 2017)

Funding: London NERC DTP Studentship

This project aims to investigate the relationship between fault geometry and slip-rates, through detailed measurements across faults in the Central and Southern Apennines. The results will be placed in the context of seismic hazard calculations and their relevance for earthquake risk.



**Emmanuel Agbo C:** “Enhancing Community Participation for Emergency Management: A Case Study of Floods in Nigeria” (Start: June 2015)

Funding: Federal Government of Nigeria

When disasters strike unprepared communities, damage can be devastating. Communities are often not prepared for these occurrences, due to influencing factors beyond their immediate needs, or a lack of technical know-how, hence little or no sense of immediate concern for disaster risk reduction.



**Gianluca Pescaroli:** “Improving Operational Resilience in the Face of Cascading Disasters” (Start: May 2014)

Funding: EU FP7 project FORTRESS, UCL IRDR

This research develops an integrative and impact-oriented research process for increasing operational resilience to cascading disasters. It defined a new theoretical approach for cascading disasters that has been applied in the city of London for events such as widespread blackouts.



**Helen Church:** “Communication barriers effecting multi-agency collaboration during the response to a major incident; A study of emergency services within the United Kingdom” (Start: October 2017)

Funding: Self funded

The UK Joint Emergency Services Interoperability Principles (JESIP) provide a framework for collaborative working, but barriers remain effecting the joint response to incidents. This research seeks to identify communication barriers and how they can be overcome for future interoperability.



**Khuloud Al Mufarraji:** “Building Community Resilience through Integrating Voluntarism within Civil Protection Systems” (Start: October 2016)

Funding: Ministry of Higher Education, Oman

This research aims to construct a conceptual model of how volunteerism is integrated into the civil protection system (CPS). to help CPS and voluntary organisations evaluate ways of working, and harmonise community resilience.



**Janto S. Hess:** “Financing Climate Change Adaptation in Small Islands: Assessing Accommodation Suppliers’ Perceptions in Thailand” (Start: September 2015)

Funding: UCL IRDR partial studentship

This study links the topics of island studies, climate change and tourism in respect to financing climate change adaptation. In many small islands, tourism is the main economic sector and driver for development.



**Justine Uyimleshi Usile:** “Effectiveness of the Nigerian Emergency Management System in Respect to Building Collapses, Human Stampedes and Electrical Power Failures” (Start April 2015)

Funding: Petroleum technology development fund (PTDF) Nigeria

In the past years, Nigeria has experienced several disasters particularly in major cities. Their increasing frequency has led to a multi-sector system of response which has raised concern for increased coordination and collaboration to improve preparedness.



**Kimon Pantelides:** “Developing a Consistent Approach to Ensuring Community Resilience during Times of Financial Crisis: A Study of Fire Services in Southern Europe and the Importance of Quality Assurance Systems” (Start: September 2017)

Funding: Self-funded

This study is concerned with understanding how fire services in Southern Europe can remain resilient and continue to guarantee an adequate level of service to their communities during times of financial crisis.



**Mark Shortt:** “A Multiscale Study of Mechanical Properties of Freeze-Bonds in Saline Ice” (Start: August 2016)

Funding: UCL/SAMCoT Impact Studentship

Consolidated sea ice features pose a considerable hazard to offshore structures in the Arctic. This research aims to determine the strength of consolidated saline ice on different scales. This will be supplemented by a micromechanical model of freeze-bond failure.



**Nathanael Harwood:** “Using Bayesian Networks to Investigate the Role of Arctic Change in the Rise of Extreme Weather at Mid-Latitudes” (Start: March 2016)

Funding: London NERC DTP Studentship

Through using Bayesian Networks, this research aims to find out whether or not a less stable jet stream is related to changing conditions in the Arctic. And if a link between the two is proven, will weather extremes become more frequent because of it?



**Nurmalahayati Nurdin:** “Disaster Risk Reduction in Education and the Secondary High School Science Curriculum in Indonesia” (Start: January 2014)

Funding: MORA-Indonesian Government/IRDR

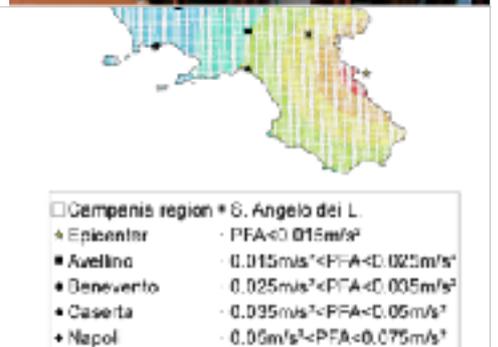
This research aims to understand the transformation process of DRR education in the global and national educational system in Indonesia and how the national curriculum has developed to sufficiently promote DRR knowledge for students in secondary high school in Indonesia.



**Omar Velazquez:** “Engineering Applications of Earthquake Early Warning Systems” (Start: April 2015)

Funding: CONACYT-Mexico, IRDR

This research focuses on the design of engineering applications of earthquake early warning systems for real-time seismic risk mitigation. The main aim is to integrate the estimations provided by the systems in real-time engineering applications to reduce human and economic losses in civil structures.



**Rebekah Yore:** “Housing, Microinsurance and the Transitional Phase to Recovery” (Start: July 2015) Part time

Funding: UCL-IRDR Impact Studentship with Rescue Global

Investigating the potential of microinsurance as a sustainable, long-term resilience supporting mechanism for rebuilding homes and livelihoods in low-income, disaster affected populations. A case study approach based in the Philippines and Dominica, Caribbean.



**Rory Walshe:** “Helices of Hazard: Tropical Cyclones in Mauritius as ‘Extreme’ Weather Events and the Important of a Longue Durée Approach” (Start: March 2016)

Funding: NERC Studentship with the London DTP

This research explores the impact, response and experience of tropical cyclones in Mauritius both across history in the longue durée and more recently, contrasting collective and social memory with archive and instrumental records, with implications for community vulnerability and resilience.



**Sally Scourfield:** “The Effect of Physical Processes in Sea Ice Rubble on Ice-Ice Friction” (Start: April 2014)

Funding: Total and UCL Impact Studentship

This research aims to understand the effects of ice rubble, particularly its angularity, on friction and sliding behaviour. This is achieved through experiments in the laboratory, ice tank, and field, and by modelling the observed behaviour using rate-and-state theory.



**Saqar Alzaabi:** “Harnessing Complexities Within an Emergency Management System: A Case Study from the Sultanate of Oman” (Start: October 2016)

Funding: Ministry of Higher Education, Oman

This research concentrates on analyzing how an emergency management system at the national and regional levels is organized during extreme tropical cyclone events. This is achieved through analyzing the functional relations between the different actors and patterns of coordination and collaboration among them.



**Sarah Alawadhi:** “Disaster Diplomacy: Comparing Emergency and Diplomatic Responses to Cyber Attacks on an International Level” (Start: September 2017)

Funding: Ministry of Presidential Affairs, the United Arab Emirates

This study shows how both emergency and diplomatic responses play out on an international level in terms of cyber attacks. Following that, one can see if those responses need to be improved or updated.



**Shinta Michiko Puteri:** “Measuring Vulnerability and Resilience to Disasters and Climate Change Impacts in Indonesian Cities” (Start: April 2017)

Funding: Indonesia Endowment Fund for Education (LPDP)

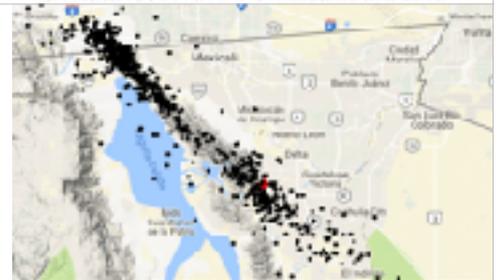
The relationship between vulnerability and resilience in an urban system is complex. Though both concepts are still measured separately in different frameworks, this research aims to quantitatively measure both concepts in an integrative approach. This will allow local stakeholders to define suitable programs for their cities.



**Tasnuva Tabassum:** “Earthquake Forecasting under Short Term Aftershock Incompleteness” (Start: September 2015)

Funding: Commonwealth Scholarship Commission

This research focuses on forecasting future earthquake phenomena when there remains a huge void of earthquake data after the occurrence of the main or large event.



## Publications 2017-18

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**9 October 2018**

**Special Seminar: tbc**

Convenor: Prof Peter Sammonds

[p.sammonds@ucl.ac.uk](mailto:p.sammonds@ucl.ac.uk)

**11-12 October 2018**

**Tohoku University-UCL Partnership Meeting and International Symposium**

Convenor: Dr Joanna Faure Walker

[j.faure-walker@ucl.ac.uk](mailto:j.faure-walker@ucl.ac.uk)

**18 October 2018**

**Humanitarian Institute Evening Conference on Sustainable Development Goals**

**19 October 2018**

**Humanitarian Institute Masterclass on Safer Schools**

Convenor: Dr Carmine Galasso

[c.galasso@ucl.ac.uk](mailto:c.galasso@ucl.ac.uk)

**1 November 2018**

**Launch of the IRDR Centre for Digital Health and Emergencies**

Convenor: Dr Patty Kostkova

[p.kostkova@ucl.ac.uk](mailto:p.kostkova@ucl.ac.uk)

**20 November 2018**

**Members & Graduates Roundtable Dinner**

For our alumni, visiting staff and members.

Roundtable discussion and student awards

[irdr-enquiries@ucl.ac.uk](mailto:irdr-enquiries@ucl.ac.uk)

**17 January 2019**

**IRDR PhD Student Forum**

Convenor: Dr Ilan Kelman

[i.kelman@ucl.ac.uk](mailto:i.kelman@ucl.ac.uk)

**7 February 2019**

**Humanitarian Institute Evening Conference**

**8 February 2019**

**Humanitarian Institute Masterclass**

**27 February 2019**

**IRDR Careers & Opportunities Fair**

To register as exhibitor/ delegate, email:

[irdr-enquiries@ucl.ac.uk](mailto:irdr-enquiries@ucl.ac.uk)

**6 March 2019**

**IRDR Public Meeting Disaster**

[irdr-enquiries@ucl.ac.uk](mailto:irdr-enquiries@ucl.ac.uk)

**29-30 April 2019**

**IRDR Spring Academy**

For IRDR research staff and students.

Convenor: Dr Ilan Kelman

[i.kelman@ucl.ac.uk](mailto:i.kelman@ucl.ac.uk)

**18 June 2019**

**UCL Humanitarian Summit**

Convenor: Dr Rosanna Smith

[humanitarian-info@ucl.ac.uk](mailto:humanitarian-info@ucl.ac.uk)

**19 June 2019**

**IRDR Ninth Annual Conference (UCL)**

[irdr-enquiries@ucl.ac.uk](mailto:irdr-enquiries@ucl.ac.uk)

**Monthly IRDR Invited Seminar Series**

Convenor: Prof Peter Sammonds

[p.sammonds@ucl.ac.uk](mailto:p.sammonds@ucl.ac.uk)

**IRDR Discussion Forum Series**

Informal - fortnightly

Convenor: Dr Mohammad Shamsudduha

[m.shamsudduha@ucl.ac.uk](mailto:m.shamsudduha@ucl.ac.uk)

## If you wish to get involved in an IRDR event

We have the following opportunities:

**IRDR Forums** with partners and funders to foster cross-disciplinary collaboration. The format is 3 lead presentations, brief talks by researchers, then open discussion followed by a reception.

**Humanitarian Institute Evening Conference series on the UN Sustainable Development Goals** which are open to the UCL community, general public and media, are organised around a UN SDG theme, with engagement from developing countries. Contact [humanitarian-info@ucl.ac.uk](mailto:humanitarian-info@ucl.ac.uk) if you would like to lead one of these events and propose a theme.

**Humanitarian Institute Masterclass series** with expertise shared by researchers and practitioners from developing countries and UCL. For students, researchers and practitioners. Contact [humanitarian-info@ucl.ac.uk](mailto:humanitarian-info@ucl.ac.uk) if you would like to lead a masterclass.

**IRDR Annual Conference** sessions on a research theme. The format may be presentations, panel discussion, keynote lecture or “*in conversation*” interview.

**IRDR Sponsorship** of launch events, conferences, seminars or workshops at UCL.

For further information, please contact the IRDR Deputy Director.

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**IRDR Director**

Prof Peter Sammonds

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**IRDR Deputy Director**

Dr Rosanna Smith

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**IRDR Administrator**

Mumtaz Ghafoor

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**IRDR Finance and IT Officer**

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Dr Patty Kostkova

Dr Joanna Faure Walker

Dr Robert Wicks

Dr Katerina Stavrianaki

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**Professorial and Senior Research Associates**

Prof Maureen Fordham

Dr Simon Day

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Andrei Boscor

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England

Stephen Kirby, USGS

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Robert Muir-Wood, RMS

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Dr Hui Zhang

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Deputy Director, IRDR

Professor of Risk and Disaster Reduction, IRDR

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Professor and Head of Structures, Co-Director, EPICentre, CEGE

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Director, Institute of Ideas

Director, Security & Resilience Network, London First

Secretary to the Board

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University College London  
Gower Street, London WC1E 6BT  
United Kingdom

Location: Main Central London Bloomsbury Campus,  
South Wing Building (2nd floor)

## Annual Report 2018



*Rohingya refugees in Bangladesh 2017. IRDR researchers are investigating issues and implications for stability, security and peace in South Asia in the Rohingya Exodus.*

**BECOME A MEMBER OF THE IRDR.** Reducing global risks and disasters presents a colossal challenge that requires coordinated and collaborative action. UCL is uniquely well placed to respond to this challenge with at least 70 academics across 12 departments and 7 faculties involved in world-class research, teaching and practice in the field. The IRDR aims to bring together this wealth of knowledge and expertise, and through research, teaching and knowledge exchange aims to overcome the barriers to understanding risk and reducing the impact of disasters.

**ONLINE:** Join more than 2000 Twitter followers of the IRDR  Follow@UCLIRDR and more than 1800 Facebook followers to stay up to date.

# IRDR

UCL Institute for Risk  
and Disaster Reduction

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