Dealing with Disasters, GCRF, UK Alliance for Disaster Research, Disasters Research Group and UK Collaborative for Development Research

DwD-GCRF-UKADR-DRG-UKCDR International Conference, 2019

17th, 18th and 19th July @ Northumbria University, Newcastle upon Tyne, UK

New points of departure in transitioning disaster reduction and sustainability challenges

PRESENTATION ABSTRACTS

Abstracts available are listed in programme sequence

A Note on the Conference Theme

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The DwD-GCRF-UKADR-DRG-UKCDR 2013 Conference taking place at Northumbria this week stems from a growing alert that, although much progress has been made in advancing the disaster reduction paradigm, action towards humanity becoming the vision we want to experience currently falls short of what is required for transitioning to sustainability. This event is driven by the quest to know what more can we do with our expanded knowledge to get from human induced disaster scenarios towards more assured survival with quality of life? This is in part the matter of dealing with unpredictable and extreme events of the environment, society and economy, and in part the matter of systemic adjustments to everyday life necessary for safety, human security and manageable levels of risk. How much of our research and action is being effective? What are the new points of departure to explore, and how are these to be acted upon going forward?

DFID Concerns and Interests

Roger Bellers, Department for International Development, UK

Fragile and vulnerable countries, the international community and the UK, in support of the international commitments, are making progress addressing recurrent and predictable crises, managing risk better, and building resilience. Yet fragility, conflict, crises and climate change are growing threats to the SDGs. Current approaches, on-going reliance on post facto responses, relying on humanitarian assistance in protracted crises remains financially unsustainable and ethically untenable. More effort and investments are needed to address causal reasons of vulnerability, to respond earlier and for longer, particularly in fragile states, where 62% of the poor are projected to be living by 2030. DFID is promoting strategically linked up, multi-sectoral approaches for risk informed development programming with shock response essential services and social protection; building resilience programmes and multi-year humanitarian programmes that develop national coping capacities supported by risk-based predictable finance. A critical contribution is being made through extensive support to research, evidence and the knowledge needed to guide priorities and investments towards a more sustainable future.

Rapid Post Disaster Damage Mapping with Satellite Imagery, Citizen Scientists and Machine Learning

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We co-create machine learning products with UK and in-country commercial, GO and NGO partners to ensure the machine learning algorithms address appropriate user needs whether for tactical decision making or evidence-based policy decisions. In one particular case, we developed and deployed a novel algorithm, BCCNet, to quickly process large quantities of satellite imagery in response to natural disasters. Crowdsourcing provides an efficient mechanism to generate labels to prime machine learning algorithms for large scale data analysis. However, these labels are often imperfect with qualities varying among different citizen scientists, which prohibits their direct use with many state-of-the-art machine learning techniques. BCCNet simultaneously aggregates biased and contradictory labels from the crowd and trains an automatic classifier to process new data. A small amount of data labelled by hand through crowdsourcing platforms like Zooniverse1 can be used to train the machine learning algorithms. Our algorithm has been developed and deployed in collaboration with Rescue Global, a UK based not-for-profit, to generate damage heatmaps for disaster responders immediately following Hurricanes Irma and Maria (2017) and earlier versions following earthquakes in Nepal (2015) and Ecuador (2016). These heatmaps were passed to the UN, FEMA and over 60 NGOs during the response phase of Irma and Maria in a timely manner. BCCNet is a multi-class classifier that combines high dimensional image data and noisy, potentially biased crowdsourced labels. It integrates a convolutional neural network with the independent Bayesian classifier combination algorithm. Using crowdsourced labels of damaged buildings from Digital Globe high resolution (30cm) optical satellite imagery of Dominica before and after Hurricane Maria in 2017 BCCNet produced a classification accuracy 83 ± 1 % overall, with 91 ± 1 % correctly identified as background, 85 ± 2 % correctly identified undamaged buildings and 91 ± 2 % damaged buildings.
1 https://www.zooniverse.org/

Estimation of Snow Cover and climatic variability using MODIS data of Teesta river basin Sikkim, India

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The accurate information on snow covers and glacier is an essential feature for understanding climatic variability. The information on the spatio-temporal pattern of snow cover area (SCA) helps in the study of regional climatic change, water resource management and is an important parameter for hydrological modelling. The SCA and climatic variability were assessed on the Teesta river basin, which is a tributary of the Brahmaputra river system. Monitoring of SCA is crucial in this region because of the large population and economy depends on the meltwater of Teesta River. The status of SCA is evaluated using standard Moderate Resolution Imaging Spectroradiometer (MODIS) daily snow cover products (MOD10A1 and MYD10A1 version 6) from 2001 to 2017, as the only available snow cover products at high spatial (500m) and temporal resolution along with wide area coverage, but cloud contamination is a major problem. Therefore, the snow cover product has been used after applying a cloud removal filter. The maximum and minimum SCA is estimated in March (33.3%) and July (6.0%) respectively. The minimum and maximum mean yearly SCA was estimated in 2010 (12.5%) and 2003 (20.0%) respectively. The impact of climate change on SCA in the basin is assessed through monthly MODIS Land Surface Temperature (LST) products (MOD11C3 and MYD11C3 version 6) from 2001 to 2017. It is available in both day and night of the region in a coarse spatial resolution (0.05°) with less cloud contamination. Combination of four products [Terra (day & night) and Aqua (Day & night)] were considered a mean monthly LST of a month. The LST was recovered below the cloud pixels by using a 3-by-3 average filter in an image. The minimum and maximum mean yearly LST was assessed in 2003 (11.1°C) and 2006 (12.8°C) respectively. The statistical analysis has been applied on LST and SCA based on non-parametric Mann-Kendall and Sen's slope methods with a 95% confidence interval. Results showed the decreasing (-0.04°C/year) in LST along with increasing (0.13 %/year) in SCA from 2001 to 2017. The results indicate that the climatic variables are the dominating factors in the Teesta river basin in controlling the SCA.

Using expert judgement and expert elicitation to assess or forecast natural hazards: a systematic review

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Expert elicitation (EE) is a technique to quantify the knowledge of experts based on their theoretical or practical experience on a topic of interest. Here we do a systematic review of EE to understand its role in assessing or forecasting natural hazards. Although the EE procedure was formalized in the early 1960s, different terminologies are used in the literature for expert elicitation. We first explore the use of EE in different fields including the medical sciences, agricultural sciences and environmental sciences, and noted commonalities in their use. After identifying all the words that are used synonymously for EE, we gathered together 55 sources (44 peer-reviewed papers and 11 grey literature) that use EE with natural hazards, and did a systematic review including: study location, hazard studied, what was assessed, methodology used, comparison of EE results with other types of evidence, uncertainty quantification, number of experts used, and purpose of study (theoretical vs practical). Based on our review we found the following: (i) the Cooke method has been used in 60% of the research studies; (ii) the number of experts involved in the process of

doing EE for each study was generally between 10-20 experts, with one research study as an anomaly that used 100 experts ; (iii) elicitation of expert knowledge has not been used in S Asia as much as it has in Europe, UK and US; (iv) about 50% of the studies did not confront their results against other sorts of evidence; (v) 60% of the studies quantified the uncertainty associated with the EE results. We would suggest the following for the use of EE in the context of natural hazards: (i) a minimum of 10 experts from diverse fields should be involved in any procedure involving experts; (ii) the results from an EE procedure should be confronted against other evidence, where possible, to further refine the results ; (iii) given that EE has been effectively used in the assessment of individual hazards, there is scope to apply it for multi-hazard and/or risk assessment; (iv) EE methods might be useful in regions (e.g., S Asia) where there is data scarcity, low-resolution data or causal links are not well understood.

Hydrodynamic Modelling Glacier Lake Outburst Floods (GLOFs) and Impact in Nepal

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Nepal is subject to some of the highest national-level socio-economic impacts from natural hazards induced by Glacier Lake Outburst Floods (GLOFs). The Nepalese Government has been actively seeking to reduce and mitigate the risks created by GLOFs. However, effective early warning and risk mitigation strategies are still lacking across the country. There is an urgent societal need to develop reliable hazard risk assessment, forecasting and warning tools to improve preparedness and build resilience at the community level. Funded through the NERC SHEAR (Science for Humanitarian Emergencies & Resilience) programme (Catalyst grants), WeACT assembled an international and multi-disciplinary team from Loughborough University and Newcastle University in the UK, and Tribhuvan University and the International Centre for Integrated Mountain Development (ICIMOD) in Nepal, to exploit recent contemporary advances in earth observation and high-performance dam-break flood modelling to innovate a web-based GLOF hazard assessment and forecasting system to improve community flood preparedness and resilience in Nepal. This talk will report the research progress of the WeACT project, with a particular focus on GLOF modelling and impact analysis in the case study site of Tsho Rolpa Glacier Lake and wider Nepal. Different scenarios of GLOFs are simulated using the High-Performance Integrated hydrodynamic Modelling System (HiPIMS) developed at Loughborough. Flood impact analysis is supported by open-source land-use and population datasets. The high-resolution flood maps and impact analysis results provide useful information for the local government and stakeholders to develop GLOF risk mitigation schemes and will become a core component of the web-based hazard assessment and forecasting system as proposed in WeACT.

Narratives of Vulnerability: How Institutions Shape Everyday Perceptions of a Disaster

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Building on the fieldwork carried out for LANDSLIP project, this paper argues that institutional narrative of disaster response shapes the lived experience of vulnerability in the disaster. The LANDSLIP project aims at producing a prototype Early Warning System for landslides in its two study areas: The Nilgiris in South and Darjeeling in North Eastern part of India. Fieldwork for this project mapped the institutional landscape of

disaster management in the two study sites. This exercise of mapping the institutional landscape aimed at identifying the user for the proposed early warning system and their expectations from it. During the field work, interviews were carried out primarily with the government officials and limited open-ended conversations were held with the local people. People, in general, identified vulnerability to landslides in terms of:

a) How likely they are to get rescued during a disaster?
b) How easily can relief reach them?
c) What assistance is provided to them for rehabilitation?

This narrative of vulnerability to landslides is defined in terms of 'rescue', 'relief' and 'rehabilitation', closely overlaps with the institutional response to disasters, which in practice was found to be 'relief' and 'rescue' oriented. By using a narrative analysis method to engage with vulnerability, this paper unpacks the rationale of institutional response towards disaster management and its role in shaping the everyday perception of vulnerability. The paper further identifies inherent structural challenges that might delay or hamper the desired shift from a response and relief-based system to a mitigation and preparedness-based system in these two study sites.

Policies, politics and practices of landslide risk management in post-earthquake Nepal: Perspectives from above and below

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Landslides are a pervasive hazard in rural Nepal, presenting a chronic threat to both lives and livelihoods via damage to and destruction of houses, farmland, roads and trails. While rural residents are very much aware of the causes and triggering mechanisms of seasonal, monsoon-triggered landslides, and have developed their own ways of reducing the risks they face, gaps in local knowledge exist. This is particularly the case when the hazard context itself evolves, for example, following a high magnitude earthquake, which brings new behaviours to otherwise familiar landscapes. The 2015 Gorkha earthquake, which triggered over 22,000 landslides, the equivalent of more than 200 years of 'normal' landsliding, is a case in point. Many households are rebuilding and are seeking definitive answers to their questions and concerns about the landslide risk faced. However, while landslide risk maps can be produced, and sites can be individually assessed by technical experts, how this information is communicated to, used by, and even contested by, local government stakeholders and residents is rarely discussed. Drawing on findings from a DfID/NERC SHEAR-funded project on landslide risk mapping, we provide a critical overview of landslide risk management in Nepal, including the role of science and technical expertise, and how this intersects with local knowledge, politics, power and agency within local government and communities themselves.

'Everyday-life preparedness': case studies and applicability

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This exploratory paper aims to contribute to the conceptualisation and practice of 'everyday-life preparedness [*seikatsu bosai*]' (EP) initially proposed by Yamori. 'Everyday' does not necessarily mean thinking about and engaging in disaster risk reduction (DRR) every day. The idea is to reinforce existing community-based disaster risk reduction (CBDRR) systems through embedding preparedness thinking and practice in communities' daily lives. International agencies, governments and experts promote CBDRR to engage 'all of society' and to achieve 'a culture of DRR'. At the same time, the challenges of how to engage communities in DRR actions and how to sustain them in the communities are also recognised. Drawing on three case studies from Japan, the paper suggests that EP could be one approach to respond to these challenges. The paper intends: 1) to relate the concept of EP to the existing literature of CBDRR; 2) to demonstrate three example cases of EP from Japan, utilising the EP framework offered by Yamori; 3) by doing so, to sharpen EP conceptually, as well as to clarify its role in disseminating CBDRR. The conclusive account includes a consideration on the applicability of EP.

Socioeconomic vulnerability to wildfires in NW Spain

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Wildfires constitute a recurring natural risk, with greater consequences on the population of areas with human settlements in contact with the vegetation. The number of people living in these areas has increased dramatically in recent years (e.g, Radeloff et al. 2018) raising wildfire risk. It is essential, therefore, to have greater knowledge of the affected population and the factors that influence the potential impacts on it (Calkin et al. 2014). These aspects have been encompassed by many authors in relation to forest fires under the term "vulnerability" (Paton and Tedim 2012). Previous studies indicate that the socially more vulnerable population has a lower capacity to apply mitigation measures against forest fires and recovery in the event of occurrence (Gaither et al. 2011; Paveglio et al. 2016; Wigtil et al. 2016). In this sense, the deficient knowledge of the recommendable practices in biomass management, building materials, actions to execute in case of forest fire increases the social vulnerability. In addition, after a disaster, the resilience of societies depends not only on the income of individuals, but also on age and health status. The overall objective of this work is to spatially identify the vulnerability of the population to forest fires. As a case study, we select the region of Galicia because it registers the highest occurrence of fires in Spain (40% of the total). Relevant socioeconomic and demographic variables at the municipal level will be selected for the construction of a spatial social vulnerability index (Cutter et al. 2006) in order to identify the most vulnerable areas to wildfire impacts. This information can spatially define the impact on local communities potentially affected by fires, showing those areas where it is necessary to improve preparedness and capacity to response by local communities, in order to increase social resilience to natural risks.
Keywords: wildland-urban interface, Galicia, population, risk, Spain

References:

Calkin,D.E., J.D. Cohen, M.A. Finney, M.P. Thompson. (2014). How risk management can prevent future wildfire disasters in the wildland-urban interface. Landscape and Urban Planning 119:44–53.

Cutter, S., B.J. Boruff, W.L.Shirley. (2006). Social Vulnerability to Environmental Hazards. Hazards vulnerability and environmental justice: 115-132

Gaither, JC., Poudyal, N.C., Goodrick, S., Bowker, J.M., Malone, S., Gan, J. 2011. Wildland fire risk and social vulnerability in the Southeastern United States: An exploratory spatial data analysis approach. Forest Policy and Economics. 13:24–36.

Paton,D., Tedim, F. 2012. Wildfire and community: Facilitating Preparedness and Resilience. Charles C Thomas Publisher.

Paveglio, T., Prato, T., Edgeley, C., Nalle, Darek. 2016. Evaluating the Characteristics of Social Vulnerability to Wildfire: Demographics, Perceptions, and Parcel Characteristics. Article in Environmental Management 58(3)

Radeloff, V.C., D.P. Helmers, H.A. Kramer, M.H. Mockrin, P.M. Alexandre, A. Bar-Massada, V. Butsic, T.J. Hawbaker, S. Martinuzzi, A.D. Syphard, and S.I. Stewart. (2018). Rapid growth of the US wildland-urban interface raises wildfire risk. PNAS 115 (13) 3314-3319.

Wigtil, G., Hammer, R.B., Kline, J.D., Mockrin, M.H., Stewart, S., Roper, D, Radeloff, V.C. 2016. Places where wildfire potential and social vulnerability coincide in the coterminous United States. International Journal of Wildland Fire, 25, 896–908.

The Making of Man-made Disasters: Corruption and Law Violations as a Catalyst in Increasing Vulnerability

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The vulnerability of people from man-made disasters in urban Dhaka has become a matter of concern in the recent times. From 2013 to 2017, there were 8,519 fire incidents in Dhaka city alone. Dhaka is rapidly urbanising and with the increasing demand of the growing population and the capitalist market forces the city is developing vertically in the form of high-rise buildings. These constructions are taking place without maintaining the planning laws and does not conform to the safety regulations. As a result, the development has been taking place at the opportunity cost of safety. In most cases the buildings lack proper precautionary measures along with the institutional inefficiency, insufficient equipment support, and lack of public awareness are increasing the risk for people. Disasters as such often reveal the effects corruption therefore plays in the making of this man-made disaster but often gets overlooked as an unchangeable problem. People in the city are living in uncertainty and considering the problem associated with corruption and law violations is important for horizon scanning of the city. Considering the current situation, taking all these aspects into account is extremely important to mitigate man-made disasters. Therefore, this paper analyses the understudied and often overlooked challenges brought forwards from corruption and law violations in urban planning and management to explore how it affects the vulnerability of people to fire in the urban area. Through a desk analysis, this paper aims to investigate recent cases of disasters in old Dhaka and new to explore the institutional failure that may have taken place thus increasing the intensity of the event. It also explores the importance of institutional reform and the strengthening of capacity at individual and institutional level is needed to scan the horizon for mitigate fire hazards.

Strengthening European disaster management through rescEU & the Union's Civil Protection Mechanism

Julia Stewart-David, Head of Unit, Civil Protection, European Commission - ECHO

Julia Stewart-David recently steered through EU negotiations to strengthen mutual support and cooperation on disaster management, enabling the development of rescEU. In this presentation she addresses five systemic challenges and makes the case for enhancing preparedness to respond to large-scale emergencies by working beyond national borders.

The International Emergency Team UK

Daryl Oprey, IETUK

The International Emergency Team UK (IETUK) is a voluntary, Charitable Incorporated Organisation (CIO) which achieved charity status in October 2018. It was established by Mehrban Sadiq – a Community Safety Manager at Tyne and Wear Fire and Rescue Service. His vision has been to help hard to reach communities overseas, to develop safer communities and enhance their resilience. IETUK is also committed to the mental wellbeing of UK Firefighters; supporting retired, serving as well as Fire Cadets. IETUK is committed to fulfilling Sustainable Development Goals (8, 11, 17) by promoting local risk management, safety, knowledge and development for strengthening partnership activities (SDG 17), contributing towards safe and sustainable communities (SDG 11) and advocating for decent work and economic growth (SDG 8) in Pakistan, Nepal, Sri Lanka, Bangladesh and India in partnership with like-minded agencies based in People's Republic of China including Taiwan, and the Republic of Korea. The IETUK's team has been delivering a wide range of services to the developing world.

Key project successes include: Punjab Region, Kashmir – 2019. Throughout our trip in Punjab and Kashmir we have successfully achieved three MOU with the Red Cross, Kumak and RCSD. To share best practice we took a member of the fire cadet (Zeeshan Ayub) from Tyne and Wear Fire Rescue Service in order to promote the fire cadet scheme. This scheme has been approved by Rescue 1122 and would like us to implement this scheme on our next visit. We also collaborated with the State Disaster Management Authority in Kashmir to share the knowledge and understanding of key concepts of fire and rescue skills. One of our main achievements in this discussion is that we have agreed to establish a Fire and Rescue station in Kashmir. IETUK visited the Hope Welfare Trust Hospital based in Kashmir as we have discussed about the First Responder Paramedic Motorbikes project as we have agreed to raise money for the motorbikes.

Pakistan – UK First Responder Paramedic Motorbikes Project – 2017 / 2018

In conjunction with Punjab Rescue 1122, IETUK has deliver a first for the country, First Responder Paramedic MotorBikes which are now actively saving lives across the Punjab Region and are about to be developed for the Kashmir Region.

Firefighter to Firefighter Comprehensive Peer Review Project – 2017

Recent project successes include the delivery of a comprehensive Peer Review of the Punjab Emergency Service; Rescue 1122 Training Academy, undertaken with the specific aim to assist them in their development and lifesaving capability.

Climate Information Services for Resilient Smallholder Agriculture

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Smallholder farmers in sub-Saharan Africa are responsible for managing 80 per cent of the region's farmland and contributing up to 90 per cent of its food production, making these farmers critical to reducing poverty and enhancing food security. They are also at the frontline of climate change impacts, with increasingly scarce natural resources and changing rainfall patterns affecting crop yields, income and food security. Poverty, insecure land rights and lack of access to resources such as quality seeds, fertilizer and storage facilities are some of many challenges smallholder farmers face. Climate information services (CIS) can empower smallholder farmers to take actions that reduce losses, improve food security and increase income by providing critical weather and climate information related to agriculture. However, in order to achieve these outcomes, we need to fully understand the varied and complex factors and actors in a CIS system. Research conducted in sub-Saharan Africa as part of a research consortia project (the Climate Information Services Research Initiative) synthesised and generated evidence to answer key questions on the development of climate information services that effectively meet African farmers' decision-making needs in a variable and changing climate:

1) Who are the users of climate information services?
2) What are their information needs?
3) What are the factors that foster or limit access to, and use and effectiveness of, CIS?
4) How can CIS be meaningfully evaluated?

We explore these questions in order to develop evidence-based best practices for CIS, as well as identifying priority questions for future research and investment in CIS.

Missing Voices: An intersectional approach to understanding gender and disaster risk

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Vulnerability to disaster risk is shaped by gender inequality, gender norms and social marginalisation. Disasters often impact marginalised gender groups more, and further entrench gender inequality which in turn undermines development goals. Research on community experience of disaster, and work to reduce disaster risk, often disregards gender, or considers gender in a tokenistic and simplified way, perhaps through a simple gender disaggregation of quantitative data. These approaches homogenise women, failing to recognise the intersectionality and diversity of gender and other identities which shape vulnerability and disaster risk. Such simplified analyses also tend to adopt a binary cisnormative approach to gender, erasing communities outside of a gender binary. In new research in Nepal and Peru, we have taken an intersectional approach, enhancing more traditional collection of quantitative and qualitative data with targeted 'missing voices' interviews. Missing voices interviewees included elderly women, women with disabilities, single mothers, transgender women, women who were pregnant or with young babies, women with young children, women with visual impairments. We adopted an approach of working through trusted intermediaries and snowball sampling, to engage and build trust with individuals with multiple intersecting areas of vulnerability or social marginalisation. In contrast to the typical approach to interviews adopted in the NGO sector, we piloted an approach of telephone interviews, with peer introduction and a series of telephone contacts. We reflect upon the challenges and advantages of this approach, contrasting the

openness of the narrative and interviewee willingness to share sensitive information on experiences of marginalisation, exclusion, abuse or violence. We consider how to document and share first person narratives, and the power of sharing voices who are often overlooked in discussion on disaster and disaster risk. The work is underpinned by a gender transformative approach. We explore the differences between a gender unaware, a gender aware, a gender sensitive and a gender transformative approach to Disaster Risk Reduction.

The Growth of Municipalities and Risk Governance in Nepal

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Urbanisation and the growth of cities are often considered to be the same. In this empirically driven paper, consideration will be given to the differences between urbanisation and the creation of municipalities in Nepal. How these concepts differ and what happens when they are conflated in a post conflict, hazard prone country where democracy is fledging. Issues of power, control over resources, risk governance and thinking about who benefits from the growth of municipalities is explored. What happens when urbanisation takes place and it results in lower density in the city is explored. How urban planning is incorporating disaster risk reduction and multi hazards is explored. This paper is based on fieldwork in 2019 and also on 2017 fieldwork immediately post local elections.

Making Aid Agencies Work: Potential and Challenges for Civil Society Organisations Supporting Transitioning Disaster Reduction and Sustainability Challenges

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The bridging role of Civil Society Organisations is valued by institutions, governments and local populations and the sector has grown in scale dramatically since the second world war. In the search for coherent and integrated approaches to combining the aims of DRR, Climate Change Adaptation and Sustainable Development CSOs are strongly placed with their links to all the above actors to support this. However the oft-quoted phrase *'We dreamed of Civil Society and they gave us NGOs'* highlights a gap between potential and reality, one which was brutally exposed in the external and internal abuse problems reported at Oxfam, Save the Children, Medecins sans Frontieres and other agencies in 2018. A newly published book: '*Making Aid Agencies Work: Reconnecting INGOs with the people they serve'* suggests that those news headlines are symptomatic of wider structural issues inhibiting CSOs, particularly large INGOs, from playing their transformational bridging role effectively. Surveying the industry's development and its current drivers for policy and action the book argues that internal and external economic and political forces have progressively drawn organisations away from their emancipatory and transformational roles towards service delivery defined by governments, institutions and foundations. Necessarily provocative, the book moves from this critique to consider ways that CSOs, both large and small, can strengthen their critical roles as change agencies by revisiting their structures, governance and sources of knowledge, refocusing towards the local as a starting point for action. The presentation given by the author, Terry Gibson, reflects 25 years' involvement as a practitioner in DRR and development, in parallel with research and writing on these themes.

DRR *to* Development: Local Level Perspectives and Bridging the Practitioner/Academic Divide

Terry Gibson and John Norton (programme convenors), Aka Festus Tongwa, Sarwar Bari, Guillaume Chantry, Manu Gupta, Jesusa Grace Molina, Nisha Shresha, Bhubaneswari Parajuli, Hepi Rahmawati and Ruiti Aretaake
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A project engaging practitioners to collaborate in applying critical thinking to their practice

Learning is a critical element in fostering Sustainable Development. However practitioners are busy activists, often pressured to deliver 'success stories' and secure continued funding, so processes of reflection, analysis and learning take second place. Acknowledging this, a group of practitioners from local-level Civil Society Organisations drew together and collaborated to produce, discuss and critique case studies investigating DRR and development. This was enabled by Emerald Publishing, an academic publisher who waived the usual peer review process allowing practitioner papers to be produced, and made space for them to take over a special issue.
https://www.emeraldinsight.com/toc/dpm/28/1
They were further enabled through support from Global Fund for Community Foundations to come together at a workshop in Kathmandu dedicated to further discussion and comparative analysis. The project has produced valuable insights from both the outputs and the process:
Outputs identifying challenges and opportunities faced in strengthening local level sustainable development, acknowledging the limitations of local action and the effect of underlying factors, and suggesting strategies such as 'legitimate subversion' to address these underlying factors.
The *process* demonstrates the potential for critical learning from practice, continuing through a web presence at drr2dev.com aiming to foster further discussion and learning.
The presentation gives insights drawn from practice and critical into 'doing development differently' through integrated, cross scale approaches rooted in local level learning.

Love in a Time of Terror: Revisiting an Indigenous love story in Christchurch New Zealand

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After the terrorist attack on Muslims in Christchurch on March 15, 2019 in which 51 people were killed, New Zealanders of all ages demonstrated solidarity with the Muslim community, responding with acts of humanity and messages of love. This compassionate response was internationally praised for sending a unique and powerful message to the rest of the world on best practice responses to racial hatred and violence. However, the use of love to unify and direct action in the face of adversity in Christchurch is not new. In the aftermath of the 2010-2011 Canterbury earthquakes, the Māori cultural value of 'aroha nui ki te tangata' (extend love to all people) became the key driver of Māori earthquake response and recovery initiatives (Kenney & Phibbs, 2014). The Māori emergency response is revisited to trace the transformation of love as a cultural practice in times of hardship to a nationally accepted moral technology for ensuring community well-being and disaster recovery over time. In his work, imagined communities, Benedict Anderson explored how collectives despite internal differences, are imagined as homogeneous entities constructed through imagined connections between written symbols, shared time and collective events. Following the terrorist attack in Christchurch, repeated expressions of unity such as 'we are one', 'they are us' and 'this is not us' were used to make sense of the event and repair the national imaginary. Yet, some members of the community experienced these attempts to bridge cultural differences through appeals to

unity as an erasure of difference and experiences of racism. This research highlights the complexities of using moral technologies to inform disaster risk reduction policy and strengthen inter-connected and valued relationships in the sector. Nevertheless, we argue that the Christchurch experience is an important exemplar of collective love as an effective disaster response and risk mitigation tool.
Key words: Sociology, culture, disaster risk reduction.

Perceptions on coping and adaptation strategies to environmental and climate stressors in Caribbean coastal communities

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Cumulative and synergistic impacts from climatic variability and environmental pressures present challenges for the governance of ecosystems, which provide natural resource-based livelihoods for communities. Ecosystems and communities on low-lying tropical coasts are at the forefront of these environmental changes. In this paper, we seek to understand the relationship between current responses to the impacts of El Niño and La Niña events and the vulnerability of mangrove and marsh dependent communities in the Caribbean region of Colombia. Using two case study sites, we show how communities are impacted by, and how they are responding to El Niño and La Niña events, and how such responses can affect their adaptive capacity to respond to longer-term environmental degradation. We show that certain coping measures to climate variability currently deliver maladaptive outcomes, resulting in circumstances that could contribute to system 'lock-in' in undesirable ecological states, and exacerbate future livelihood vulnerabilities. There is an opportunity to reduce vulnerability through enhancing the communities' capacity to adopt more positive and preventative responses, but this is likely to require close cooperation between formal and informal organisations at different levels, the development of shared objectives, and coordination of activities to work towards these. There are significant social barriers to achieving this in these and similar areas, including perceptions of state abandonment and a long history of mistrust in authorities.

Developing a "culture of preparedness" – lessons from the CARISMAND project

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The Horizon2020 project CARISMAND explored the role of cultures and cultural factors in European citizens' disaster-related attitudes, perceptions and behaviours. At the same time, it aimed to, methodologically, bridge potential "cultural" gaps between disaster practitioners and citizens. Understanding their different perspectives as complementary, a series of events across Europe was organised between 2016 and 2018, consisting of three Stakeholder Assemblies and six Citizen Summits held in Romania, Malta, Italy, Germany, Portugal and the Netherlands. The cyclical character of this series, with quantitative findings from real-time surveys and qualitative findings from focus groups discussions in each event shaping the content of the next, allowed for a progression of ideas co-created by disaster

practitioners and citizens. The synthesised results of this process were moulded into user-specific sets of practical recommendations, which were presented and evaluated in the last round of events. These recommendations suggest a number of specific strategies that can be expected to foster a "soft" cultural change towards disaster preparedness over time, such as: (1) encouraging measures that build upon already existing cultural values and daily routines; (2) organising preparedness-related activities that are designed as part of citizens' everyday-life events; (3) improving perceived self-efficacy by addressing citizens' already existing, personal everyday skills to adapt them for usefulness in disaster situations; or (4) using the transformation of personal values into cultural norms for transforming preparedness intentions into actual preparedness behaviour. We will provide specific examples for these dynamics, and argue that combining Citizen Summits and professional Stakeholder Assemblies in several feedback loops provide a unique format to merge original research with knowledge transfer and demonstrable impact.

Yonmenkaigi System Method as an Educational Framework for Climate Change within the United Kingdom: A Pilot Study

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Climate change can be viewed as probably one of the greatest environmental issues that society is currently facing. It is already being argued that society is already feeling the effects of climate change, with an increase of 1^{o}C experienced worldwide. Climate change impacts within the United Kingdom are expected to be extensive, with an increased probability of droughts, heatwaves and flooding events by the end of the century. Despite, these potential effects, there is now only a limited education about climate change mitigation and adaption strategies within the United Kingdom's education curriculum. One potential option to overcome this issue is an engagement framework that can be used within schools and colleges, such as a Yonmenkaigi System Method. Therefore, a Yonmenkaigi System Method was undertaken with sixteen first year Northumbria University Environmental Management students on the 4th October 2018; a questionnaire before and after was given to monitor the student's perception of climate change throughout the engagement exercise. It was found that there was a significant change ($p<0.10$) in the way several questions were answered within the questionnaire before and after this engagement exercise. This demonstrates that the Yonmenkaigi System Method has a potential to be used as an educational approach for educating and engaging students within United Kingdom about environmental issues, such as climate change.

Keyword: Climate Change Engagement, Risk Reduction Education, United Kingdom

Disaster Risk Perception of the Rohingya Refugees in Cox's Bazar, Bangladesh

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Rohingya refugee crisis is a matter of great concern for Bangladesh, as the country is currently holding more than 1 million Rohingyas fleeing persecution, with crimes against humanity and genocide in Myanmar. The refugees have been given temporary shelter at overcrowded tent camps in Cox's Bazar which is extremely vulnerable to landslides, flash-flooding, cyclones and storm-surges. The research aims to understand how the Rohingyas cope with the natural hazard-induced disasters in extreme humanitarian conditions in the Kutupalong Camp (the most densely populated and largest refugee camp in the world). It

is important to remember that vulnerability of a local Bangladeshi in his own territory and vulnerability of refugees in the host-country are not the same due to additional restrictions on free movement and building permanent/disaster-resilient structures. The paper explores scopes and challenges related to disaster resilient strategies within refugee community to achieve the UN Sustainable Goals. A total of 250 Rohingya families were interviewed (as per UCL ethics approval) to generate quantitative data on their demography, perception on natural hazards, current life standard, adopted disaster risk reduction (DRR) techniques and relocation from temporary camp in Cox's Bazar to Bhashan Char/ a small island in the middle of the Bay of Bengal in Hatiya, Bangladesh. The household survey was conducted from April-May 2019 targeting the landslide and flash-flood vulnerable areas, and GPS locations and photographs were taken to identify and validate the high, medium, and low risk areas. The results suggest that though the refugees have developed some sort of mechanisms to respond to disasters, they lack awareness and DRR trainings to reduce the severity of impacts from natural hazards. The study will contribute to our current realization on how extremely marginalised populations or stateless refugees respond to, and cope with environmental hazards in the context of conflict and disasters.

Prevention and treatment of acute malnutrition in humanitarian emergencies: A multi-organisation collaboration to increase access to synthesized evidence

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Background: Program decision-making to prevent and treat acute malnutrition in an emergency can be hampered by a lack of accessible, relevant and robust research evidence. A multi-disciplinary, international group of specialists worked together to build an open-access evidence collection, making available to humanitarian actors concise, synthesised, relevant and up to date evidence on what works for programming.
Objectives: This project was designed to make the evidence from relevant systematic reviews about malnutrition as accessible as possible to support evidence-based decision-making and to guide future research on the prevention and treatment of acute malnutrition in humanitarian emergencies.
Methods: Between March 2017 and March 2018, a large group (21 volunteers and stakeholders) with different backgrounds collaborated to review and curate collections of systematic reviews of interventions for the prevention and treatment of moderate and severe acute malnutrition relevant to humanitarian emergencies. The methodology loosely followed general guidance for overviews of systematic reviews with a pre-defined question (formulated using the PICOS format) and search strategies applied to multiple databases.
Results: Search strategies were run in 12 databases, in the week of 15 September 2017, yielding a total of 4,646 records after de-duplication. The collection was published on the Evidence Aid website in March 2018 and on the Cochrane website in August 2018.
Conclusion: Through this collaboration, we successfully generated a collection of robust research evidence to guide prevention and management of acute malnutrition in humanitarian emergencies. These collections provide accessible synthesised evidence that can be used to inform decision-making on strategies and policies in the humanitarian emergency and disaster risk reduction sectors and to guide future research by identifying gaps in robust evidence and areas that are under-researched.

Health Impact of Flood Disaster: Experience of Children from a Slum Community in Lagos State, Nigeria

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Children are the most vulnerable to flood disasters and it may harm them inexplicably, often with long-lasting effects on their mental and physical health. The heavy rainfall and flood in 2018 caused massive destruction in Lagos State, Nigeria especially among slum dwellers. This study therefore investigated the health impact of this flood disaster on children in Ijora Badiya, a suburb of Lagos state Nigeria. In this case study, data were collected from a total of three hundred (300) respondents through the use of a semi-structured instrument (questionnaire) with a relatively higher internal consistency, using purposive and systematic random sampling technique at an interval of five housing units with children. Two research questions and one hypothesis were answered. Descriptive statistics and Chi-square were used for data analysis. The results showed that children suffered symptoms such as post-traumatic stress 68%, depression 71%, anxiety after the flood disaster 62%, phobias 57%, and increased aggression 58%. Physical impacts reported included malaria 84%, waterborne diseases 60%, and body injury 49%. The impact was more on boys than on girls. In recommendation, parents should be taught how to identify these problems early and teach children coping skills to reduce impact and increase safety resilience. It is important to reduce children's exposure to too many visual electronic images that displays the worst experiences of people during flood disasters as this may traumatize them. They should be given information that is appropriate for their age and get them back into their routines as soon as possible. Also, to protect children from death, injury and harm from flood, government should support disaster risk reduction initiatives that will lead to continuous behaviour change in the education sector as this will help children develop a culture of continuous safety resilience.
Keywords: Children, Disaster, Flood, Health, Resilience.

Innovative communication and engagement for children's hand washing behaviour in high risk environments

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Handwashing with soap (HWWS) at critical times of the day can prevent the 704,880 deaths per year caused by diarrhoeal infectious disease by up to 35% (UN Millennium Project). However, achieving this through risk communication and behaviour change methods has been a global challenge. This study seeks to understand how the No Strings International (NSI) tool of puppetry and play is impacting children's behaviour change around WASH practices (with a focus on HWWS). This study is currently being conducted in two locations; one development setting in the peri-urban area in Nairobi, Kenya and one humanitarian setting in the Rohingya Refugee Camp, Bangladesh. The primary focus group in both settings are children (aged 4 – 18); who attend both formal (Nairobi) and informal (Bangladesh) educational programmes. Probability sampling and stratified random sampling was used to select the 250 children in Nairobi and 1370 children in Bangladesh. These children were sampled during hygiene promotion activities involving the NSI tools; such as puppetry, shadow plays and school model making. A mixed methods approach was applied and data collection methods in the field included: direct observation, interviews, focus group discussions, secondary data and questionnaires. A literature review also contributes to the study as a basis for current theory and practices in this area. The work is ongoing in both Nairobi and Bangladesh, with further data collections scheduled for the coming months. Therefore only a small set of results are available

to report thus far. The full findings will be valuable to the lead project partner, NSI, in evaluating their own work and objectives to improve the lives of beneficiaries. The conclusions will contribute to the wider community of health and disaster risk reduction in demonstrating how effective this type of risk communication and engagement can be for long-lasting changes in behaviour among children.

Shared leadership in dangerous contexts: the implication for emergency response teams

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Leadership has received much attention as a field of study, predominantly in the standard organisational context with an emphasis on the functional approaches leaders use to manage situations. In normal operation the organisational context is characterised by relatively low levels of ambiguity, and information, resources and time available to enable adaptive responses.

Few studies have focused on leadership in dangerous contexts, characterised by high levels of complexity where ambiguity is high, and resources and time are constrained. High reliability organisations such as police, fire and ambulance continually face dangerous situations to their personnel and the public. Hannah et al. (2009) see leadership as uniquely contextualised in extreme contexts and that extreme contexts have characteristics that create "*unique contingencies, constraints and causations"* (Hannah et al, 2009:898) that will influence leadership in this context. However, based on the unique social dynamics that are inherent in these contexts, Osborn et al. (2002) state that this is perhaps where leadership is needed the most.

Emergency services such as police, fire and ambulance continually face dangerous situations to their leaders, their team personnel and those they protect and serve. Leadership is tasked in these contexts of ensuring that, through social and relational processes, team members and other leaders have an aligned understanding of the situation often characterised by high ambiguity, equivocality of information, rapidly unfolding risks and threat to life. Conducting focus groups with these teams has enabled an in-depth exploration of the nature of the danger that these teams face and provides a unique insight into how an integrated, shared approach to leadership emerges as an important aspect of the working team. Findings highlight how all team members need to have leadership capabilities to be able to work effectively in these teams. To enable effective sharing of leadership in order to manage the span of control at incidents, team members must be considering all elements at play, have an acute awareness of situational dynamics, complexities and the implications for leadership approaches and processes at different stages of an incident. Therefore, drawing on the empirical findings from my doctoral study, this research discusses the emergence of shared leadership in emergency response teams and specifically to operating in dangerous contexts. The implication of this study is for teams to develop the concept of shared leadership as a core element of their team training, informing team, individual and organisational development.

Becoming a recognised 'good practice' case study for urban risk management: An analysis of critical junctures for institutional development in Manizales, Colombia

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The intermediate city of Manizales in Colombia has gained national, regional and international recognition as a 'good practice' case in disaster risk management. Previous research has sought to amplify learning from this city through examining its characteristics and the innovative practices which are championed by an inter-institutional alliance between academia, the local government and the regional environmental

agency. This presentation contributes a deeper understanding of the historical trajectories that have allowed Manizales to create and consolidate the current enabling environment for disaster risk management. Findings are based on semi-structured interviews, secondary data and participant observation. A critical juncture analysis reveals why and how a firmly institutionalised approach and clear conceptual and strategic framework were established to create, adapt and sustain a multitude of disaster risk management measures. Results show that the enabling environment in Manizales has been configured by the relations between normative, regulative and cultural-cognitive factors, which emerged from three themes of critical junctures: 1. hazard and disaster events; 2. normative changes in the built environment and land use planning; and 3. political strategies and frameworks. A better understanding of these critical junctures and their interrelations has potential implications for building institutional capacities and generating co-benefits while practising disaster risk management.

Cascading effects on Overhead Line Equipment (OHLE) of extreme wind and flood events

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In modern railway systems, overhead line equipment (OHLE) is the component for the electric train which provides electric power to the train. Due to its slenderness, cantilever mast, which supports the OHLE for one or two tracks, is one of the vulnerable components in railway system. Note that, as previously recorded, the strong wind caused considerable damage over the large area and possibly cause electricity failures on OHLE. According to previous studies, it was found that OHLE can be failed due to the large contact wire displacement caused by earthquake and ground borne vibrations. This study presents the cascading effects of extreme wind and flood events on OHLE. It is important to note that flood events may undermine the bearing capacity leading to improper support conditions and its foundation resulting in soil stiffness reduction. A finite element model updating technique has been used to perform the dynamic responses of OHLE considering soil-structure interaction of OHLE subjected to extreme winds. The scaled winds at various magnitudes are applied to the OHLE. It is interesting that the flood event plays a significant role in the dynamic responses of OHLE by reducing its support stiffness. Moreover, strong wind together with flood event can easily cause damage to OHLE. The results obtained demonstrate that the extreme wind and flood events can significantly cause catastrophic damage to the OHLE which linked to the failure of electric train. The insight will raise the awareness of engineers for better design of cantilever mast structure and its support condition for future natural hazards.

Disaster Adaptation to Mitigate Storm Surge (Damss): A Framework Proposal Towards Storm Surge Resilience

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With the increasing vulnerability of coastal infrastructures, assets, and communities exposed, tropical cyclone-generated storm surges can leave significant socio-economic damage. The depleting natural coastal

buffers and the increasing coastal urbanization further increases the exposure to storm surge flooding. This paper examines the feasibility of future mitigation and framework approaches for rising sea level and increasing coastal extremities. As storm surges are a complex phenomenon, which is highly sensitive to the slightest change in any of its factors, it is essential to analyze the 'uncertainty' involved to explore future adaptation paths and resilient approaches. Considering the damages and loss of lives occurred from these extreme weather events (EWEs), profound economic and social pressure requires industries and public sector investors of coastal infrastructures to develop mitigation solutions and pre-emptive plans to address these increasing risks. The paper further discusses in detail the limitations of the existing global frameworks highlighting the potential gaps within existing mitigation approaches and the requirement of a framework specifically focusing on the storm surge hazard.

Key Words: Storm surge ¦ tropical cyclone ¦ coastal hazards ¦ sea-level rise ¦ critical infrastructure ¦ adaptation ¦disaster risk reduction ¦coastal communities

Community needs of host and displaced communities following a disaster and conflict-induced mass displacements: a review of literature

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Following a disaster and conflict-induced mass displacement, a community will undergo resettlement as part of the recovery process which comprises the efforts to reinstate the displaced community's equilibrium level. In this process of resettlement, the satisfaction of a beneficiary can be measured based on the extent to which the welfare of the community is conserved. To ensure the well-being of the community, it is essential to identify how the community perceives its wellbeing in relation to the built environment based on its needs and expectations. Therefore, it is imperative to identify the needs of communities, prior to the identification of the role of the built environment in addressing the community needs and enhancing social cohesion between displaced and host communities. With this view, as part of the ongoing process of a project called REGARD (REbuildinG AfteR Displacement), a detailed literature review in the global context was conducted identifying the needs of the displaced and host communities following a disaster and conflict-induced mass displacements. Accordingly, this paper presents the findings of this literature review disclosing two main approaches in identifying the Community needs of host and displaced communities following a disaster and conflict-induced mass displacements. The first approach attempts to identify the community needs which are common to any community. The second approach identifies the community needs through the identification of challenges faced by displaced and host communities following disaster and conflict-induced mass displacements. Further, the findings of the initial review of literature confirm that the integration of community needs; displaced and host, into resettlement planning will increase the satisfaction of every member of the displaced and host communities and assist in enhancing the resilient built environment.

Keywords: Built environment; disaster and conflict-induced displacements; displaced and host communities; Rebuilding communities; Resettlement

The inverse response law: A global gaze on institutional failure in the aftermath of disaster

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The inverse care law refers to the idea that people who require the most care actually receive the least and to a lesser standard (Tudor Hart, 1971). The inverse care law is principally concerned with the effect of market forces on health care which create inequities in access to health services through disadvantaging certain groups and advantaging others. In the area of disasters consideration needs to be given to the way in which inequities, driven by economic and social policy as well as institutional decision-making, create vulnerabilities prior to a disaster which are then magnified post disaster through systematic differences in access to resources. In a market model of recovery, vulnerable groups lack the power to compete for necessary services creating inequities in adaptive capacity as well as in outcomes over time. The authors posit a mid-range sociological theory, the inverse response law, as a mechanism for enabling exploration of the social patterning of vulnerability within social systems as well as its upstream drivers. Recent disasters in the United Kingdom and New Zealand are examined in order to illustrate themes at work relating to vulnerability in disasters. An argument is advanced that attention to the workings of the inverse response law in hazard mitigation and preparedness actions, could ameliorate a lack of basic resources, such as poorly maintained infrastructure, to build resilience and decrease dependency on governmental and NGO sectors in the aftermath of disasters.
Key words: Sociology, disaster, public health, justice, marginalisation

Bringing US Long-term Care and Skilled Nursing Facilities up to Acceptable Levels of Emergency Preparedness Compliance

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US nursing home residents experience death and injury at a disproportionately higher rate than other populations during and after a disaster. Addressing the complex chronic conditions of vulnerable elderly residents will become even more challenging due to compounding effects from continued disasters and rapid population aging. Since 2016 the Centers for Medicare and Medicaid Services (CMS) has established national emergency preparedness requirements for long-term care (LTC) and skilled nursing (SN) facilities within the US. The problems facing nursing facilities created by an increasing population to serve, present a challenge to meeting the highest level of requirements and responsibilities for elderly healthcare preparedness. This encompasses personnel education, training and administrative operations which are difficult to implement in the LTC/SN industry. Currently nursing facility personnel are required to participate in an unfamiliar culture of operational processes, using terminology foreign to their profession, all within an environment requiring planning and decision-making skills using organizational concepts they most likely have never experienced. Unlike US hospitals, long-term care and skilled nursing facility staff have not had long-term access to standardized training to meet the current requirements. The inability to protect elderly residents as the result of ineffective emergency and evacuation plans, inadequate resource support, and poorly formulated response actions, highlight the potential threats faced by current nursing home facilities. This present environment adversely affects nursing home administrators, emergency managers, local and regional Healthcare Coalitions and community responders, which unnecessarily increases their emergency planning and operational burdens.

Key Words: Emergency preparedness, Nursing homes, Long-term care facilities, Elderly populations

Health and Wellbeing of Displaced Population in Disaster Settings: Victims and Survivor's Reactions to Losses and Refugees' Trauma

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The current presentation is designed to discuss common reactions, needs and psychological wellbeing of a traumatized displaced population who often suffer immeasurable losses and pain throughout their journey and the transition period. The coverage will also highlight the size of the problem, risk factors, challenges and main mental health problems manifested among a newly arrived displaced population. Additionally, screening of mental health problems and wellbeing for children, women and those who suffer multiple losses should be a priority and conducted by professional trauma experts and experienced mental health practitioners. Hence early diagnosis and treatment is expected to help adjustment in the new and dissimilar surroundings; and to prevent deterioration of mental health among those vulnerable and at risk groups.

Tackling persistent exclusion of older people and people with disabilities in humanitarian responses: Towards critical capacity building of humanitarian organisations

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The sustainable development goals promises to leave no one behind and calls for social inclusion of the excluded or groups marginalised in the development processes and all its SDG goals. Pursuance of these goals in inclusive ways would require various institutions to have the capacities to deliver this agenda. This paper is a contribution towards this global ambition and reflects on the evidence from the Age and Disability Capacity Project to deliver it, particularly in relation to two social groups – older people and people with disabilities in the context of humanitarian responses and humanitarian institutions. In this relation, this paper asks two questions: Why does persistent exclusion of older people and people with disabilities take place in humanitarian responses? How can humanitarian institutions be capacitated to enable inclusion of older people and people with disabilities in their work? The paper makes a new knowledge contribution by outlining the 'social-political discursive' (SPD) framework for critical capacity building initiatives of humanitarian organisations to enable inclusion. The framework calls for critical capacity building initiatives within humanitarian organisations addressing: a) social – which is about questioning the organisational barriers (for example physical infrastructure, information, communication) which prevent older people and people with disabilities from participating in the organisational work and programmes, b) political – which is about sharing power to define agendas of humanitarian organisations in partnership with organisations of older people and people with disabilities c) discursive- which is about questioning the hegemonic discourses and representations about older people and people with disabilities within their organisations, which forms the basis for discriminating policies and practices towards these groups in these institutions.

Please Mind the Crap Between the Train and the Platform Edge: The Sanitary Systems of Railways: Perception, Reality and Behaviour.

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Pathogens are found in many locations that are linked to human activities. They have been found in domestic homes, hospitals and not surprisingly, where waste water is used in irrigation schemes. People's interaction with these pathogens is one factor which influences weather or not the hazard will present a disease risk. People's awareness of hazards influences risk, those who can exercise avoidance behaviours, are able to lower disease risk after an exposure to a hazard. Disgust is noted as one such behaviour which promotes avoidance. While some work has been carried out to investigate some aspects of this relationship on busses and aircraft, railways have not yet been investigated in this way. Meanwhile, anecdotal comment has been made by railway staff and newspapers. In a way, these comments are suggesting that railway staff, some journalists and rail unions are aware of the hazards presented by waste water from trains. It is not known however what awareness rail passengers have of this hazard. It is not known what avoidance strategies are used, if any, to protect railway staff and passengers from these hazards. This research aims to investigate these relationships through an exploration of what hazards, if any, are present that are associated with railway sanitation systems on railways. It is investigating what awareness there is of these hazards and what avoidance behaviours are practiced by rail users. The study is examining the disease resilience this behaviour may represent along with the protection afforded by governmental legislation and activism from community groups representing rail passengers and staff.

KEYWORDS: Community resilience, Disease hazard, Disease risk, Avoidance behaviour, Infection, Railways, Sanitation, Microbial Pathogens

Reflections on flood early warning systems in Nepal and Peru

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Effective early warning systems (EWS) are people centred, ensuring appropriate early warning reaches the last mile, including the most vulnerable. An effective and sustainable EWS considers and is designed to meet the needs, capacities, constraints, and priorities of all people, enabling appropriate and timely early action to save lives and reduce losses. However, barriers and challenges remain in embedding early warning systems within existing governance structures, effectively operationalising the system from end-to-end, ensuring sustainability, legacy and ownership, and disseminating and communicating often complex warnings to communities and individuals at risk. In this session, Practical Action will share our experiences piloting and helping to scale operational flood early warning systems in developing countries. In Nepal, research was undertaken to analyse and understand the current flood early warning system. The research reviewed the availability, access, and utilisation of flood forecast information in Nepal during the 2017 monsoon, their integration into dissemination (bulletins and SMS warnings) and decision support tools (Common Alerting Protocols and Standard Operating Procedures), considering their impact on improving early action. In Peru and Nepal, research was undertaken to examine the gender dimension of early warning in existing systems in Peru and Nepal, particularly identifying the different needs, challenges, and opportunities for gender responsive early warning systems, and sharing lessons of success (and failure) to ensure a truly gender-sensitive and gender-inclusive early warning system. Gender is a critical consideration in ensuring effective Early Warning Systems leave no one behind. However, limited research has focused specifically on the connection between gender and EWS, and there is a shortage of evidence

on best practices to ensure EWS are effective for all. Five themes emerged from the research, into which gender related findings and recommendations have been grouped. These are vulnerability; participation; dissemination; response; and power and decision making.

Collaborative Early Warning System: An integrated Framework for mitigating impacts of natural hazards in the UAE

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The impacts and costs of natural disasters on people, properties and environment is often severe when they occur on a large scale or when not prepared for. Factors such as impacts of climate change, urban growth, poor planning to mention a few, have continued to significantly increase the frequencies and aggravate the impacts of natural hazards across the world; the United Arab Emirates (UAE) inclusive. The lack of deployment of early warning system, low risk and hazard knowledge and impact of natural hazard experienced in some communities in the UAE have emphasised the need for more effective early warning systems. This paper focuses on a collaborative approach taken to instituting and implementing early warning systems. Using mixed methods 888 people completed the questionnaire and eight people were interviewed in Abu Dhabi. The results indicate that collaborative approach to early warning system in UAE is needed, but lacks essential principles of early warning and is currently underutilised. It is recommended that the collaborative early warning system is applied at every stage of the early warning system with specific responsibility of each stakeholder and actor.

Global food security impacts of abrupt shocks, and research priorities

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While a large volcanic eruption may cause thousands of proximal fatalities, the effect on global food systems could cause many times more harm than the initial event. The 1815 Tambora eruption led to simultaneous famines in five continents. Unlike with WHO for pandemics, there is no global research, planning and coordinating body for volcanic explosivity index (VEI) 7-8 eruptions. Existing humanitarian capacity (WFP, USAID) is not designed to cope with multiple breadbasket failure (MBBF), even if anticipated. Eruptions may impede international trade and logistics supply chains. Outcomes may be exacerbated by public, institutional and governmental responses, including export bans. Atmospheric, food, and trade consequences of a regional nuclear war could be similar. Robock and others have flagged that in such scenarios, millions could die. However, no detailed research and modelling of the impacts on the global food system from “volcanic winter” scenarios has been conducted. UNDRR’s Sendai Framework mainly addresses local-national-regional needs, and implicitly assumes scenarios where WFP can source bulk food supplies Although annually there is a low probability of volcanic/nuclear scenarios, the “expected harm” in coming decades is substantial due to the scale of the consequences. We consider MBBF scenarios caused by a volcanic eruptions. We outline a promising modelling approach to explore these outcomes that

takes scenarios of volcanic eruptions and considers the atmospheric emissions; the climate impacts; vegetation/crops response; food prices, markets changes; nutrition/health outcomes. We suggest that expected distal malnutrition deaths can be limited through specific research, resilience and preparedness, at low cost per life saved. We outline a case for resilient or adaptable distribution systems, consideration of how food production could be increased in less affected regions, multi-disciplinary research on preparedness options/alternative foods/cost-per-life-saved and the need for *specific research and investment funding streams* addressing this scale of disaster.

Communities' Perspectives on Effective Community Participation in Disaster Risk Reduction (DRR)

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Community participation in disaster risk reduction programs and projects has been long advocated, but its implementation remains uncertain. There is also very little understanding and consensus on how and to what extent local communities can be and should be involved in these projects. Arguably, both concept and practice of community participation remain so equivocal and contentious because there lacks any systematic effort to define the participatory framework in disaster risk management. The framework for community participation however can be copied from other planning and management discourse yet they are basically expert-driven, designed by the researchers, planners, government officials and practitioners. The main beneficiaries, local communities play hardly any role in designing the participatory framework. This study therefore took an alternative approach to define the meaning and implication of community participation from local communities' own perspectives. To accomplish these research objectives, field surveys were conducted in some severely flood impacted slum communities in Mumbai, India. The study findings will open an alternative perspective to design community participation programs in disaster risk reduction and ascertain its implementation.
Keywords: Participatory Disaster Risk Management, Evaluation, Community's Perspectives.

Why we need to invent stewardship cities

Peter J Taylor, Emeritus Professor, Northumbria University

1. Politics and climate research. Verdict: *necessary but insufficient*
2. Economics and climate policy. Verdict: *supply over demand*
3. Theory and climate change. Verdict: *poverty of geographical imagination*
4. What role for cities? Unthink: *from place to process*
5. What theory of cities? Unthink: *Jacobs' economic development*
6. Which cities? Unthink: *China's unique urbanization*
7. Reinventing the city. Sufficiency result: *deep stewardship cities*

Disaster and Development - Existential Threats - Mobile Agile Conflict

Maitland Hyslop, Affiliate Disaster and Development Network, Northumbria University

Disaster and Development over the last two decades has developed with a backdrop of UN and NGO bodies who have become much more understanding of how disasters play out and their role in development; a generally liberal and supportive rich west; increasing academic understanding and knowledge; and political and social understanding in 'at risk' areas.
This is about to change in a major way. In this paper the following challenging themes to the *status quo* are examined:
Politics: Populism, the rise of the right and authoritarian regimes;
Economics: The threats to the banking system, the use by the USA of its economic power as a weapon, resources;
Social: Population; social media; the addition of the other half of humanity to the Internet
Technology: AI, analytics and big data;
Environmental: Natural and man-made disasters; on land, sea, air and in space;
Legal: The retreat from international conventions.
These themes are then further examined against the traits of Mobile Agile Conflict ©.

Challenges of Interagency Collaboration in Emergency Response in Nigeria

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Disaster Risk Management (DRM) in any nation often involves multi-sectoral, multi-resource and multi-disciplinary processes, and this requires the alignment of roles and responsibilities in emergency responses and operations. Therefore, its success usually requires the interaction among governmental and non-governmental actors in manners that protect and promote humanitarian principles so as to avoid competition, minimize inconsistency, and pursue common goals. The institutional structure for responding to humanitarian emergencies in Nigeria comprises the National emergency Management Agency (NEMA), The State Emergency Management Agency (SEMA), and the Local Emergency Management Committee (LEMC), serving as the coordinating bodies at the 3 tiers of Government; Federal, State and Local governments respectively in the disaster management cycle. These stakeholders are expected to cooperate, collaborate and coordinate in the various components of the disaster risk management including: Early Warning, Planning; Operation; Data Collection; Information Management; Resource Mobilization; Monitoring and Evaluation. However, experience has shown that these agencies often engage in competitive actions which have made it impossible to achieve resilience and sustainable DRM necessary to achieve early and long-term recovery in disaster situations in Nigeria. Some of the identified hindrances for these agencies to work together include, fear of subsidiarity, political considerations, inadequate information on coordination process, fear of failure and lack of coordination skills. This paper examined the challenges of collaboration among DRM agencies, the implications for national disaster risk preparedness and reduction. Recommendations for appropriate strategies and procedures for coordinating DRM structures in Nigeria were made.

Keywords: Challenges, Interagency, Collaboration, Emergency, Response, Nigeria.

Interdisciplinary approaches to community-led disaster risk reduction: time to open up citizen science?

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Using volcanic eruptions as an archetype for a multi-hazard environment we can demonstrate that short-term threat to life is critically linked to longer-term threats to livelihoods. Thus, risk to life can more effectively be minimised by also ensuring positive outcomes for livelihoods, wellbeing and security. The challenge is then to reconcile our existing knowledge of timescales of hazard escalation and impact with warning, actions and decision-making processes that are consistent with preservation of livelihoods and wellbeing as well as life. The opportunity addressing that challenge creates is to both reduce disaster risk and enhance sustainable development. Citizen science has the potential to address that challenge by empowering communities to improve their life outcomes in the face of multiple hazards. However, there are valid critiques of its true value in the context of disaster risk reduction. We use a systematic mapping of a 'family' of citizen science related techniques applied to various hazard environment to present the argument that taking a less science-centric view of citizen science and opening up to other disciplinary practices in disaster risk reduction could create a powerful tool for effective decision-making around risk reduction. There is the potential not only to unlock new hazard knowledge but to attend to issues of equity, responsibility and the empowerment of those most vulnerable to disaster risk.

Inclusion of Youth in Disaster Risk Reduction

South African Youth Centre for Disaster Risk Reduction (SAYCDRR)

During recent years significant advances were made in the field of disaster risk reduction. However, the role of youth in DRR has been, and continues to be, greatly underutilized within the community. It is of great importance to acknowledge and include youth in our efforts to allow the DRR activities we implement today, to continue making a difference in the lives of future generations. We believe that cultivating a passion for disaster risk reduction in young minds might very well be the key to sustainable DRR measures. Understanding what motivates their participation in initiatives and allowing them to identify the components they perceive as important for DRR, will promote the efficiency of future measures greatly. The South African Youth Centre for Disaster Risk Reduction (SAYCDRR) was established in 2018. As an organization we believe in not just thinking outside the box, but also creating new & more effective boxes fitting for all generations. As such we aim for:

- Inclusive youth and children engagement/empowerment in Disaster Risk Reduction.
- Furthering Education and Research in relation to disaster risk reduction and capacity building.
- Serving as the officially recognized spokesperson for youth and children in the broader disaster management community in South Africa.
- Enabling and empowering young females in disaster risk areas.

The SAYCDRR differs greatly from other organizations in that we ourselves are still youth. As an organization we will appreciate the platform to introduce our organization to make the voice of youth in DRR louder. We hope to contribute to the DRR community through sharing our experiences & findings as well as proposing possible areas of improvement.

Strengthening capacities to manage flood risk in Senegal: enhancing heavy rainfall and impact nowcasting, and reviewing the communication and use of warnings. CONFIRMED

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Flash flooding from heavy rainfall frequently results in major damage and loss of life across Africa. In the Sahel, intense rainfall within Mesoscale Convective Systems (MCS) is the main driver of flash floods, with recent research showing that these storms have tripled in frequency during the last 35 years. Appropriate disaster preparedness, response and resilience measures are required to manage this increasing risk. The NFLICS (Nowcasting Flood Impacts of Convective storms in the Sahel) project aims to co-develop a prototype early warning system for nowcasting flood risk from MCS at city and sub-national scales in Senegal, using emerging methods based on using Meteosat cloud-top temperature data, and historical data on risk and vulnerability. A key early component of the project has been to engage both with ANACIM, the agency responsible for issuing warnings and alerts on climate-related risks in Dakar and Senegal, and also those who use these warnings: stakeholders from across different levels and departments of government and non-state actors, including those with local-scale department and commune responsibilities. Workshops have been used to communicate the scope, scientific capability and focus of the NFLICS project, and to explore the principal concerns and requirements of decision makers regarding flood risk management in Dakar. Although the range of user requirements go beyond the scope of the current science capability and resources of NFLICS, participatory group activities (e.g. Problem Tree Analysis and Stakeholder Mapping) and Key Informant Interviews have been essential in focussing on common areas. These engagement activities have also provided a baseline of the current warning system, identifying gaps and areas where existing processes could be improved and where NFLICS could provide most benefit. An overview of the NFLICS project will presented, and key conclusions from recent engagement activities will be discussed, with a focus on lessons learned about managing the gap between the user expectations and science capability.

Slow emergencies? Amazonian droughts, (dis)connecting jungle cities and everyday harm

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Amazonian droughts are increasingly frequent and severe yet their human impacts remain under-studied. Work shows how social vulnerability to climatic shocks is particularly high in ‘deep urban’ contexts; remote jungle cities ≤ 2,900 km by boat from major cities and unconnected by road. Our paper focuses on the role of river transport in mediating drought impacts, given that the ‘resilience’ of riverine transport determines how provincial urban populations are (dis)connected within inter-urban networks. Advancing a quantitative political ecology, we intersect recent theorizing on ‘slow emergencies’ (Anderson et al. 2019) with extensive empirical work in Amazonas State, Brazil. Our mixed-methods field-work includes structured interviews with 65 boat captains, GPS-tracking and spatial-analysis of ferry journeys, combined with secondary health-data and documental/discourse analysis around emergency governance. Boat-operators, we show, face everyday struggles to maintain flows of goods, passengers and services due to competition,

uncertain fuel prices, and a hazardous physical environment. Captains are skilled and innovate to cope with droughts and lower river-levels but must contend with the added pressures of increased journey distances, duration and fuel-consumption. However, these 'logistical' struggles are also political, rooted in economic history and incurring racialized consequences which can deepen social inequities. Provincial urban elites – whose lineage often extends back to the rubber economy – dominate ownership of boat-fleets, contributing to complex topologies of power with blurring of transport, political patronage and mayoral finances. Governmental techniques include the 'claiming' of emergencies by decentralized agents of the *Defesa Civil* and tardy yet lucrative arrival of public funds for disaster-relief. But disastrous for who? Crucially, we find that rising food prices and scarcity overlay on chronic food and nutrition insecurity of the marginalized urban poor. Confirming the 'slow emergency', we show how drought impacts blend into, yet worsen, everyday experiences of harm and suffering that are racially and gender-differentiated.

Towards a hybrid epistemology: Why social and physical science should work together in the El Niño Southern Oscillation research

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A common criticism of science-related interventions for disasters – particularly in the Global South – is that the results that the science produces do not correspond to the requirements of communities that are affected by the phenomena in question, and hence the interventions do little to reduce vulnerability. This paper goes further, to argue that the logic of science constructs phenomena that are materially different from the disasters that are experienced in the ground. The case study is the El Niño Southern Oscillation (ENSO), a phenomenon that has been constructed by 130 years of scientific analysis and that has created expectations of certain meteorological extremes; expectations that are often not met when an El Niño or La Niña event occurs. For example, the 2015-16 'severe' El Niño did not produce flooding in Peru, whereas the 2017 'coastal El Niño' – which did not have El Niño characteristics under any of the official definitions – was devastating for the region. Building on interviews with ENSO scientists in the US, the paper will argue that the self-generated logic of ENSO science needs to be questioned. What is needed instead is a 'hybrid epistemology', where the nature of ENSO itself and the decisions on how it is researched and forecasted are driven by social questions, rather than scientific.

From man-made disaster to environmental hazard: Strategic Design Intervention of a learning centre for Rohingya children considering future reclamation of nature

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The story of persecution and exodus of Rohingya refugees from Myanmar and their temporary relocation in the south-east hilly areas of Bangladesh is a widely discussed narrative. Lesser known fact is how the man-made disaster or persecution has led to an unprecedented environmental hazard in the ecologically critical areas of Cox's Bazar where more than a million refugees have been put up into emergency settlements. While the recent influx of these refugees has caused an explosion of construction of temporary shelters aiming to immediately provide housing and other facilities to them, the overall standard of the built environment and their detrimental impact on nature have often been disregarded. Massive pressures on

the environment leading to loss of natural forest and potential risk of landslides due to the indiscriminate hill cutting to build the temporary shelters are grave issues of concern. The paper discusses the strategic interventions for designing a learning centre in Ukhiya and elaborates the considerations followed to protect environment and minimize loss. This also analyses the design decisions leaving prospects for future reclamation of nature when the crisis will be over. Finally, it argues that the concept of temporariness of refugee camps has been used, over the years, as a justification to disregard quality of life in it and explores the role of designers to preserve spatial quality and environmental justice even in constrained situations.

Natural, Technological, and Natech Disaster Research: Toward a Convergence of Perspectives

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Since the early 1970s, research on human-caused or technological disasters has contributed substantially to the social science disaster paradigm. This presentation will include discussion of various foundational theories and concepts in technological and natch disasters, and ways in which these have increased understanding of societal dimensions of these types of events. It will also examine areas where there is growing consensus about social impacts of natural, technological, and natech disasters—a convergence of perspectives. Finally, the presentation will offer opportunities to consider “techna disasters.”

Perceptions Associated with Human-Induced Seismicity: Qualitative Findings from Oklahoma and Colorado

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Technologies such as hydraulic fracturing and wastewater injection can elicit strong and sometimes diverging reactions among the public, particularly when there is uncertainty about the associated risks. Understanding how people are weighing potential benefits in the context of these risks can help to address some of the challenges associated with people’s responses, such as community conflict and social disruption—especially when multiple risks intersect, as in the case of induced seismicity. As a relatively new phenomenon, perceived risk of induced seismicity remains an underexplored area in hazards and risk analysis research. This presentation will focus on findings derived from in-depth interviews and informal conversations with 36 Oklahomans as part of a larger study of social responses to induced seismicity in that state and Colorado. These findings center around participants’ reported concerns, problems, benefits, and new opportunities associated with oil and gas development, including the ways in which participants weigh the costs and benefits of oil and gas development activities—particularly hydraulic fracturing—within the context of induced seismicity.

A systematic review of the relationship between shale gas development and crime

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There is an interest in expanding shale gas development in the United Kingdom (UK). However, the development literature often describes the catastrophic impact of shale gas development for the communities where it occurs. High levels of crime, for example, are one negative social consequence of shale gas development. An increasing interest in the connection between shale gas development and crime has led a number of researchers to study the relationship between shale gas and crime using cross-sectional, time series and panel study data. The present research reports on the findings of the first systematic review of empirical studies that examine the effects of shale gas development on crime. We follow basic systematic review protocols to synthesize and report on 21 studies of hydraulic fracturing and crime identified in the literature across multiple academic disciplines. While we discover the correlation between shale gas development and crime is positive in a most of these studies, we suggest that it is unlikely that shale gas development and crime will be problematic in the UK context.

Improving organisational resilience to the cascading effects of technological failures

Gianluca Pescaroli, Ilan Kelman, Rob Wicks and David Alexander, Institute for Risk and Disaster Reduction, University College London,

Technological networks have increased their interdependency, complexity and level of integration with society, determining a shift in how organisations have to prepare and respond to crises. Instead of focusing solely on triggering events, the need for understanding the escalation of emergencies caused by critical infrastructure failure has been highlighted, with implications for developing new strategies for policies and continuity management. This presentation has two components. First, it introduces the idea that cascading effects of technological failures must be addressed by identifying the common vulnerabilities between different threats, defining the common operational consequences that they could cause. This includes clarifying the distinction between the concepts of compound, interacting, interconnected and cascading risk to facilitate scenario building, exercises, and impact analyses. Secondly, building on the work on blackouts and satellite failures developed at University College London, the presentation will explain how technological failures could imply the existence of 'hidden dependencies' that could compromise some common physical, organisational and cyber assets. It will provide an essential overview of the recurrent elements that could affect 'day to day operations' and 'business as usual activities', for emergency facilities, public service utilities, and the business community at large. The conclusions aim to define challenges around coping with such impacts and lays out guidance aimed at improving organisational resilience.

Real-time research and supporting urban self-recovery after disasters. The case of Cyclone Idai, Beira, Mozambique

Holly Schofield, CARE International UK

Cyclone Idai made landfall near the city of Beira on Thursday 14 March 2019 leaving mass destruction in its wake. According to the Government of Mozambique's official figures, as of 7 April 2019, a total of 239,682

houses had been destroyed or damaged, including 111,163 houses totally destroyed, 112,735 partially destroyed and 15,784 flooded. As of 20 April 2019, over 77,000 people were sheltering in temporary accommodation centres across four provinces. This paper presents the findings from a real-time research project that sought to understand the impact of Cyclone Idai on urban households and communities in Beira, Mozambique, as well as the options for shelter actors seeking to support recovery. It shows that as the focus of the response to Cyclone Idai turned from emergency response to recovery, shelter actors faced the all too familiar challenge of defining and implementing recovery programmes that achieve maximum impact with increasingly scarce resources. With need far outstripping financing, the paper shows how direct and indirect support to self-recovery are the key ways in which actors can reach increased numbers of Beira's urban population. The paper presents the challenges and opportunities associated with the recovery options as well as the value of deploying shelter actors with the specific mandate to carry out contextual analysis for recovery during the immediate emergency phase of the response.

The 2019 contingency associated with increased volcanic activity at Popocatepetl Volcano, Mexico

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Eruptive activity at Popocatepetl volcano began in 1994 and has continued until now producing frequent ash fall and ballistics associated with the explosive destruction of 82 subsequent domes. Over 20 million people live within a 100 km radius from the volcano, with frequent ash fall that includes Mexico City, the city of Puebla as well as smaller cities and rural areas. An updated hazard map has been the mail tool authorities use for contingency planning. Although the intensity and frequency of the eruptions has varied, in early 2019 activity increased and as a result the meetings of the scientific committee with authorities became more frequent. The behaviour of the volcano also changed. Explosions since February when the last dome destroyed are no longer associated with crater domes. On March 28 2019, the volcano alert changed from yellow faze 2 to yellow faze 3, which meant all roads and shelters had to be checked and all protocols including tasks and drills had to reviewed and carried out. When conditions returned to the previous level, we recommended returning to faze 2 again, that was done on May 07. Another contingency occurred from May 14 to 17 when environmental pollution in Mexico City reached alarming levels. Luckily wind direction during that period carried volcanic ash away from the city.

Air Quality in Major Incidents (AQiMI)

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The UK developed its Air Quality in Major Incidents (AQiMI) project to provide fire plume concentration data for use by responders during major industrial fires. Based on the involvement of the authors in the AQiMI project we: describe the project's function, detail the nature of these fires, and report the concentration range of particulates that populations may be exposed to. We reflect on the appropriateness of current short-term guideline values in providing public health advice. Monitoring data for PM_{10}, $PM_{2.5}$, and PM_1, collected by AQiMI teams during deployment to 23 major incident industrial fires has been analysed. Incident-averaged concentrations ranged: 38 to 1450 µg m^{-3} PM_{10} and 7 to 258 µg m^{-3} $PM_{2.5}$. For

several incidents, 15-minute averaged concentrations reached more than 6,500 µg m^{-3} for PM_{10} and 650 µg m^{-3} for $PM_{2.5}$. In the absence of accepted very short-term (15 minutes to 1 hour) guideline values for PM_{10} and $PM_{2.5,}$ we have analysed the relationship between the 1-hour and 24-hour threshold values and whether the former can be used as a predictor of longer-term exposure. Based on this analysis, for PM_{10}, our tentative 1-hour threshold value for use in deciding whether to close public buildings or to evacuate areas is 510 µg m^{-3}. For $PM_{2.5}$, 1hr concentrations exceeding 350 µg m^{-3} might indicate longer-term exposure problems. We conclude that AQiMI are a positive development but there is a need to consider the accuracy of the data provided and to develop very short-term guideline values (i.e. minutes to hours).

A Flood Preparedness Model for Resilience Around Fluvial Disasters

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The background to the study follows prior literature in property resilience in the United Kingdom with several research gaps identified by Fell, Bain and Williams (2014). This study aims to develop a community participation model for flood preparedness to address fluvial hazards, threats and disasters that can improve the resilience of property to flooding, of communities and to fluvial flooding. The study is expected to contribute to the flood resilience of all aspects of communities and property exposed to fluvial flooding and come up with an operational framework. The outcomes will stem from an epistemological perspective that gives a philosophical grounding for knowledge to be adjudged to be both adequate and legitimate. The literature review determines the methodology, which will be followed by data collection and data analysis. The model will hopefully contribute to knowledge on the adaptation required to deal with procedures in anticipation of changes and anticipated extreme flooding events. Proposals to enhance resilience are also considered to proffer strategies, choices and policy implications. The anticipated results for consideration will hopefully enhance the creation of quality livelihoods that can stimulate the economy without endangering the environment.

Construction Health, Safety & Resilience in post-Disaster/Emergency Response

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Health & Safety is a largely Western/Developed World realization and development, following numerous industrial disasters and emergencies, the public harm created, but also the loss of revenue, court cases, and loss of corporate image, all being fundamental aspects to the Legislative drive of Health & Safety to make corporations accept responsibility. Governmental responsibility can be accepted, but is often dodged, shirked, or simply not recognized. It is agreed, within Disasters and Emergencies, of there being stages or phases of the event – physical impact, immediate situation, fast response, short-term effects, medium-term effects, and long-term effects, and then creative solutions (if appropriate). Clearance of rubble, with demolition, is largely put to construction companies, with consultants as part of their external expertise. Majority or all personnel will have had no or little training of these situations, so will revert to basic training of their job/role, with Govt advisors stepping in to provide an oxymoron Supporting Governance role to enable a fast clearing of debris, waste, but also of the dead. In this presentation, I compare UK, Romania, Portugal, USA, EU, against other parts of the world, with influences, drivers, pressures against Culture in general and specifically, which allow for increases in virus, disease, zoonoses, mental and physical stress, fatigue and pressures of human populations, but also within animal populations and plant ecosystems. The

use of Sendai Framework can be a foundation for instilling Legislative Health & Safety, but, instilling public knowledge to learn, self-develop and endorse actual community Resilience Programs will be the key, in a lot of global regions and communities, to ensuring the right knowledge can be used effectively in immediate and short-term Emergency/Disaster Response situations.

Negotiating NGO-state relations for equitable resilience: evidence from the Andaman Islands

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The language of 'transformation' is becoming ubiquitous in DRR and adaptation to describe the deep social-ecological and institutional shifts necessary to meet the challenges of global environmental change. However, establishing precisely what transformation pathways look like and how to negotiate them in practice remains a key challenge. This paper examines INGOs and NGOs as one sphere in which the politics of transformation are ongoing – specifically, how NGOs navigate advocacy for transformation within rigid and centralised political-institutional contexts, contexts which in themselves can reproduce geographies of risk. In a case study of the Andaman Islands (South India), the paper examines how NGOs engaged in post-tsunami rehabilitation negotiated influence in development decision-making within a historically inflexible and centralised governance landscape. The paper examines the positioning, advocacy and negotiation strategies engaged by these NGOs as they seek to address root causes of risk (social inequality, poverty, lack of education, lack of active democracy), whilst at the same time not threatening the state's authority. The ability of NGOs to establish themselves and advocate for equitable resilience in spite of key political-institutional challenges – gaining a place on Administration committees, being regular attendees at stakeholder meetings, and forming partnerships with government Departments for the roll-out of state-funded programmes – holds important lessons for other NGOs seeking to establish a platform within state-heavy institutional contexts. Ethical issues associated with INGOs engaging in local politics for transformation are also addressed.

Towards measurement of resilience of educational communities

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The sustainability of school infrastructure and the resilience of the educational communities to natural hazards is of paramount importance to heal the post-disaster trauma and to provide the safety and protection from the various natural and mad-made threats children face. However, after a natural disaster, it is typical for most efforts to focus on shelter, recovery and reconstruction without due consideration of a wider framework for building back better school buildings and at the same time creating infrastructure and institutions that are resilient to different shocks and stresses. Our current research, which is using Nepal as a study area (see www.safernepal.net), is addressing this need and the objective of this contribution is to report on the development of a tool for resilience assessment of educational communities. Different major stakeholders of educational community including school management committee, head teacher, teachers, students and parents/community members are incorporated in the evaluation of resilience with their experience, knowledge and preparedness. Several categories from social to governance and shocks to preparedness are aligned with different weightages for specific stakeholder group having several sets of

relevant questions. All the questions with objective responses are quantified and evaluated with reference to priority level of the question under that category. Overall educational community resilience index is calculated from the responses of all stakeholders and can be represented in the form of qualitative result. A mobile application with the sets of questions is being implemented which can be used to do the survey in a school community. This method of measuring community resilience would be useful for the self-assessment of schools and track their resilience.

Building Resiliency and Capability in the Wake of Challenges, Risks and Vulnerability: The UAE Case Example

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Disaster risk evolved through various nations. Recent research work shows that most of the efforts and actions are focusing on institutional capabilities and resiliency. However; there are elements that are significant to be considered in terms of ensuring an overall resiliency. Some of these are the analysis of vulnerability and root causes of risks. On a different matter, the importance of considering the public as one of the main stakeholders is a crucial element which should be parallel to institutional resiliency. Consequently, such processes will lead to a holistic resiliency among the stakeholders. This study focuses on the UAE as a case example study where most of the country's infrastructure and population are located along the coastal zone. The primary and the secondary data illustrated that community resiliency is one of the vulnerability sources especially due to the UAE's demographic conditions. Therefore, further community engagement is recommended to ensure higher levels of resiliency. In addition, more attention to the root causes of vulnerability should be given to ensure Disaster Risk Reduction (DRR).

Keywords: vulnerability, resilience, community, disaster, risk, Disaster Risk Reduction (DRR), institutional, public

Assemblage Theory and the Future of Disaster Risk Management (DRM) in Kalimpong, India

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Kalimpong is West Bengal's youngest district, annexed from Darjeeling district on 17th February 2017. This did not prevent the district from being one of the most important sites of the 107-day agitation for a separate state of Gorkhaland. This was the second violent agitation in the past 10 years, and the 3rd major uprising of a movement which has shaped the politics of the region for a century. Landslides have had no less of an impact on the lives of those living on the steep slopes of Kalimpong, but efforts to reduce the risk of landslides occurring struggle for space on the political agenda, which is dominated by the Gorkhaland movement, and an agenda of urban development to boost economic growth and house it's rapidly expanding population — a situation facing many large Indian towns (Rumbach and Follingstad 2018, Rumbach and Németh 2018). This presentation will come immediately after the speaker's first field visit of his PhD research. It will reflect on the speaker's attempts to combine assemblage theory (AT) (DeLanda 2016) and DRM as sustainable development' thinking (Collins 2009, Lavell and Maskrey 2014), with a view to providing a useful conceptual framework to guide his research into DRM in Kalimpong. With regards to studies of disasters, the thesis will seek to propose a conceptual framework which can help researchers to

understand the complexities posed by extensive risks associated with slow-onset environmental degradation (Nixon 2011, Staupe-Delgado 2019) and multi-hazard interactions (Gill and Malamud 2017); in places such as Kalimpong which are facing political strife (Stein 2017, UNISDR 2015). In particular, the presentation will propose that AT's conceptualisation of the future – or 'futures-in-the-making' (Groves 2017) – is of use to studies of disaster risk and climate change adaptation which have a focus on 'horizon scanning and living with uncertainty'.

References:

Collins, A. (2009) *Disaster and Development,* Routledge.

DeLanda, M. (2016) *Assemblage Theory,* Edinburgh University Press.

Gill, J. C. and Malamud, B. D. (2017) Anthropogenic processes, natural hazards, and interactions in a multi-hazard framework. *Earth-Science Reviews, 166*, pp. 246-269.

Groves, C. (2017) Emptying the future: On the environmental politics of anticipation. *Futures, 92*, pp. 29-38.

Lavell, A. and Maskrey, A. (2014) The future of disaster risk management. *Environmental Hazards, 13*(4), pp. 267-280.

Nixon, R. (2011) *Slow Violence and the Environmentalism of the Poor,* Harvard University Press.

Rumbach, A. and Follingstad, G. (2018) Urban disasters beyond the city: Environmental risk in India's fast-growing towns and villages. *International Journal of Disaster Risk Reduction*.

Rumbach, A. and Németh, J. (2018) Disaster risk creation in the Darjeeling Himalayas: Moving toward justice. *Environment and Planning E: Nature and Space, 1*(3), pp. 340-362.

Staupe-Delgado, R. (2019) Progress, traditions and future directions in research on disasters involving slow-onset hazards. *Disaster Prevention and Management: An International Journal*.

Stein, S. a. W., Colin (2017) *The Sendai Framework for Disaster Risk Reduction as a Tool for Conflict Prevention*: Social Science Research Counci.

UNISDR (2015) *Making Development Sustainable: The Future of Disaster Risk Management*. Global assessment report on disaster risk reduction. Geneva, Switzerland: United Nations Office for Disaster Risk Reduction (UNISDR).

Viewing Community Resilience in the South through the "eyes" of Mega Storms: A conceptual Analysis

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In March 2019, cyclone Idai, the worst weather-related disaster ever to hit the Southern Hemisphere, wreaked havoc in Mozambique, Zimbabwe, and Malawi. Six weeks later, cyclone Kenneth also hit Northern Mozambique with devastating consequences. These giant storms have demonstrated the destructiveness of extreme events on vulnerable communities: about 90% of the cyclone-impacted areas have been destroyed; about 1,000 people died, more than 100,000 people lost their homes with their possessions and more than 600,000 have been displaced. With arguably climate change's connection to cyclones, there is heightened concern about intensifying extremes and their effects on the most vulnerable communities. How and whether such communities can be resilient to severe natural disasters is the question this paper seeks to investigate. The aim, therefore, is to re-examine community resilience within the context of mega-disasters. Using Mozambique as case study, this paper will critically analyse the concept of community resilience in the wake of cyclones Idai and Kenneth. Community resilience is theorised with emphasis on what communities can do for themselves including how to strengthen their capacities to "manage or maintain certain basic functions and structures during disastrous events" and/or "recover or 'bounce back'

after an event". The hypothesis is that mega disasters have the potential to shape/alter community resilience. Based on theorised frameworks that provide a comprehensive picture of disaster resilient communities, this paper will use two relevant thematic areas (risk management and vulnerability reduction, and disaster preparedness/response) to conceptually examine resilience in communities affected by the March-April successive mega cyclones that have ravaged Mozambique. The analysis will further inform the concept of community resilience in the context of mega disasters battering vulnerable communities.