

THIS ISSUE

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The Problem with Bank Bailouts
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Volcanic Health Hazards
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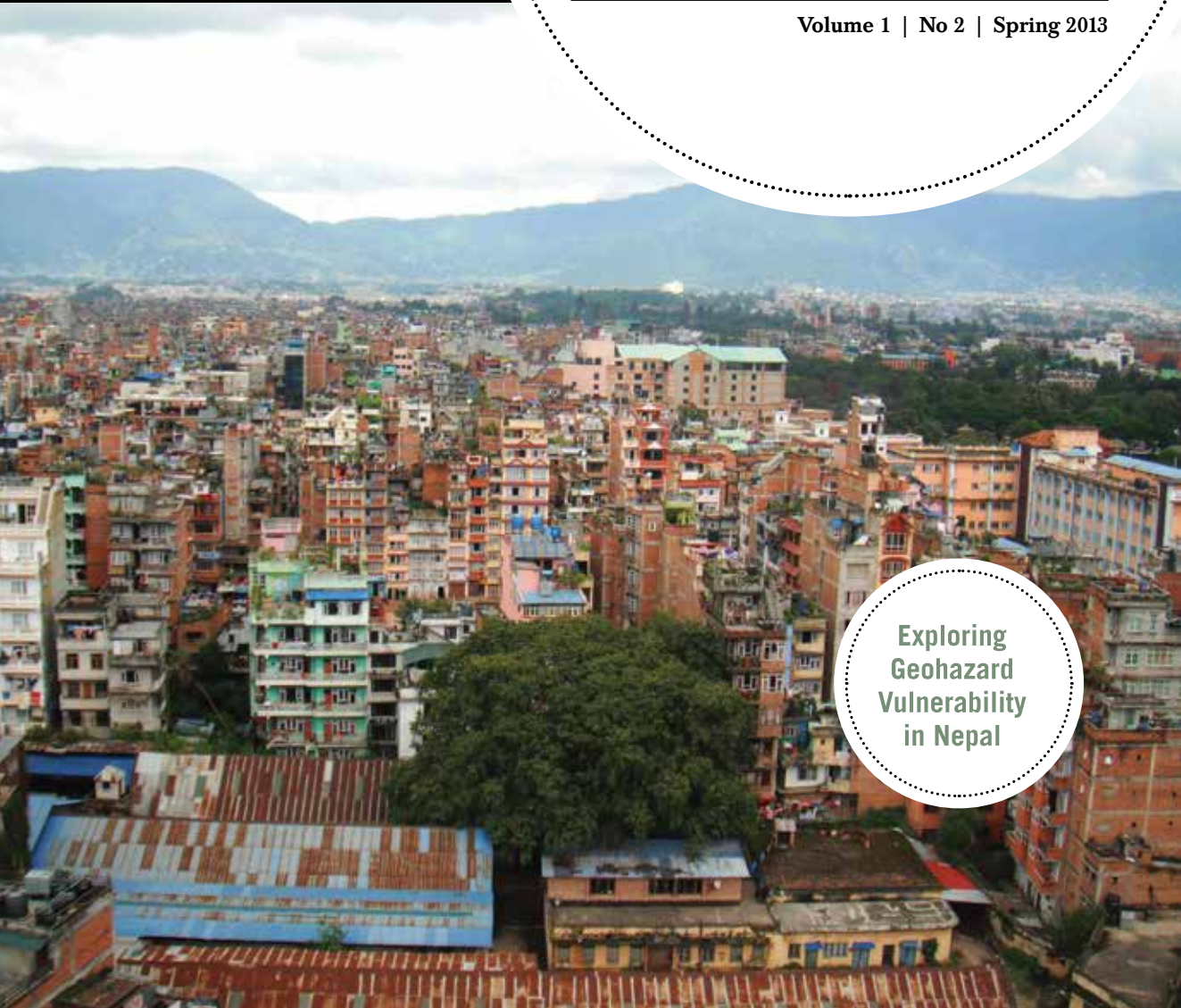
Photo Stories of Resilience

THE MAGAZINE OF DURHAM UNIVERSITY'S INSTITUTE OF HAZARD, RISK AND RESILIENCE

HAZARD RISK RESILIENCE

Volume 1 | No 2 | Spring 2013

Exploring
Geohazard
Vulnerability
in Nepal



Welcome to Issue 2 of Hazard Risk Resilience



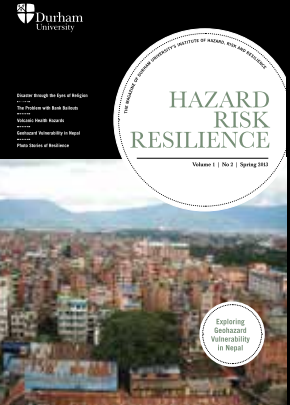
IT IS A REAL PLEASURE to introduce the latest issue of IHRR's magazine *Hazard Risk Resilience* and to be doing so for the first time in my capacity as Executive Director of the Institute of Hazard, Risk and Resilience (IHRR). Last summer I took on this role in IHRR from Professor David Petley as he moved to become Dean of Research at Durham University. We are all very grateful to David for his excellent leadership of IHRR and I am very pleased that he is able to continue contributing to our work as a member of our management board as the Wilson Chair in Hazard and Risk.

Since last summer, the work of IHRR has continued apace and we have continued to expand our activities to include new partners within and beyond Durham University. The articles in this issue reflect the breadth and depth of work that we support. A significant body of research focuses on generating and communicating new knowledge about *hazards* in our environment and the factors that put vulnerable populations at risk of these hazards. Viewed from the perspective of resilience, our work is also very much about how to mitigate hazards or adapt to them in ways that help us reduce the risks that they pose to human societies. Resilience depends upon better preparedness for the possibility of hazards, stronger capacity to intervene during major incidents in order to help reduce their impact, and resources and skills to support reconstruction afterwards. IHRR is very consistent with this message and helps to inform work in all of these fields.

Readers will find in the following pages discussion of research relating to hazards in both the physical world and in our social environment. Often these concern relatively sudden changes that can be extremely disruptive to natural or socioeconomic systems we all depend on. Examples operating at the global scale that are considered in this edition of the magazine range from efforts to better predict and respond to changes in the climate and risks faced around the world due to geohazards, to crises in the economy and strategies to prevent bank failures. At the more local and individual scale, we report on research from China, Java, Thailand and Ethiopia that illustrates the courage and determination that offers communities and individuals the possibility of 'post-traumatic growth' and reconstruction after disasters, and illustrates how religious, social as well as other forms of strength play a vital role. We also discuss strategies for risk governance in quite specific settings, such as local emergency planning and risk management in psychiatric hospitals.

I do hope you will enjoy reading this magazine and I am always very pleased to hear from any readers who would like to send us feedback about the magazine or who would like to submit material for future articles on their work in association with IHRR relating to hazard, risk and resilience.

COVERS: *The city of Kathmandu has a population of c.2.5 million people* and is located within one of the most seismically active zones in the world. This makes it extremely vulnerable to the impact of a large magnitude earthquake. In 1934, Kathmandu was struck by the 8.1 Mw Bihar earthquake that destroyed much of the city and led to a death toll in the tens of thousands. Much work is currently needed to help prepare the city for future earthquakes, including public awareness campaigns and new earthquake resilient construction practices. © Rebecca Masters and Thea Gordon-Rawlings.



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What is the role of religion in local interpretations of disaster?



The Problem with Bailouts

How insurance policy reveals new insights into government bank rescues



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RESEARCH HIGHLIGHTS

Government housing reconstruction in Bangladesh after the Cyclone Sidr disaster

Landslide fatality numbers severely underestimated

A NEW DATABASE developed by Professor Dave Petley from the International Landslide Centre at Durham University, can help policymakers manage landslide hazards and risks that have been severely underestimated in the past.

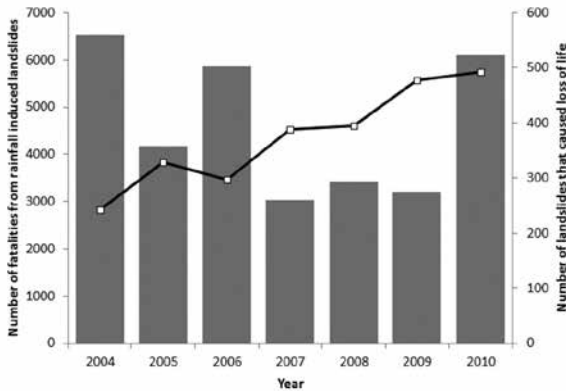
According to the Durham Fatal Landslide Database, 32,322 people died in 2,620 landslides between 2004 and 2010. Previous estimates ranged from 3,000 to 7,000 fatalities. The database allows researchers and policymakers to identify areas most at risk where more effective earthquake plans and response could help save thousands of lives. It provides the first detailed analysis of fatal landslides across the world, identifying vulnerable regions in China, Central and South America, India and many others.

The research underpinning the database focused on non-seismic processes, which excludes earthquakes. More fatal landslides were recorded from May to October with monsoon rainfall as the dominant trigger.

Extreme rainfall events such as cyclones can trigger landslides in Asia while hurricanes have the same effect in parts of the Caribbean and Central America. The database is compiled from government statistics, aid agency reports and research papers. The actual numbers of landslide-induced fatalities could be higher than records suggest, as some landslide-prone regions do not report all deaths caused by landslides.

KEY FINDING: Regions with a combination of extreme changes in landscape, intense rainfall, and a high population density are most likely to experience high numbers of fatal landslides. Seismic activity also plays a fundamental role in creating weakened slopes that lead to landslides triggered by subsequent rainfall.

'Global patterns of loss of life from landslides'. *Geology*, 40, 10. doi: 10.1130/G33217.1



Number of fatalities caused by non-seismic landslides 2004-10.

NEW RESEARCH by Dr Md Nadiruzzaman, whose PhD in IHRR and the Department of Geography was funded by the Christopher Moyes Memorial Foundation, has found that housing reconstruction efforts made by the government of Bangladesh after the Cyclone Sidr disaster in 2007 were inadequate and in some cases posed health risks. In coastal Bangladesh 1.5 million homes were completely or partially destroyed leaving many people homeless (nearly four times the number of homes destroyed by the 2004 Indian Ocean Tsunami). The study focuses on communities living in the village of Gabtola in southern Bangladesh, which was hardest hit by the cyclone in terms of death toll and damage. The research shows that the government failed to deliver homes in Gabtola of better quality that could withstand hazards, in fact, many local people found them to be unliveable. The new homes were not sufficiently resilient to withstand cyclone hazards, nor were they cost-effective or conducive to the livelihoods of communities expected to live in them. While the study notes that the government of Bangladesh has succeeded in improving people's lives after Cyclone Sidr by preventing mortality caused by diarrheal disease for example, there is much work to be done in improving its 'build back better' housing scheme for those left homeless after the disaster. Findings from the research have implications for revising and improving post-disaster housing programmes for disaster recovery.

'Post-Sidr Public Housing Assistance in Bangladesh: A Case Study'. *Environmental Hazards*. doi:10.1080/17477891.2012.759523

Climate science terms going out of style?

A NEW STUDY by Professor Alex Bentley and Dr Phil Garnett from the Tipping Points project has found that some of the most popular keywords from climate science have recently been used much less frequently in publications. This may be an important indicator for how climate science needs to be communicated more effectively for it to have a greater societal impact. Researchers sampled a series of top one-word climate

science terms, such as 'climate' and 'adaptation', from a random selection of books from the Google N-Gram database, about 4 percent of the world's published books. They modelled the frequency of the climate science words over time to find out how popular they were. They also explored how the words themselves were used, because how they spread socially may be key for their use by non-scientists.

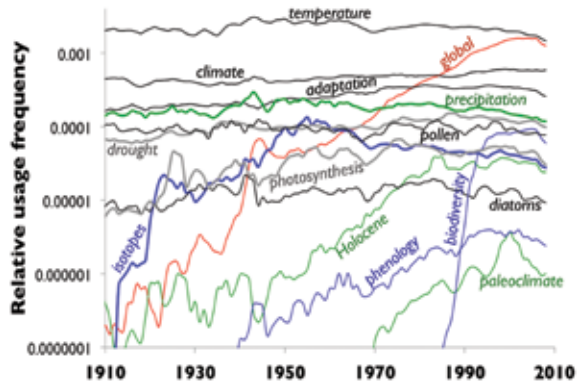
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KEY FINDING: To encourage widening interest and understanding about the findings of climate change science, an approach that accounts for how information about climate change spreads through social learning is needed. Effective and accessible science communication allows members of the public, in their respective communities, to learn about climate change themselves.

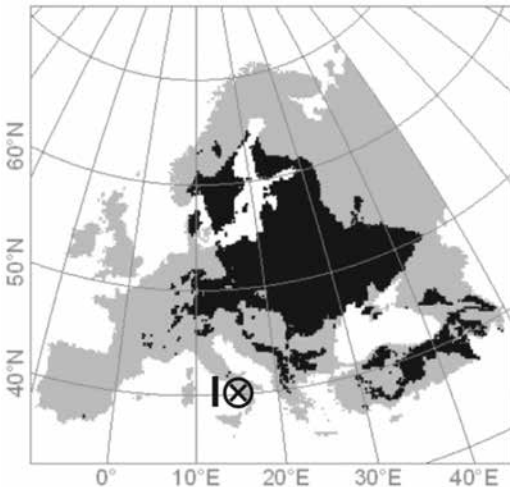
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'Word diffusion and climate science'. *PLOS ONE*, 7(11). doi:10.1371/journal.pone.0047966

The rise and fall of top climate science words that appear in books.



Climate-driven species migration



Species that lived in southern Europe during the Last Glacial Maximum could move to similar conditions in the north after widespread warming occurred.

RESEARCH led by Dr Ralf Ohlemüller and Professor Brian Huntley looks at how climate conditions have shifted across Europe since the Last Glacial Maximum (LGM), 21,000 years ago when ice sheets were at their maximum extent. Researchers used past climate simulations to quantify and map source and sink areas for potential species re-colonisation in Europe since the LGM. Finding the routes and distances species have travelled since the LGM is important because there is currently limited knowledge of the source locations where species lived and the 'sink' areas with analogous climate conditions that they travelled to. Regions of the world with climatic conditions analogous to LGM conditions were new homes to species that migrated because the climate was warming rapidly. Species that lived in southern Europe, such as parts of Spain and France, were able to move north after the LGM because of widespread warming throughout the continent.

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KEY FINDING: Even where little is known about the identities of species in a given region, identifying analogous climate conditions reveals potential migration routes under future climate change.

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'Potential source and sink locations for climate-driven species range shifts in Europe since the Last Glacial Maximum'. *Global Ecology and Biogeography*, 21, 2. doi: 10.1111/j.1466-8238.2011.00674.x

Too big to fail: The Bank of England and financial crisis

IN NEW HISTORICAL RESEARCH on banking and financial regulation from the Tipping Points project, Professor Ranald Michie finds that banks need to evolve continually to meet challenges and that this can require them to grow in size and extend their activities into new types of financial products and services. Prior to the recent financial crisis, banks were found to have taken risks because of the belief that failure was impossible. There was widespread belief that financial innovation had reduced these risks to a low level, and that the Bank of England could always be relied on to support a bank that found itself in difficulties. Belief that the Bank of England's support would always be forthcoming created a moral hazard in that bankers could behave recklessly, secure in the knowledge that the bank they worked for would be saved from bankruptcy. The fact that no major British bank had failed for over 100 years also made bankers over-confident about their ability to manage their business in such a way as to escape the consequences of the risks they were taking. This allowed them to generate large profits and bonuses, but simultaneously endangered the financial system. Their actions tended to ignore certain factors: the changed nature of British banking as the degree of competition intensified from the late 1980s; the inability of the Bank of England to adequately monitor what they were doing; and the vast increase in the transactions taking place in the inter-bank money markets located in London. Professor Michie recommends that the Bank of England should take on the responsibility as lender of last resort to the London money market as a whole, rather than to individual banks. This way the financial system could be saved if necessary without encouraging moral hazard from bankers as the government would only guarantee bank deposits in savings accounts wholly invested into the National Debt, which is already secured by government.

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KEY FINDING: When the financial crisis of 2007-08 occurred banks relied on the support of national central banks, which was insufficient in resolving the crisis. What is required in the future is for the Bank of England to be able to carefully monitor bank behaviour and have mechanisms in place to cope with both illiquidity and insolvency. Also, closer international cooperation between banks is essential if a future global crisis is to be avoided.

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'Too Big to Fail: UK Financial Services Reform in History and Policy'. *Economic Affairs*, 32, 3. doi: 10.1111/j.1468-0270.2012.02168.x



Social networking key to behavioural change

A NEW BOOK by renowned economist and author Paul Ormerod, a researcher on the Tipping Points project, looks at how social networking can help change human behaviours in order to address global risks, such as those caused by climate change.

Paul highlighted the policy implications in an article in *Nature*. During the 2012 London Olympics there was high risk of car traffic and public transport disrupting the events due to congestion in the centre. Public transport commuters were bombarded with messages urging people where possible to avoid driving or taking buses and trains, a strategy which was reinforced by employers who allowed their employees to work from home or have flexible hours. The strategy worked because it created network effects where people in social groups imitate or copy one another's behaviour.

Positive Linking: How Networks Can Revolutionise The World looks at how social networking can lead to behavioural change that is effective at addressing risk. According to Dr Ormerod, obesity, a widely known social health risk, is driven by the network effect of 'peer acceptance', where if most of your friends are obese, it is more acceptable to gain weight. In order to help reduce the risk of obesity, gaining weight should be seen as less acceptable in social groups. Network theory is important for understanding the complexity of economic, social and environmental problems where behavioural change is essential to resolving them directly.

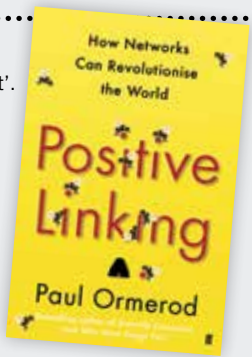
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KEY FINDING: In policymaking, incentives should not be given only with individuals in mind, but should account for social networking as an underlying factor of behavioural change.

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'Social networks can spread the Olympic effect'. *Nature*, 489, 337. doi:10.1038/489337a

Positive Linking: How Networks Can Revolutionise the World. Faber and Faber.

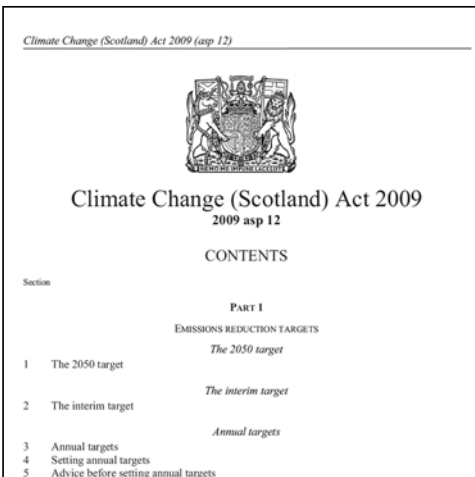


The role of beliefs and values in shaping evidence for climate change policy

BELIEFS AND VALUES are often viewed as separate from scientific evidence, but they can affect how evidence is generated and presented, especially with regard to policy.

Ruth Machen, a research postgraduate in the Department of Geography, is investigating the boundary between evidence and belief in Scottish climate change policy. In 2011, the government of Scotland redesigned how it engages with climate science in order to make publically-funded science more responsive to the needs of policy. This once again challenges traditional notions of a clear, demarcated, linear relationship between science and policy. Concepts of expertise and evidence are being called into focus and the two-way exchange is made more explicit.

How is this move affecting the way in which climate change knowledge is framed and, in what ways does it affect the understanding of scientific knowledge as evidence? Does distinguishing evidence from belief to legitimise policy decisions make sense under current conditions of scientific uncertainty and controversy surrounding climate policy? In her PhD research, Machen will address these questions in studying how evidence-based policymaking is constructed both politically and scientifically.



Scotland leads Western Europe in setting CO2 emission reduction targets of 42 percent by 2020 and 80 percent by 2050.

Prioritising early cancer diagnosis for improving community health and saving lives

CANCER SURVIVAL RATES can be significantly improved if patients are diagnosed early. The number of pre-referral consultations is often used as an indicator of patient experience, along with time intervals between first consultation and diagnosis.

Professor Greg Rubin, together with colleagues from the University of Cambridge and North Wales Clinical School, examined data from the 2010 National Cancer Patient Experience Survey in England. They found a wide variation between different cancers in the proportion of patients who had visited their general practitioner three or more times prior to hospital referral. Their analysis accounted for patients' age, sex, ethnicity and measures of socio-economic deprivation.

Both young patients aged 16-24 and women were more likely to have had three or more pre-referral consultations for most common forms of cancer, but not stomach cancers and melanoma, in comparison to older, white and male patients. There was also variation in the number of consultations according to cancer type. For example, patients with colon, ovarian, pancreatic, lung cancers and Hodgkin's lymphoma were more likely to visit their GP three or more times before hospital referral. Findings from the study can help prioritise initiatives and further research.

The researchers recommend further exploration and assessment of physician-level education interventions, further development of point-of-care decision aids, risk calculators and diagnostic tests, and redesigning of systems already in place in order to make best use of specialist diagnostic tests such as imaging and endoscopy.

KEY FINDING: There are inequalities in speed of cancer diagnosis for younger adults, women, ethnic minorities, and for some types of cancer which require further research and the development of targeted initiatives.

'Variation in number of general practitioner consultations before hospital referral for cancer: findings from the 2010 National Cancer Patient Experience Survey in England'. *The Lancet Oncology*. 13,4:353-365. <http://dro.dur.ac.uk/9316>

Risk and well being in psychiatric hospital design

BALANCING the tensions between risk management and well being for patients and staff is one of the most important features in the design of psychiatric hospitals. Research by Dr Victoria Wood, Professor Sarah Curtis and colleagues from the ADVANCE team in the Mental Health Research Centre explored the challenges involved in trying to mitigate risk and enhance well being in a psychiatric care setting*. The research team focused on an evaluation of the transition from an old to new psychiatric inpatient facility. The study demonstrated the need to balance features such as security and surveillance with other features contributing towards the well being of patients and staff, such as privacy and autonomy, and positive personal interaction. A design permitting close observation and surveillance orientated towards a reduction in harm, including self-harm, was seen as very important, yet at the same time new innovations such as CCTV, installed to deal with this issue, raised concerns over the potential negative psychological effect on patients and over-reliance on these

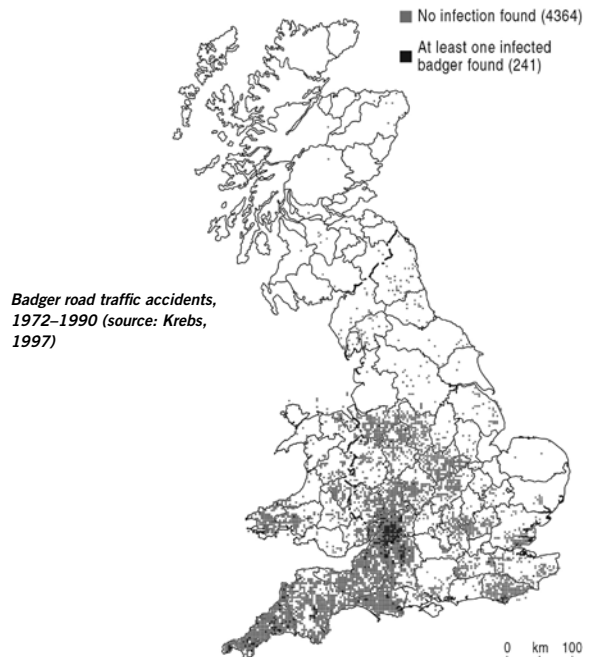
methods of observation. Research by the ADVANCE team helped demonstrate that careful consideration about how to balance these tensions when designing psychiatric inpatient facilities is essential.

KEY FINDING: In the design of psychiatric hospitals a suitable balance needs to be found between mitigating risks, by carefully controlling the hospital environment and promoting other aspects of well being for patients and staff. Over reliance on surveillance technologies, for example CCTV, could potentially have negative psychological effects, upsetting this sensitive balance.

*Details in a forthcoming paper in *Social Science and Medicine* entitled: 'Compassionate containment? Balancing technical safety and therapy in the design of psychiatric wards'.

The spread of bovine tuberculosis in England reconsidered

TWO NEW geographical studies led by Professor Peter Atkins and Philip Robinson, a PhD student in the Dept of Geography, reveal a historically uneven distribution of bovine tuberculosis (bTB) in cattle and badgers throughout England. Maps from the research published in *Epidemiology and Infection* are the first to address the historical dimensions of bTB. One of the largest outbreaks of TB that occurred in the mid to late 19th century in northwest England led to the slaughter of large herds of cattle. More recently bTB has been concentrated in southwest England requiring large financial investment by government in attempt to control the disease in cattle. Badgers are a well-known wildlife reservoir for bTB. They have been suspected by government and some farmers of spreading the disease in the southwest and other parts of the country. According to the research, while the badger may play a role in the spread of the disease in the southwest, past surveys have shown few badgers to be infected with bTB during the previous outbreaks in northwest England. This means the badger may not be solely to blame for the spread of bTB and cattle to cattle transmission could be a major contributing factor. According to the research, the coalition government's plan to cull badgers is overly reductive and only applicable in certain parts of the country. Vaccinating badgers or controlled culls have parts to play in controlling bTB in the southwest and South Wales, but this may have little to no effect elsewhere in the country because there is less evidence of badgers infected with bTB outside concentrated areas of infection. Authors of the study recommend that policies to control bTB in cattle and in badgers should focus on spatial patterns of the disease based on region, rather than applying the same policy as in the southwest to the whole of Britain.



'Bovine tuberculosis and badgers in Britain: relevance of the past'. *Epidemiology and Infection*. doi:10.1017/S095026881200297X

'Coalition culls and zoonotic ontologies'. *Environment and Planning A*.



IHRR Online

Baroness Valerie Amos, UN Secretary-General and Emergency Relief Coordinator for OCHA

Reports

Tipping Points **Annual Report 2011-12**

The second annual report from IHRR's Tipping Points programme has been published. Tipping Points is funded by the Leverhulme Trust. The report presents the project's recent research on the role of trust in maintaining the resilience of financial markets, development of the UK banking sector, changes in past climate in the North Atlantic, trends in the use of the term 'tipping point' in popular culture, plus much more.

<http://bit.ly/QMr2XI>

Podcasts

Professor Lena Dominelli on Social Work and Disaster Intervention

Professor Lena Dominelli introduces the role of social work in disaster intervention using the example of recovery efforts during the aftermath of the 2004 Indian Ocean Tsunami in Sri Lanka. Social work is crucial to disaster relief efforts and essential to communities' recovery and reconstruction.

<http://bit.ly/SYkUd4>

Bovine TB Risk in the UK: Past and Present

This podcast investigates the history of the spread of tuberculosis in cattle and badgers in Britain. It includes a highly informative interview with Durham researcher Professor Peter Atkins who led two recent studies on the subject. The research provides historical insights that could help better inform policy in preventing the spread of TB in the UK.

<http://bit.ly/ZaluuX>

Video

Breaking the Mould: Resilience and Disaster Intervention

This video features Baroness Valerie Amos, UN Under-Secretary-General for Humanitarian Affairs and Emergency Relief Coordinator (pictured), asserting that 'resilience is about breaking the mould' in order for humanitarian and development organisations to mitigate and prepare for natural disasters and other large-scale emergencies that require humanitarian aid.

<http://youtu.be/GDKzgwexC58>

Uncovering the Climate of the Past in Greenland Part 2

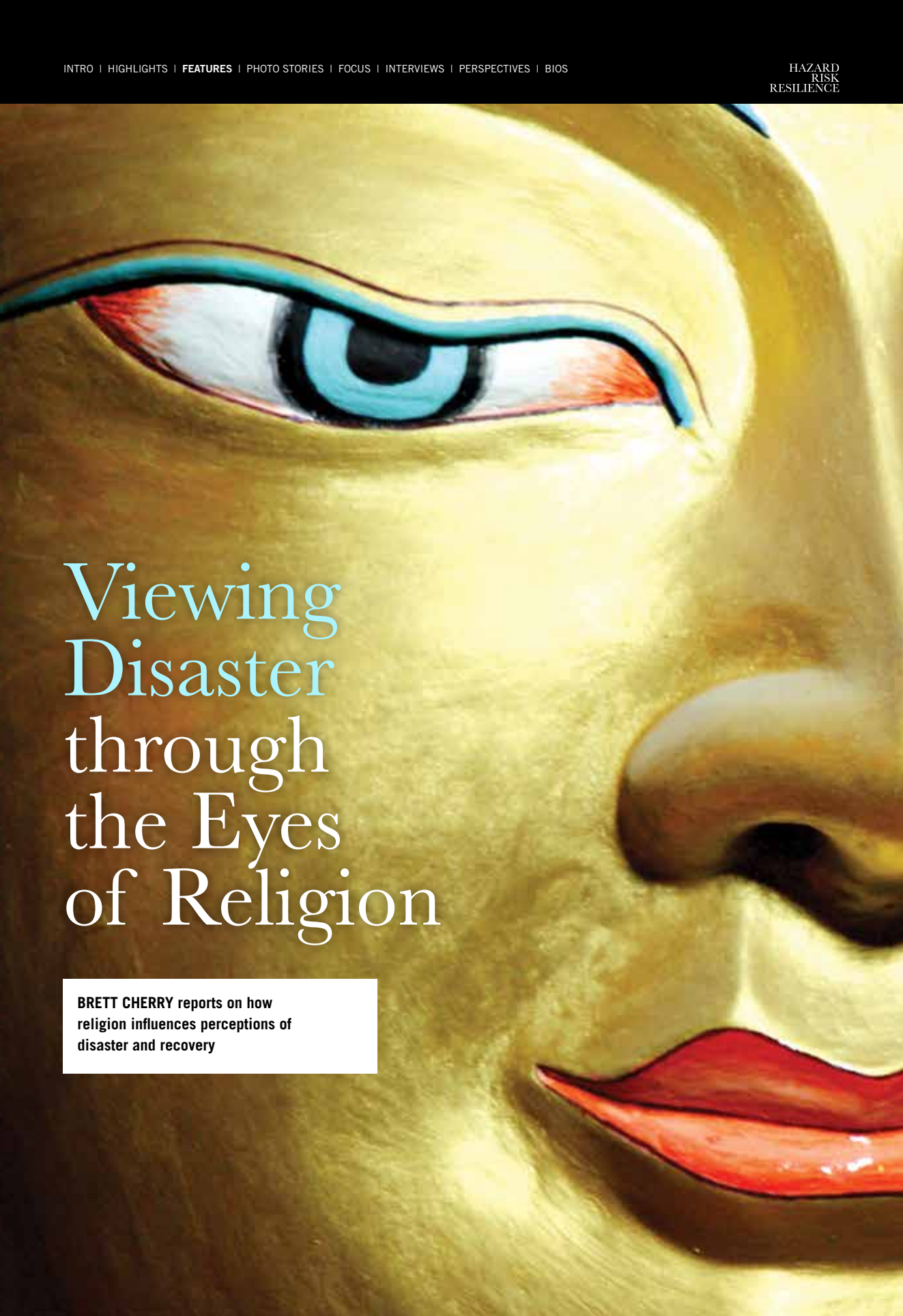
Dr Eleanor Maddison, a researcher on the Tipping Points project, investigates the climate of the past in Greenland by studying ancient remains of tiny insects (non-biting midges) that provide clues to what the climate was like thousands of years ago. This is Part 2 of an ongoing video series that gives an insider's perspective on studying past climate change as researchers investigate potential 'tipping points' in the Earth's climate system in the North Atlantic region.

<http://vimeo.com/50687881>

Wenchuan Yingxiu Primary School Photo Story Roving Exhibition

Dr Timothy Sim from Hong Kong Polytechnic University presents a unique exhibition of photos by young people who lived through the 2008 Sichuan earthquake in Wenchuan, China. Dr Sim explains the resilience of the children who survived the earthquake and the story behind their international photo exhibition.

<http://vimeo.com/52587812>



Viewing Disaster through the Eyes of Religion

BRETT CHERRY reports on how
religion influences perceptions of
disaster and recovery

‘IF WE POSSESS
OUR *WHY* OF LIFE
WE CAN PUT UP
WITH ALMOST
ANY *HOW*’.

FRIEDRICH NIETZSCHE

If disaster interventions do not consider the role of religion they are missing a very important point.

SO SAYS DR CLAUDIA MERLI, an anthropologist at Durham University who has witnessed firsthand how people use religious ideas to frame disasters in an attempt to put order back into their lives.

Despite the secular views of those who inhabit the richer, more developed and technologically advanced parts of the world, religion still plays a fundamental role within societies. Religion influences what many people wear, what language they speak, the food they eat and most of all how they perceive the world. In times of disaster and crisis people use religion in a variety of ways from social and political control to assisting humanitarian aid efforts, but also to cope with the hardships they face when so much around them, such as the people they love and their homes, have been lost or damaged. Yet despite its pervasive influence, risk research tends to overlook or ignore the role of religion in interpreting disaster.

During catastrophe there are often few, if any answers as to why it may have occurred that are available to those most affected. Thus religious ideas are used to inform disaster victims' sense of purpose in life. Religion is an important stepping stone for many disaster-affected communities, allowing them to surpass immense obstacles.



For others it can be used as a tool to maintain political dominance. Furthermore, religious ideas or philosophy not only serve as a ‘coping mechanism’, a way for people to put things behind them and move on with their lives, they also set the tone and setting within communities prior to a disaster.

Religion forms an intricate part of the social, psychological and cultural makeup of a ‘natural’ or ‘technological’ disaster to such a degree that it seems inseparable from the actual physical event. How does it influence the impacts of disaster and what should governments, NGOs, researchers and emergency aid workers know about the role religion plays in the lives of communities they are providing assistance to? How should religion be considered when designing policy to assist less developed countries that may have few material resources to prepare for, or deal with large-scale hazards, such as an earthquake or volcanic eruption?

Researching disaster means more than looking at statistics about the local populations affected and more even than understanding the physical nature of the hazard that led to it. For those impacted, it comes down to their cultural identity and what disaster means to them. While natural scientists resort to scientific explanations as to how a disaster occurred in order to make sense of the event, those affected often use religious, cosmological ideas to make disasters intelligible. It is also for this reason that they are able to adapt to the aftermath of a disaster and begin to pick up the pieces of their lives. /// **CONTINUED**

2004 INDIAN OCEAN TSUNAMI

DR CLAUDIA MERLI saw the aftermath of disaster through the eyes of Muslim and Buddhist communities impacted by the 2004 Indian Ocean Tsunami, which devastated the countries of Indonesia, India, Thailand and Sri Lanka.

During her field research in Satun, a province in southern Thailand impacted by the tsunami, Merli discovered that not only did people explain the disaster in terms of divine retribution, for example, or the response of nature to the actions of humanity that damage the environment, but that these religious understandings of what occurred underlay how the catastrophe was managed and perceived by the wider community.¹

In Satun the majority of the population is Muslim, but includes a large Buddhist community. Merli found that in some ways different religious ideas about the disaster overlapped, but they were also dissimilar in other respects. For example, all forms of Buddhism are non-theistic, meaning they do not believe in a central God or divine force that governs the actions of humanity. In the religion of Islam, however, Muslims believe in one God who is both compassionate and vengeful.

According to Merli, NGO workers and local government in southern Thailand are very inclusive of local religious communities in organising relief assistance. Both Muslims and Buddhists would work together in assisting their communities to recover during the aftermath of the tsunami disaster. 'There wasn't a clear divide between Buddhist NGOs helping only the Buddhists and so on, it really was a communal effort to help the local communities. At the same time they were defining each other', says Merli.

During her field research, Merli discovered that Muslim and Buddhist communities would define each others' ideas about how they would explain the disaster. For example, the Buddhists would say the Muslims thought of the disaster in terms of divine retribution and the Muslims would say the Buddhists thought of the disaster in terms of karma. While the tsunami disaster could be understood in terms of karma, Merli says Buddhist monks in southern Thailand explained the cause of the disaster as according to natural forces of the planet. Some Muslims, however, did see the tsunami as a form of purification or cleansing of sinful places.

Divine retribution is well-known in the Quran. Islam invokes responsibility of an all knowing and supreme deity (Allah), who punishes those who commit sinful acts through *balaq* or annihilation. Unfortunately, this may include harming those who are innocent.

In contrast, the Buddhist law of karma views retribution in terms of individual and collective action. There is a relevant story in the Quran. After asking Allah why, when the wicked are punished, the innocents are also harmed, the prophet Musa (Moses in the Bible) squashes a group of ants when one stings him in the foot, but of course at the same time he also crushes the ants that did not sting him. Muslims in Satun resorted to what is known as a 'theodicy', a way of reconciling the existence of a good and merciful God with the existence of unjust human suffering. Merli learned that theodicies in Satun were directly related to the local context of the post-disaster situation.

Muslims in Satun believed that the tsunami was purifying the sinful or 'dirty' places of the areas impacted. Local interpretations of the tsunami include the cleansing of defilement, such as illicit sexuality. For example, many parts of Phang Nga province that were severely damaged by the tsunami also attracted the majority of tourists who were seen as spreading immorality. However, the village of Ko Panyii also in Phang Nga, which was not a tourist spot, was not damaged as badly, and according to some Muslims from the region this was because people there were not misbehaving. 'It was perceived as a warning for the villagers to go back to the right path of Islam', says Merli, 'There were degrees of destruction depending on the degrees of morality, misbehaviour or straying from an ideal morality'.

Other religious interpretations of the tsunami disaster encountered by Merli include associating the earthquake with the 'greedy exploitation' of oil drilling in Indonesia. Some Muslims Merli spoke with connected the event with Hurricane Katrina which they believed was God's punishment of the United States for the war in Iraq and the exploitation of oil resources. Ultimately, an endemic 'human sinfulness' was held responsible for the disaster.

Not all explanations of the disaster were rooted in Islam or Buddhism. Some came from myths indigenous to the region. For local fishermen confronted with the chaos of nature presented by the tsunami, they were extremely frightened because they couldn't explain it through their own cosmology. They could no longer trust their own knowledge of the universe; their entire world view had fallen apart.

Surprisingly, religious interpretations of the tsunami disaster were not necessarily in opposition to 'natural' or scientific explanations, instead both interpretations intermingled. In the case of the Buddhists, their understanding of the disaster was parallel to scientific explanations. Muslims in Satun recognised the role of nature in these events, but saw it as subject to the will of God. The hazard itself is perceived as originating from nature, but after the event religious understandings play a direct role in recovery. While religious views incorporate perceptions of large-scale hazards they also influence the disaster itself, which can be largely due to lack of preparation, lack of resources and infrastructure, poor management or a combination thereof. Importantly, religion affects how a society will adapt to disasters. **/// CONTINUED**

¹See Merli C. 'Religious interpretations of Tsunami in Satun province, Southern Thailand'. *Svensk Religionshistorisk rsskrift*. 14: 154-181. <http://dro.dur.ac.uk/5303/1/5303.pdf>



Above: The devastation left by the Indian Ocean Tsunami.

Below (clockwise from left): Warning sign for tsunami hazard zone; Satellite image of waves from 2010 Indian Ocean Tsunami along coast of Sri Lanka that appear to spell Allah in Arabic; Flooding from tsunami in Thailand.



2006 MOUNT MERAPI EARTHQUAKE IN JAVA, INDONESIA

JAVA is one of the most populous islands in the world that was formed by volcanic eruptions. On 26 May 2006 it was struck by a 6.4 magnitude earthquake south of Mt Merapi volcano that killed at least 6,000 people and left 1 million homeless.

The disaster was interpreted in terms of both geological processes and through religion and mysticism which underlie Javanese culture and society.² Anthropologists who have visited Java find that the Javanese have a sophisticated view of how hazards connect with society and political power.

Javanese society has more recently shifted from its traditions and is adopting modern values and globalisation. The people of Java viewed the earthquake as a sign that they should return to the traditional rules and values that were originally the foundation of their society. According to religious understanding, disasters are not seen as random occurrences, but as events happening for a special reason. For example, the Javanese research participants viewed the 2006 earthquake as a response to human insults to the environment such as polluting the air and even building a shopping centre.³ Thus, similar to the aftermath of the tsunami disaster in southern Thailand, a religious understanding of the world is connected with concerns for the welfare of the natural environment and the politics of

human societies; the earthquake was perceived as a critique of government and the political regime. The hazard became intertwined with political reality. The earthquake had major political implications, especially for government leaders on the island of Java.

In response to disasters, Javanese people perform a series of rituals that interlink religion, culture and disaster, while preserving the culture of their ancestors. In a way, disasters incite the Javanese people to respond by working to preserve the cultural traditions that have been part of their society for generations. It is not merely a disruption to their way of life or a tragedy, but a catalyst for coping and preserving their society for the future. But there are also clearly problems with relying upon religious or mystical explanations for why disasters occur, as they also have the potential to be easily used for political manipulation. Sultan Hamengku Buwono X who is the current monarch and governor of Yogyakarta in Java, was considered a representative of the modernisation of Javanese society that was later blamed for the earthquake. The sultan may have referred to science and rationalism instead of the religious or mystic traditions of Java because the scientific view would correspond better to his political strategy.

Studying how these hazardous events are viewed through religious cultures in particular settings helps us to understand how people respond and build resilience. For centuries, strongly held religious values have been used to help societies cope with disasters. This human aspect of religion as a coping strategy and source of resilience is important to consider.

Below: Examples of local cultural traditions in Java.



² See Schlehe J. 'Anthropology of religion: Disasters and the representations of tradition and modernity'. *Religion*, 40, 2:128-131.112-120. doi: 10.1016/j.religion.2009.12.004

³ Ibid. P. 4

RELIGION AND HUMANENESS

MOST RELIGIONS invoke the idea of a deity or divine intelligence in some form or another that may seem foreign to the actual human condition. But, if the separation between the human and the divine is turned on its head, it looks much different from what is generally supposed.

Regardless of the actual existence of the divine, knowledge of it is always mediated through human thought and action. Humans are capable of taking some of the worst situations, such as catastrophes, and transforming them into something positive or extraordinary while using the idea of divine powers in the process. Learning to cope with disaster may lead to resilience, but also individual transformation. Ideas and myths about the interaction between humanity and the divine go back many thousands of years, and are invoked again and again when earth shaking events occur.

While divinity, which means 'having the nature of a deity' and humaneness may appear separate in practice they are both channelled through the individual human experience and emotions.

'The view of the event as an 'act of God' might resonate appropriately with a person's emotional state and at the same time fly in the face of reason', says philosopher Dr Guy Bennett-Hunter, an Honourary Research Associate at Durham University and a Research Fellow at the University of Aberdeen.

Religion and religious experience is used in many ways to provide a sense of purpose and in the case of the Javanese in Indonesia and the Muslims and Buddhists in Thailand, what they experience is the basis for how they interpret it religiously, which helps regulate their actions. 'No one coping with the aftermath of a tsunami will be worried about whether the divine attributes are consistent', says Bennett-Hunter, '...religion will be the means by which they re-evaluate the meaning of their existence in light of their situation'.

Even if researchers learned nearly everything needed to plan for or mitigate disasters the problem of how people would respond individually still exists. This is often based on the relationship they have within their respective religious communities. 'It is suggested that the word 'religion' derives from the Latin *ligare* (to bind). Instead of religion preventing care for victims of disaster,

...we might hope that religion would function as its Latin root implies and bind people together, leading them to work together for the benefit of their whole community,

says Bennett-Hunter. In disaster risk reduction this could not be more crucial.



FAITH-BASED DISASTER RISK REDUCTION

DISASTER management and humanitarian intervention can be affected by religious interpretations of disasters and the faith of local communities who are in need of aid and other forms of assistance. They can also affect how the disaster itself is managed and how aid is distributed.

Since community preparation is key to mitigating disasters, religious communities and faith-based NGOs are likely to continue to play an important role in their aftermath and in reducing the damages caused by disasters in the future. Religious identity and faith not only mediate how people perceive a disaster, but may also encourage them to prepare and build resilience.

Infrastructure that is vulnerable to disaster (such as school buildings) is in many cases already maintained by faith communities.⁴ Similar to other public buildings, churches, mosques and temples are used for shelter when disaster strikes. Therefore a possible solution for enhancing aid efforts would be to work with faith-based communities to ensure that they have in place the best possible strategy for reducing disaster risk. The hazards can of course occur in some less developed countries more than others, but bearing in mind the religious faith of communities may better assist practitioners in social work, medicine and other fields in helping them to prepare in advance.

'Faith communities have a role in providing post-disaster assistance and in proactive risk reduction. Some aspects of religious practice such as gender inequality or preferential treatment in providing post-disaster assistance are limitations, but can be lived with as long as faith communities are seen as only one of many channels for disaster response and recovery,' says Dr Ben Wisner, a disaster expert based at Oberlin College (USA) and University College London, who has worked with faith-based communities in disaster risk reduction and planning.

Religious faith may not be an obstacle to aid, but a conduit for organising communities to address reoccurring disasters caused by earthquakes and landslides. Taking into account religious interpretations of catastrophe can also assist emergency aid workers, psychologists and the military to work more effectively in delivering aid by considering the role of religion within communities. Wisner gives an example of how, through an NGO, an Islamic group actually helped encourage

people to plan for disaster. The NGO contacted Islamic teachers and scholars who produced video and other outreach materials for people who previously thought there was nothing that could be done about disaster risk. 'This collaboration with Islamic leaders freed local people from 'fatalism' and got them working proactively to reduce disaster risk', says Wisner.

CULTIVATING RESILIENCE

THE INFLUENCE OF RELIGION in interpreting disaster is common to many cultures throughout the world, but especially where humanitarian intervention is most needed. Since much of the aid received by disaster-affected countries originates outside of the cultural context in which the disaster has taken place, the methods for delivering aid across national and cultural boundaries may be limited in practice. There are also moral challenges to overcome for disaster intervention, especially if religious views prevent or hamper assistance coming from outside. Yet working within communities by taking into account their religious beliefs and ideas as well as other aspects of their social identity, may still be effective in mitigating disaster impacts. For those who survive a disaster: 'I think they construct a new life. You accept what has happened and if you can find an explanation, you can overcome', says Merli.

/// KEY MESSAGES FOR POLICY

- Religious ideas shape people's understanding of disaster and for this reason cannot be ignored during humanitarian interventions to reduce disaster risk.
- In some communities religion plays a strong role in helping them adapt after the impact of a large-scale hazard such as an earthquake.
- Working with religious communities in vulnerable regions can help scientists, social workers and aid workers address the aftermath of a disaster more effectively.
- Where religious interpretations prevent or limit humanitarian intervention they still need to be taken into account when developing an aid strategy, as it may still be possible to work with them in disaster planning and preparation.

⁴ See Wisner B. 'Untapped potential of the world's religious communities for disaster reduction in an age of accelerated climate change: An epilogue & prologue'. *Religion*, 40, 2:128-131.



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THE PROBLEM WITH BAILOUTS:

A Risk Mitigation Critique of the Global Financial Crisis



David Rose/Panos Pictures

FOLARIN AKINBAMI argues that government rescues of banks should be avoided to mitigate financial risk

THE GLOBAL ECONOMY is still recovering from the devastating global financial crisis of 2007-2009. The global financial crisis was caused, in large part, by excessive risk-taking by banks and other financial institutions, and by the eventual bursting of asset price bubbles in housing markets in many western countries such as the UK and the US. The global financial crisis saw the near-collapse of several banks and the subsequent need for governments to use taxpayers' funds to rescue such banks.¹ The financial rescue packages for the troubled banks are popularly referred to as 'bank bailouts'. However, bank rescues need not be funded by the government, and sometimes they are funded by the banking industry itself. Examples include some of the bank rescues under the so-called 'lifeboat' during the secondary banking crisis of 1973-1975.² On this occasion the magnitude of the financial problems faced by the troubled banks meant that their fellow banks were either unable or unwilling to come up with the funds necessary to rescue them. The costs of these bank rescues are substantial; for example the UK's National Audit Office (NAO) reported in 2010 that the scale of financial support provided to the UK banks was £512 billion.³

The bank bailouts that resulted from the global financial crisis have been subjected to criticism on several fronts. For example, economists argue that bailouts encourage moral hazard, while social commentators (social justice advocates) have complained about the inequity of the bailouts, and argue that it resulted in an unfair transfer of wealth from the less affluent to the more affluent in society. Both sets of criticisms are, arguably, very strong. But another perspective is needed, in this case a 'risk mitigation' perspective. Risk mitigation refers to the ways of dealing with or managing risk, that is, the way in which risk is assessed, measured, prevented or managed.

The risk mitigation critique here is not a critique of the failures of the banks' risk assessment models or their risk management techniques.¹ Rather, it is a broader critique of how individuals and society as a whole approach risk, and the ways in which we deal with (mitigate) risk of damage when a banking crisis occurs. For this critique it is helpful to draw upon a well-known risk mitigation device that is prevalent in society today – insurance. Insurance is not necessarily the only risk mitigation technique one might compare with bailouts, but is useful for considering key features of a taxpayer-funded bank bailout. The objective is to compare the ways in which both insurance and bank bailouts are used to deal with the fallout from a bank failure and to highlight some of the more problematic features of bank bailouts.



Northern Rock was one of the first banks to be bailed out by UK government during the banking crisis.

A BRIEF EXPLANATION OF INSURANCE

INSURANCE is a method of risk mitigation whereby individual people, corporations and other organisations facing a particular type of risk take action to protect themselves from the potential losses if that risk materialises. It therefore differs from risk mitigation or risk management techniques that try to prevent risk.

Rather than try to prevent the risk altogether, insurance looks to protect the insured i.e. to compensate them for potential losses arising if the risk should happen. It is an *ex ante* (before the event) way to tackle the risk of a damaging event. It accepts the fact that risks cannot always be prevented and that they can occur.

With most types of insurance today, a number of people come together to collectively share the cost of protecting themselves from the potential losses they may individually suffer if the risk arises for them individually. This can either be done privately, for example fire insurance, buildings and contents insurance, or through a public, social insurance scheme, whereby the pool of insurance funds are collected and administered by a public authority, or some other social insurance fund (for example social security or publicly-funded health insurance schemes such as the UK's National Health Service). /// **CONTINUED**

¹ For a critique on this see 'Is meta-regulation all it's cracked up to be? the case of UK financial regulation'. *Journal of banking regulation*. 14:16-32. <http://dro.dur.ac.uk/10250/>

² R Cranston, *Principles of Banking Law (Second edition)*, Oxford: Oxford University Press (2002) p. 95

³ National Audit Office (NAO), *Monitoring the Financial Stability of UK Banks: Update on the Support Schemes*, HM Treasury (2010) HC 676 Session 2010-2011, at pages 3 and 6. http://www.nao.org.uk/publications/1011/support_for_banks.aspx

FEATURES OF INSURANCE

Highlighting three key differences between insurance and bailouts helps us to see what problems bailouts have in terms of risk mitigation:

1) EX ANTE PAYMENT OF PREMIUMS

A key feature of insurance is that all the insured pay an insurance premium (a monetary contribution) to the pool of funds that is kept and used to protect them from risk. The funds are held by an insurance company (in the case of privately organised insurance) or by the State or one of its agencies (in the case of social or public insurance), which disburses funds to those who have paid their premiums and then subsequently suffered the misfortune of the insured risk occurring. Insurance premiums are paid *ex ante* to the insurance pool of funds. This is hugely beneficial because it means that each individual's contribution (i.e. their insurance premium) is pre-determined and therefore each individual knows, from the outset, the full extent of their ultimate liability to the insurance fund. It is also advantageous because there is an attempt, when setting premiums, to calculate each individual's insurance premium according to the risk that person poses to the insurance fund, for example people living in flood-prone areas might pay flood insurance premiums higher than for those in areas of low flood risk. This apportioning of premiums based on the risks posed by the individual represents a much fairer way of spreading the cost of disasters than most other risk protection strategies.

Bailouts, on the other hand, often occur without any prior or *ex ante* preparation for them. This is highly problematic because those who end up paying for the bailout (in the case of banks, the taxpayer) do not know in advance the full extent of their liability to the bailout fund. For example, governments in the

UK and US have not really done a good job of explaining to taxpayers the full and final cost of the bank bailouts in those countries. In the US, the initial bank bailout proved to be inadequate and the government had to ask taxpayers for a further, larger bailout. It is also problematic because the costs of the bailout are not borne by those who posed the ultimate risk to the bailout fund. This failure to allocate costs based on the risks posed by the individual represents a very unfair way of spreading the cost of disasters.

2) INSURANCE IS OFTEN VOLUNTARY AND BASED ON PRIOR CONSENT

Another important feature of private insurance is that it is usually voluntary and consensual, although some public insurance is mandatory (for example National Insurance contributions in the UK and social security contributions in the US). Even some privately organised insurance is mandatory, such as compulsory third-party insurance for motorists in the UK. The insured want the benefits of insurance conferred on them, and for this reason, consent to contributing to the pool of funds available to protect the less fortunate amongst them. Insurance is therefore in accordance with the rule of law and the principles of natural justice (duty to act fairly). It is also in accordance with most people's preference for autonomy over themselves and their decisions.

Taxpayer-funded bailouts, by contrast, are never voluntary or consensual as amply demonstrated by the hostility of a vast majority of citizens, in the UK, Ireland, Spain and US to the bank bailouts in those countries. Instead the decision to impose the bailout on taxpayers is carried out by governments who are faced with the threat made by the banking industry, that the consequences of not bailing out the troubled banks will be calamitous. Former US Treasury Secretary Henry Paulson appeared before US Congress warning US lawmakers that if they failed to approve his proposed bank bailout they would be responsible for precipitating *the end of the world as we know it*. Taxpayers are thus faced with a mandatory

Protests around the world from the Occupy Movement were critical of governments bailing out banks during the financial crisis.



payment to the banking industry even though the majority of taxpayers object, in principle, to making such payments and did not know before the banking crisis that they might have to meet these costs. It is unfair to make one group of people pay for the damage incurred by another group in this way. Some would even argue that this is immoral.

3) THE TRANSFER OF FUNDS IS PROGRESSIVE, NOT REGRESSIVE

A further important feature of insurance is that the materialisation of the risk results in a progressive transfer of resources from the more fortunate to the less fortunate. The transfer of funds helps the less fortunate to cope with the consequences of the risk occurring. Privately organised insurance indemnifies the victims of the disaster out of the pool of funds created from premiums paid by all those insured (including those who have not suffered from the disaster). With public or social insurance the less fortunate, such as the sick, elderly or unemployed, are paid out of the social insurance fund that all healthy, employed citizens have to contribute to. These examples represent a progressive and just way of collectively dealing with the occurrence of certain risks.

Taxpayer-funded bank bailouts do not, however, have this feature, and in fact the bank bailouts in the wake of the global financial crisis represented a regressive redistribution of resources, since taxpayers (many of whom are not necessarily wealthy or even 'well-off') had to bail out an industry regarded by many as comprised of well-paid, privileged constituents. Ironically, many of the bankers who took excessive risks were the employees that were being paid the largest amounts, and certainly, for bank employees, compensation often increased in line with their level of risk-taking. This represents a regressive and unfair approach to risk mitigation and it is bound to increase inequality in society, lead to problems of social cohesion and disrupt the very fabric of society. To this extent, taxpayer-funded bailouts can be regarded as very problematic for the financial system and civil justice.

We need an alternative way to govern risk in the banking industry.

The problems associated with taxpayer-funded bank bailouts are made clear by comparing such bailouts with the features of insurance. The comparison has shown that such bailouts are an inefficient and unfair way of dealing with the consequences of financial risk. They are inefficient because they represent an ineffective method of allocating liability for covering the costs associated with the occurrence of risk, and they are unfair because they represent a regressive, rather than a progressive, method of risk mitigation. To this extent, such bailouts should be avoided in the future and governments all over the world should search for ways to help taxpayers recoup the money expended on such bailouts, and ensure that the risk of bank failures is mitigated in the most efficient and fair manner possible.

/// KEY MESSAGES FOR POLICY

- Taxpayer-funded bank bailouts are not voluntary and the decision to impose them lies with governments faced with potentially devastating consequences for the financial system arising from bank failures.
- Bank bailouts as a way to resolve financial crises should be avoided in future, because they unfairly transfer the cost of a disaster onto those who had little role in it.
- The present system means that those who must bear the costs for the bailouts (i.e. the taxpayers), are unaware in advance of the full extent of their potential liability.
- In the aftermath of a taxpayer-funded bank bailout it is important that governments find ways of recouping the public funds spent on the bailout.

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PHOTO STORIES OF RESILIENCE

RESILIENCE can mean many things to different people, spanning art, culture, history, language, science and nature. What is fascinating about resilience is that it may not be limited to words. Photography can be used to explore a highly ambiguous term by revealing its meaning through pictures. IHRR recently held an online photo competition to see how people viewed resilience from their perspective. What we received in response was a wide range of photos, from portraits of people to landscapes, ways of life and survival. These photos tell stories of resilience in both personal and universal ways.

Small-scale agriculture being undertaken in very poor quality soil with the help of local irrigation at the periphery of a small oasis on the edge of the Sahara in Tunisia. Stephen Willis



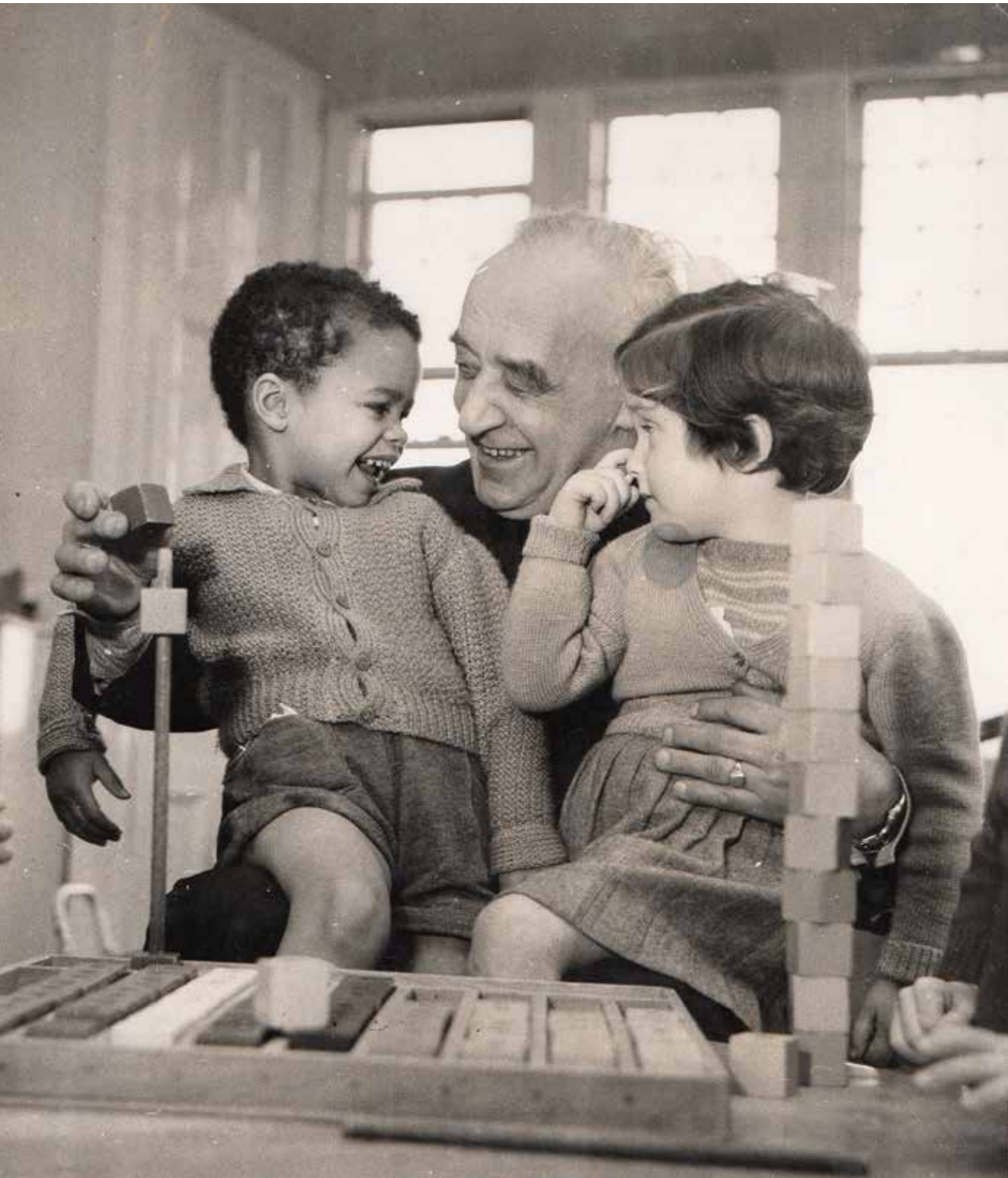
As temperatures dip to 3-4 C in winter, people without electricity in this village in North East India have only one option to keep themselves warm: burning fire wood and agri-waste. Access to firewood makes them resilient to the immediate hazard of cold weather, but exposes them to long term-hazards emerging from air-borne diseases caused by pollution. Ankit Kumar



A goat-herd in the foothills of the Albertine Rift Valley in Rwanda. Pastoralists in Rwanda, which has the highest population density in Africa, are making a living from grazing the road-verges in a landscape dominated by intense farming. Stephen Willis



Top: Natural forests on hill slopes reduce soil erosion in Rwanda. Rural areas are constantly at risk of small landslides occurring that threaten roadways as a result of over-grazing on steep slopes leading to large-scale soil loss. Stephen Willis. Bottom: Mt Yasur is an active volcano located on Tanna Island. Communities living on the island experience its fury during both the wet and dry seasons. Scientists have setup seismometers that detect tremors and send information to the capital Port Vila. This allows the people of Tanna Island tourists to visit the volcano when it is safe and gives warning when the volcano is active. Julian Templeton



David Divine grew up as a perplexed, anxious child on the banks of the Linn Falls in Morayshire, Scotland. He has fond memories of his experience living in an orphanage in his youth thanks to the loving relationships he had amongst peers and staff who nurtured him. He is now living as a successful adult, thriving in the 'outside' world. David Divine



Top: A tree that fell sideways in the Dalby Forest in North Yorkshire, England continues to grow. Pojanath Bhatanacharoen

Bottom: A flower bed on Palace Green in Durham city after snow fell throughout North East England. Despite the unusually cold weather these colourful primroses continued to bloom. Peter Swan



Installation of solar hot water systems in residential towers in Thane, Mumbai Metropolitan Region of India. In Thane it is mandatory by law for all new buildings to install solar hot water heating systems, which help reduce demand for fossil fuel-based sources of energy, mitigating adverse effects on public health and the global climate. Andrés Luque



Top: Wenchuan Yingxiu Primary School Photo Story Roving Exhibition. Zhao Liang
Bottom: Wenchuan Yingxiu Primary School Photo Story Roving Exhibition. Zeng Hongyange



PHOTOS SELECTED FROM

the Portraits of Resilience young people's photo project. Portraits of Resilience is part of the Many Strong Voices Programme. It illustrates in a personal way what climate change means to young people in the Arctic and Small Island Developing States and helps communities create their own visual archive of the environmental changes they are experiencing.

www.manystrongvoices.org



Top and top right: Mangroves protect the country of Samoa from soil erosion and add nutrients to the soil for growing banana and taro plants. The mangrove trees also share a symbiotic relationship with the coral reefs. The coral reduce the force of the ocean waves giving the mangrove calm water, while the mangrove roots filter soil and dirt that can harm the coral reef. Oswald Tapelu & Eneri Henry Reiher



Bottom: The village of Satoaleapai lies on the exterior of Samoa and has been plagued by flooding from heavy rains due to climate change. During the floods, children would have to travel to school by canoe. Through a UNDP grant they were able to build a bridge for people to cross the river and a sea wall to prevent the land from eroding. Louise Tapu



EXPLORING GEOHAZARD VULNERABILITY IN NEPAL

AN EXCITING FIELD TRIP to Nepal part of the Mountain Hazards Module for undergraduate students in the Department of Geography at Durham University, studied the science of geohazards such as earthquakes, landslides, floods and debris flows that frequently occur in this amazingly beautiful mountainous region. Learning about landslide mechanics, river dynamics and new techniques in remote sensing and field data capture, students led their own group research projects which were presented later at a conference in Durham. They also looked at the impact a large magnitude earthquake in the city of Kathmandu could have on the lives of the people living there. These photos from the field trip capture well some of the hazards they learned about and the communities vulnerable to them.



Top: Nick Rosser Bottom: Laura Barksby



Thea Gordon-Rawlings





Top: Nick Rosser Bottom: Celia Jacques



RURAL VULNERABILITY

Rural mountain communities are vulnerable to landslides that threaten their lives and livelihoods as these landslides can block vital transportation routes they depend on for survival.





Top: Thea Gordon-Rawlings

Bottom: Peter Bartlett



URBAN VULNERABILITY

Urban communities in Kathmandu are at risk of building collapses during an earthquake. Deaths and injuries are often caused by unsafe building construction, not by the earthquake itself.





Stuart Marshfield





Nick Rosser





Top: Charles Jefferson Bottom: Matthew Couchman



HAZARDS

Landslides and debris flows usually occur without warning as a result of seismic events, heavy rainfall or other environmental factors. In Nepal, a large number of landslides occur annually, many of them causing fatalities.

INVESTIGATING VOLCANIC HEALTH HAZARDS

DAVID DAMBY introduces the potential respiratory health impacts of ash from volcanic eruptions



NEARLY 10% OF THE WORLD'S POPULATION (500M PEOPLE) LIVE WITHIN 100 KM OF A HISTORICALLY ACTIVE VOLCANO

Small C. and Naumann T. 'Holocene volcanism and the global distribution of human population'. *Environmental Hazards*, 3: 93-109.



A **DISPROPORTIONATELY** high number of these active volcanoes lie in less economically developed countries, where rapid urbanisation and growing populations have increased the risk of future volcanic eruptions affecting public health.

Communities throughout the world continue to live within areas of active volcanism despite repeat, catastrophic eruptions, and some have developed measures to mitigate volcanic hazards, including engineering solutions, monitoring systems, evacuation plans and land-use restrictions.

While these measures address the immediate hazards posed by an eruption, chronic exposure to volcanic ash can be easily disregarded. Although it is not known to contribute greatly to the number of deaths caused by volcanic eruptions, volcanic ash is a potential respiratory hazard, especially from volcanoes that have long-lived eruptions that can last for decades.

HOW HAZARDOUS IS VOLCANIC ASH?

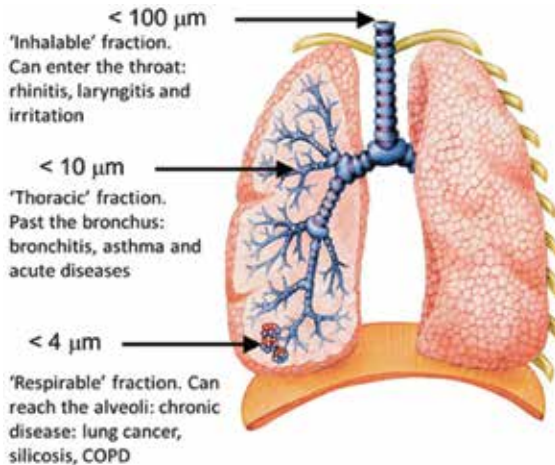
THE 1980 eruption of Mount St Helens in the United States sparked scientific interest in the study of volcanic ash as a potential health hazard from a range of scientific disciplines, including geology and toxicology. Since the Mount St Helens eruption, more than 80 studies have investigated the effects of ash on respiratory health at more than 25 different volcanoes. It is now widely known that breathing in volcanic ash results in irritation and worsens existing health conditions, such as asthma and bronchitis, but whether or not volcanic ash itself can cause chronic disease is an open question for scientific research.

When evaluating the chronic hazard posed by volcanic ash, the particle size, composition, and potential reactivity in the body all need to be considered. Eruptions that generate fine ash of a respirable size are of greatest concern. This is because respirable ash penetrates into the small airways and air sacs (alveoli) of the lungs, where it could cause adverse, long-term health effects. The amount of respirable ash varies greatly among eruptions. While many eruptions result in very fine-grained ash, some eruptions fail to produce enough respirable ash to pose a public health hazard. For example, ash samples from the 2010 eruption of Pacaya volcano in Guatemala contained no respirable material whatsoever.

Ash is comprised of a number of different minerals, but only some of them may be toxic. Crystalline silica is one of the volcanic minerals of greatest concern; it has been shown to be a potential human carcinogen in industrial settings and is the cause of the debilitating respiratory disease silicosis. In addition, the surface of an ash particle can be modified by the presence of reactive metals from the volcano, especially iron, which can result in the generation of extremely harmful free radicals in the body.

A particular type of eruption, known as a 'dome-forming' eruption, may be uniquely hazardous to respiratory health. During these eruptions, domes form when viscous or sticky lava piles up on the crater of the volcano instead of flowing away. These domes are extremely unstable and prone to collapse. Ash from dome-forming eruptions is particularly hazardous because it is very fine-grained and can contain an abundance of crystalline silica in the form of cristobalite, which crystallises within the dome prior to collapse. For example, cristobalite can comprise nearly one quarter of the ash from the ongoing (1995-present) eruption of the Soufrière Hills volcano on the Caribbean island of Montserrat. These results prompted the need for the silicosis hazard to be considered at other dome-forming eruptions near populated areas. For my research, we studied a selection of volcanoes in South Asia and Central America, where recognising hazards based on volcanic setting can significantly aid decisions made by hazard managers during a crisis.

Breathing in ash particles can affect human health in different ways depending on their size. Tiny ash particles can penetrate deep into the lungs causing damage and disease.

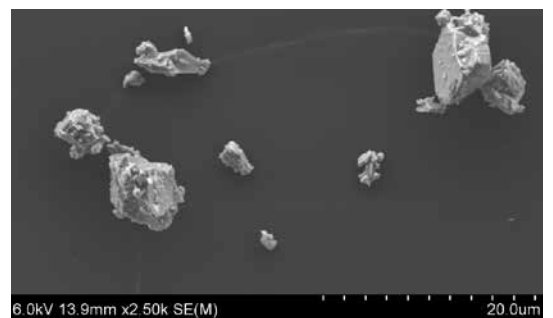
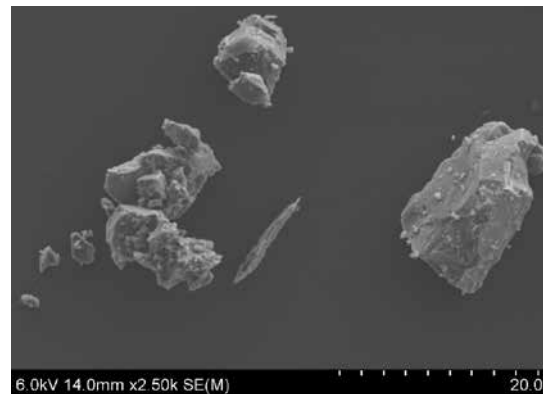


HAZARD AND EXPOSURE TO VOLCANIC ASH

TOXICOLOGICAL research on cristobalite-rich ash from dome-forming eruptions in Guatemala, Indonesia, Mexico, Japan, and the USA, found ash to be far less harmful to the lungs than the cristobalite concentrations might indicate. These data correspond with previous studies on ash from Soufrière Hills volcano, which found ash to be only mildly toxic. The International Agency for Research on Cancer (IARC) has noted that crystalline silica is not carcinogenic in all instances, depending on 'internal characteristics and external factors' which regulate toxicity.

For volcanic cristobalite, the diminished toxicity likely results from the following 'internal characteristics and external factors': first, individual ash particles are a mix of phases so people will always be exposed to particles that consist of a mixture of different minerals. Second, all volcanic cristobalite has substitutions of aluminium for silicon within the crystal; aluminium is known to make crystalline silica less toxic. Lastly, the concentration of cristobalite in volcanic ash may be insufficient to be a significant burden to the lungs.

These results, combined with epidemiological studies on Montserrat and following the eruption of Mount St Helens, find that the risk of silicosis from volcanic ash rich in silica is lower than anticipated.



Images of volcanic ash taken by scanning electron microscopy (SEM).

Long-term studies are difficult to do and inherently expensive because they require monitoring a population over an extended period of time, and require consideration of multiple demographics, such as healthy, elderly, and chronically ill populations.

The duration of exposure is crucial to health outcomes. Populations can be exposed to re-suspended ash through routine activities and by efforts to clean-up and remove ash from communities. On the island of Montserrat, where ash persists in the environment for years, gardeners were shown to have the highest exposure to re-suspended ash. Conversely, the majority of ash from the 2010 eruption of the Merapi volcano in Indonesia had been removed from towns and cities within weeks of the cessation of the eruption. For this eruption, exposure was probably minimal as the eruption took place during the rainy season, resulting in limited exposure to re-suspended ash.

Occupational exposure to volcanic dusts can also occur as deposits of erupted material are quarried worldwide for construction material and horticultural use. Workers in this industry may be exposed to similar concentrations of dust that lead to the better documented occupational lung diseases, such as black lung disease (coal workers' pneumoconiosis). Although ash does not appear to be highly toxic, results over the past 30 years suggest that precautions should still be taken to minimise exposure for high-risk individuals, such as those with tuberculosis, asthma or occupational lung diseases.

FUTURE RESEARCH AND IMPLEMENTATION

SUSTAINED population growth in areas with active volcanoes could continue to stress the capacity of local governments and international organisations to mitigate and respond to emergencies. For many natural disasters, monitoring and relief is concentrated in the immediate time frame of the event. Ash as a respiratory hazard is a longer term concern that may be overshadowed by more pressing public health issues. Health risks of ash may combine with factors such as man-made pollution, behavioural habits such as smoking, and individual susceptibility, especially with pre-existing conditions like tuberculosis, but may receive little attention from governments.

To reduce the potential for chronic hazards to go unnoticed,

the International Volcanic Health Hazard Network (IVHHN) has developed a 'rapid response' protocol, where ash samples can be tested for their potential to cause respiratory disease within days to weeks following an eruption. This rapid approach has been successfully implemented for a number of recent eruptions, including the 2010 eruptions of Merapi and Eyjafjallajökull. By working with local volunteers, governments, NGOs, health agencies and volcano observatories, potential hazards can be identified and information on preventative measures quickly disseminated to local communities where they are needed most. To aid this, IVHHN has also produced pamphlets for the public on the health hazard of volcanic ash, which can be mass-distributed to local populations (www.ivhnn.org). Future research into hazards posed by volcanic ash can help strengthen local planning and policy to mitigate respiratory volcanic health hazards.

David Damby is currently a research assistant in IHRR and the Department of Earth Sciences, having successfully defended his PhD as a Christopher Moyes Memorial Fellow. His thesis was on the respiratory hazard posed by crystalline silica in volcanic ash. He gratefully acknowledges the work of Dr Claire Horwell on crystalline silica at Soufrière Hills volcano, and her supervision throughout the PhD, and of Sabina Michnowicz on the quarrying of volcanic deposits.

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Further information on the effects of volcanic eruptions on respiratory health is available from the International Volcanic Health Hazard Network at www.ivhnn.org.

FOCUS

CLIMATE CHANGE AND MIGRATION: A EUROPEAN SOCIAL SCIENCE NETWORK

ANDREW BALDWIN introduces an exciting multidisciplinary research initiative at Durham University to address issues of climate change and human migration

The effects that climate change may have on human mobility are hard to predict and may pose a formidable challenge to societies around the world. The impacts of climate change are not certain and human mobility is not attributable to climate change alone, so the human mobility effects of climate change are not easily understood using the normal procedures of scientific research.

Some interpretations of the science of climate change suggest that climate change-induced human migration is inevitable, as rising sea levels and unpredictable climatic variability will dramatically alter the habitability of many parts of the world. When these environmental effects take hold, people will move.

However, the science of climate change involves uncertainty and the resulting challenge is familiar to many in the climate change policy community: How should we act in the face of uncertain

science? Moreover, for a growing number of scholars around the world, the challenges posed by the human mobility effects of climate change are not solely a problem of uncertainty in environmental science. Such challenges also demand a rigorous social science if they are to be properly diagnosed and managed.

This is why a group of European social scientists recently banded together to form an exciting new pan-European research network on climate change and migration based at Durham University: COST Action IS1101 *Climate change and migration: knowledge, law and policy, and theory*. The network recognises that while individual research can make a difference, a more concerted effort is required to address fully the complex social, political, cultural and economic challenges posed by the phenomenon of climate change-induced human mobility.

The Action provides the networking resources required to build a robust social science on all aspects of climate change and human mobility. It is sub-divided into three working groups – knowledge, law and policy, and theory – each of which approaches the

phenomenon from a unique perspective, each posing unique sets of questions, and each organised around unique methods and literatures.

- **Working Group I (Knowledge)** aims to develop a more robust empirical understanding of climate change-induced migration.

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- **Working Group II (Law and Policy)** aims to develop our basic understanding of the issue.

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- **Working Group III (Theory)** aims to furnish the scholarly debate on climate change-induced migration with a set of innovative, sometimes challenging, concepts and insights that will help us better conceptualise the various social, political, cultural and economic dimensions of the phenomenon.

One of its main goals is to put these various working groups into dialogue, to cultivate creative tensions and foster greater learning amongst a body of disciplinary scholars to move towards interdisciplinary research that will directly address issues of climate change and migration.

Website: <http://bit.ly/11gb7Ep>



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INTERVIEWS

The Dynamics of Disaster
with Professor Sue Kieffer

Professor Sue Kieffer is from the University of Illinois at Urbana-Champaign. During her time in the Institute as a Senior Research Fellow, Sue researched highly energetic geological events, particularly comparing and contrasting the behaviour of torrential river floods with that of large landslides. She is one of the world's leading authorities on geological fluid dynamics that address dynamic surface processes, such as movement of water and wind and the dynamics of volcanic eruptions and meteorite impacts. Her work has made a large impact on the geosciences, especially in understanding the geological processes that lead to different kinds of hazards, such as floods and landslides. Sue's research spans terrestrial as well as extraterrestrial environments as her geyser theory was applied to the study of volcanoes on Io, one of Jupiter's moons. Her shockwave theory was used to study the historic eruption of Mt St Helens in the US, as well as the massive flood on the Colorado River in 1983. Sue's forthcoming book *The Dynamics of Disaster* provides some unique insights into both geohazards and 'stealth disasters', such as climate change.

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What is your new book *The Dynamics of Disaster* about?

I'm a geologist, and I wanted to convey a sense of the science behind disasters and create a sense of unity, because I've found that if people are aware of disasters in one region, for example, near their home, they still might not understand, or even be aware of disasters in other regions. I believe that it is important for people, especially policy and decision makers, to understand the full scope of disasters. In the book I try to unify the science of disasters in this word 'dynamics'. Scientifically, I'm using that word to encapsulate that a disaster occurs when something in nature changes state.

In the book, I talk about disasters such as landslides, volcanic eruptions, earthquakes, rogue waves, tsunamis, droughts and floods. In detail the science for each hazard is quite different – what do droughts and volcanic eruptions have in common? For every one of these hazards energy changes from one form to another, what I call a 'change of state'. So, for example, when the Earth moves in a landslide, energy stored in the form of potential energy gets transformed into kinetic energy of motion. In a volcanic

eruption chemical energy stored in dissolved gases, like a soda pop bottle, gets transformed into kinetic energy as the gases nucleate and expand.

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What would you like people to learn from your book?

At the level of individual readers, I would like people to be aware of what the planet does and how it might impact them, their neighbours and communities. A good way to begin (for people in the US) is to contact their state geological surveys or the US Geological Survey. Similar agencies exist in Britain (such as the British Geological Survey) and many other countries. On a bigger level, I would like policy makers to understand enough about the science of these processes to help them in decision-making processes.

In the book and in papers that I've published, I've distinguished between natural disasters that basically result from the physical processes of the Earth, and disasters that I call 'stealth disasters'. These result from, and can even be caused by, humans and their interaction with the Earth. Compaction and poisoning of the soil, acidification of the oceans, and climate change are examples of stealth disasters.



Left: Aftermath of 2005 Hurricane Katrina in New Orleans.



Right: Mount St Helens.

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Why do you call them 'stealth disasters'?

Generally, a natural disaster has a fairly rapid onset – boom – an earthquake happens or a volcano starts erupting. Sometimes there are no precursors. Other times there are some warning signs, but the actual onset of the disaster tends to be rather quick. In contrast, stealth disasters or human-induced disasters have a fairly slow onset so they tend not to be noticed because they 'creep up' on us, like a stealthy predator. There were indications a hundred years ago about climate change but the signs were fairly subtle, and we didn't have the instrumentation or the global awareness to follow-up on it.

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You've talked about disasters within disasters in some of your previous work.¹ How do you define 'disaster within a disaster'?

I think Hurricane Katrina in the US is a good example. The natural disaster was the hurricane, the disaster within that disaster was the mismanagement of the evacuation. Even within that disaster there's another one. The more impoverished people lived in the lowest, and thus, the most hard-hit areas and were thus disproportionately affected by the hurricane and evacuation.

Although the hurricane event was geologic, the disaster within the disaster was something human-related. Again in the Tohoku earthquake and tsunami you had two natural disasters. The disaster within the disaster is that the Japanese had built on the deposits from a previous tsunami so they were living in an exposed area. Seeing what the Japanese do as they rebuild is going to be fascinating. They've got very limited liveable and tillable land, this is really valuable so can't just be abandoned. There are mountains nearby and I've seen sketches where they're going to have people live up in the mountains, for safety, but that's really hard on the fishermen who need to live near the coastline for practical reasons.

I think as we move toward a population of 9 billion on the planet projected for 2050, there's going to be a lot of pressure to live in hazardous places...

...and the Japanese will be pioneering problems that many nations will eventually face: how to live in equilibrium with natural hazards.

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What are the disasters that we're not talking about right now, that we should be?

I think it's more the stealth disasters than the natural disasters because stealth disasters don't grab newspaper headlines. They also require a longer attention span than a typical short election cycle, so many governments like the US and Britain don't have much capacity for the required long-term attention to stealth disasters. For natural disasters the biggest problem is the rare event. We don't even know what the precursors for an event that occurs only every thousand years look like. I think that is where geology is a very powerful science, and a very relevant science today, because if we're going to get clues about rare events it's going to be through the geologic record.

*For more geological insights from Sue visit her blog www.geologyinmotion.com. Her book *The Dynamics of Disaster* published by W.W. Norton & Company is available for pre-order: <http://www.amazon.co.uk/The-Dynamics-Disaster-Susan-Kieffer/dp/0393080951>*

¹ See Warren JL and Kieffer S. 'Risk Management and the Wisdom of Aldo Leopold'. *Risk Analysis*, 30, 2:165-174. DOI: 10.1111/j.1539-6924.2009.01348.x

1 INTERVIEWS

Developing Community Resilience Strategies with Kate Cochrane and Helen Hinds



PEOPLE who specialise in resilience planning may not be widely known to the public outside of the establishments they work in, but they are essential to public safety. Two of those individuals, working in resilience planning for the city of Newcastle in the UK are Kate Cochrane, Resilience and Business Continuity Officer, and Helen Hinds, Head of Resilience Planning. They share some of their insights into community resilience, better preparing for disasters and how academic research can inform resilience planning.

What is the biggest risk that the city of Newcastle faces at the moment?

HH: Newcastle has produced its own risk register and at the top is actually pandemic flu. This is based on the impact it could make. It's also one of the 'highest priority risks' on the UK's National Risk Register for Civil Emergencies. If you're looking at it based on process, that's our biggest risk.

What planning is the city doing right now for pandemic flu and other emerging risks?

HH: We did a lot of pandemic flu planning when we actually had swine flu. Most of our pandemic flu planning would be dealt through business continuity planning, because it's about knowing what critical services are, identifying them and making sure you can keep those going in an event of pandemic flu.

KC: It's about working with colleagues across the organisation, identifying what functions within the council that, if we didn't do [them], would increase people's likelihood of harm. Identifying critical services and working with them to find out how long those services can be down before the risk to the people they support increases. Do I have to get a service back up and running in 12 hours? In five days? Can it wait

longer? It's about developing those prioritisation scales, working out risks the council faces if we stop doing some bits. Pandemic flu and fuel shortage are the two hazards that stretch business continuity to its fullest extent.

What are you doing for community resilience at the moment?

KC: The very beginning of what we hope is a holistic approach to developing resilience within the city. Nationally, community resilience has been driven by communities coming together to write a plan. Now this is great if you've got communities that have a natural understanding of their risk environment. If you're a parish council that has seen and experienced flooding there's probably a driver to write a flood plan for your village. If you're a community that's living in a city centre particularly Newcastle, when we have flooding it tends to be surface water flooding instead of large floods so the risk



environment is not necessarily going to be as strong, but the impacts of a loss of something like electricity are going to be significantly higher.

When we're looking at community resilience it's from the perspective of a community that needs to be resilient to lots of things, not just hazards and threats that appear on our National Risk Register.

We're responding to the 'localism agenda' at the moment; it's about local areas essentially buying into the services that they want, a much more mosaic approach to community services. Does that support the resilience of the community? Has that community got sufficient capacity to be able to take advantage of the opportunities that kind of work offers?

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How would you like to see academic research inform resilience planning?

KC: Publish research in places where people who don't have big libraries or journal subscriptions can access it. At the moment it is incredibly two-tier. Academics talk to academics. Practitioners talk to practitioners and the areas where the two voices come together are very few and far between.

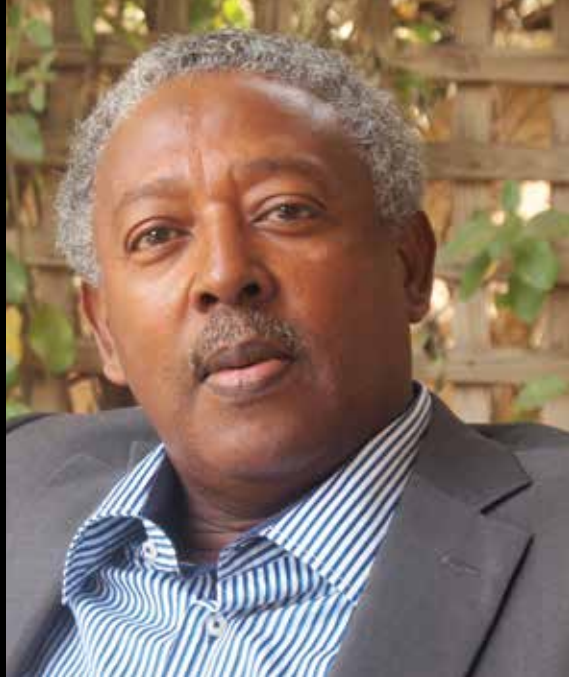
HH: It's the academics recognising that while the research is valuable for me I want to know what the practical application is. I don't want research that is just going to give me another set of problems. There needs to be some practical value or practical application that is obvious.

KC: As practitioners we don't have time to do the translation. And when the grant's finished and everything is published it's at that point because

of the way the academic grant system works. People move on and do something else, but that's at the time when it actually starts to trickle out into the practitioner community, but by then the people who've done it have moved on and are doing something else or are in different institutions. So it's like 'That's done! Next!' and there's no legacy of support.

There needs to be, at the start of the project, thinking about how it's actually going to be made available to the practitioners. Not just a case of publishing stuff at the end of the project and saying 'This is what we thought, this is what we've found. Bye'. Impact needs to be more than a word.

Identity and Development during times of Crisis: *A conversation with Professor Abye Tasse*



Brett Cherry speaks with **Abye Tasse** about the importance of identity in rebuilding after crisis

DURING a political upheaval leading to militaristic violence or a natural disaster that brings the history of an entire country to a standstill, the search for who we are and where we come from as individuals, communities and nations could not be of greater importance. When disasters occur, whether man-made or 'natural', we need to rebuild not only the physical structures of a former life, but also an identity. If the situation is bad enough people may be forced to leave the very places they first called home. They may have to travel to an entirely different social, cultural and political landscape in order to create a new life.

Many millions of people from Africa have experienced this situation firsthand and one of them, Professor Abye Tasse, who fled his home country Ethiopia at the age of 16, was forced not only to leave his family and culture behind, but also to immerse himself in an entirely foreign place, language and people in France. He is now a world-renowned international leader in social work education. His PhD

on *Ethiopians in France and the United States: New forms of migration* was later published as a book, and it received the highest honour in the French education system.

In France, he started work as a social youth worker in poor communities. Later he would describe their situation thus: 'The poor who have nothing, yet we have everything'. He foresaw the possibilities of poor communities moving beyond poverty and the plethora of other seemingly insurmountable challenges they face.

After he returned to Ethiopia, Tasse participated in the rebuilding of the country's School of Social Work by serving as its first dean at Addis Ababa University. The University provides teaching at undergraduate, master and PhD level. With the support of sociologist and social worker Professor Lena Dominelli at Durham University, he was elected President of the International Association of Schools of Social Work. His role in social work education included focusing on the development of African perspectives in teaching programmes and promoting anti-racist policies and practices.

Growing up in Ethiopia and migrating to France, Tasse possessed a distinctive perspective that combined both African and European values. He supports social work education that does not begin with a clean slate, but within a context indigenous to the area. According to Tasse: *Being successful with a community may be considered a populist approach. Understanding that people are not just there to be a subject of study, but want to understand the problems at hand.*

If you link with community you have to be very careful, because at the same time it's going to be seen negatively by a part of the academia who are supposed to be distant from the community and expect to know what's best for them. It's not easy to question the entire system.

You are not an outsider, but you are not an insider either. All the time you have to find a balance. The issue is if you don't know, you don't understand.

When social workers and scientists work with communities, especially those from non-Western societies, there is a tendency to apply 'solutions' that seem remote from the problems that people experience. There is also concern to

Below: Drought in Ethiopia.



avoid causing more harm, especially in regions of the world where people have endured countless tragedies from military conflict, or are attempting to recover from a natural disaster.

In founding social work education schools and programmes in Africa and Europe, Tasse '...emphasised methods for students to build knowledge about their own communities and articulate a new vision that's local to the communities they work in', rather than merely applying methods that were developed from outside.

It was thought that everything could be imported from Europe in terms of knowledge and culture. Many educated people were sent to Europe to learn techniques as if techniques were not embedded into a specific culture.

They suffered huge distress because they thought what they learned in Europe would be easy to transfer ... Rather than trying to develop their local knowledge, they just go on destroying the local and importing.

According to Tasse, during the social and political movements towards the European model of development in

Ethiopia, 'there was no systematic assessment made of what worked in the past and what didn't, it is as if we just started from a clean slate'.

In Tasse's view this does not mean that he dislikes European culture, values or practices, including solidarity, but rather he opposes a state of 'modernity' in countries of Africa that erases the ways of life of entire societies that had existed there for many years.

Europe has a beautiful culture that we can learn many things from, but we cannot learn from it if we don't know what we are. We cannot translate. We cannot even understand European model if we don't know from what point people are taking it from.

Tasse says when there was a movement towards Marxist political programmes and socialism in Ethiopia, attitudes were not much different from when the country had an Emperor. In both cases opposition was towards the Europeanisation and inequality of the society. In terms of class: *There has always been disproportion of wealth, but the issue is the distance between each social group and how that distance is widening*, said Tasse.

When dealing with issues of development and identity, rather than placing the cultures of two continents – Africa and Europe – in opposition it would be far better to examine closely how communities in Ethiopia, or other less developed countries in Africa, or the rest of the world, are able to build their own knowledge, as students would in Tasse's social work programmes, assisting them in ... 'articulating a new vision that's local to the communities they work within.'

'The issue is how to reconnect and somehow to push people to go deeper and look into solutions to problems from different perspectives', said Tasse. This means making use of indigenous and external knowledge to create something new and effective.

/// FURTHER READING

Butterfield A and Tasse A. *Social Development and Social Work Learning from Africa*. Routledge <http://www.routledge.com/books/details/9780415528160/>

Rethinking Management of Risk and Crisis *with Professor Edward Borodzicz*



Brett Cherry speaks with Professor Edward Borodzicz about crisis management in contemporary society

We don't rise to the level of our expectations, we fall to the level of our training.

ARCHILOCHUS



WHAT IS THE VERY FIRST THING

you should do when turning up at a crisis? Try standing back and having a cup of tea. 'Take it in, work out what's going on around you. The most important facility to have is to be calm and actually understand the event taking place because if you don't then you're not really understanding what you're responding to and firing off a response that may not be appropriate to the setting', says Professor Edward Borodzicz, an expert on risk and crisis management at Portsmouth University, who gave a seminar on

emergency and crisis at the Institute of Hazard, Risk and Resilience.

Borodzicz believes breaking the rules may be necessary to resolve a crisis that risk management has failed to address:

Risk management is done with the ultimate assumption that if you did everything correctly you would get rid of the risk. My argument is that we can't get rid of the risk, things will still go wrong despite our best and most valiant attempts to prevent risk.



According to Borodzic, the protocols or standards relied upon for emergencies are not appropriate for resolving a crisis. In fact, the rules in place could actually have contributed to or caused the crisis to begin with, or may make us even more vulnerable if they fail.

While reliance on technological systems in modern society has led to substantial improvements in quality of life, in some cases they have exposed human populations to new vulnerabilities. This is well-illustrated by transport systems

that have become highly sophisticated, but can easily fail if exposed to the 'wrong' hazard. In many cases all that is needed is a volcanic ash cloud or in the UK particularly, a snow storm, and suddenly the systems in place are severely hampered or could fail to operate altogether. Borodzic gives the example of communication infrastructure:

In terms of communication, we take it for granted that communication facilities are there and we can just pick them up and use them. And what you suddenly find is

that when they're not there our systems break down rather quickly, they're not very resilient at all, and we might be more vulnerable than we realise.

When standards fail to address the vulnerabilities inherent to the system new avenues need to be explored for managing crisis. Borodzic recommends that generic training for crisis management should teach teams to respond more flexibly during crisis events, by encouraging them to develop and run their own exercises for example.

Borodzic argues, 'the majority of the work is done by trainer, not trainee' and, '...the players should become the exercise designers'. Trainees would design specific scenarios where the rules don't work. 'If the rules work it's not a crisis exercise, it's an emergency response exercise. This forces them to find inventive ways of resolving the problem. I believe that's a really effective way of building capability', he says.

Going beyond the rules in order to manage crisis doesn't mean that people should not work to prevent risk – yet preparations should be made for when risk management fails.

We should still try to prevent risk. I think that's our duty as human beings to try and make the world a safer place, but there are times when those rules don't operate and the tipping point is the point at which you realise those rules no longer work and what happens next is crucial to the outcome.

/// FURTHER READING

Borodzic E. *Risk, Crisis and Security Management*. John Wiley & Sons.

IHRR RESEA

Pojanath Bhatanacharoen



POJANATH is a political scientist by training but a management researcher by trade. She is a postdoctoral researcher on Work Package 4 of the Tipping Points project, which explores how innovative ideas spread. Working on the premise that social realities are constructed through language, this part of the project looks at how ideas, buzzwords and concepts diffuse in different contexts. Notably, Pojanath has been investigating the origins of the term 'tipping point' and the process in which it became popularized and entered our everyday usage. True to the interdisciplinary nature of the project, Pojanath's other current

research covers a wide range of topics in the area of diffusion of innovation as well as persuasive communication, from the spread and usage of the term 'tipping point' in climate change and corporate crisis contexts to management fashion and management gurus. Her work on management gurus aims at understanding how a group of knowledge entrepreneurs have played a critical role in producing and disseminating new management techniques and ideas which, according to many commentators, lead to organizational changes.

Graham Coates



GRAHAM is an engineer with a PhD in computational engineering design. He is a Senior Lecturer in the School of Engineering and Computing Sciences at Durham University. His recent research focuses on emergency management in designing computer simulations for major emergency incidents in the UK in order to adequately manage and plan for these events before they occur. The EPSRC-funded REScUE project, on which Graham is Principal Investigator, uses agent-based simulation coupled with optimisation-based decision support to enable coordinated emergency response.

Agents are used to represent emergency responders, such as firefighters whose behaviour is defined by standard operating procedures, operating within a geographical environment. Simulating exercises to test plans for different kinds of emergency scenarios, assists authorities in developing preparedness at a local level. Research by Graham and colleagues can help local authorities study strategies for addressing emergency events and improve upon current emergency planning.

Lena Dominelli



PROFESSOR LENA DOMINELLI is a Co-Director of IHRR, leading the Institute's vulnerability and resilience programme of research. Lena has been involved with numerous projects in IHRR, including Built Infrastructure for Older People's Care in Conditions of Climate Change (BIOPICCC). She is a sociologist, social worker and community development worker, widely known for her contributions to social work education and social science research that has actively engaged with the needs of local communities.

She has led influential international research projects such as Durham University's ESRC Research Project Sri Lanka. Capacity building in social work education in the tertiary sector was one offshoot of this research into the immediate and long-term consequences of the 2004 Indian Ocean Tsunami. Additionally, the Durham University Project Sri Lanka that formed part of the ESRC study has now evolved into a registered charity dedicated to assisting communities in Sri Lanka with long-term reconstruction

RESEARCHER BIOS

and educational developments in schools. Lena has authored 24 books on the theory and practice of social work including her latest book *Green Social Work*, which explores the role of social work in addressing environmental crises and social inequality. She is especially interested in bringing people together in research dialogues across the physical sciences, social sciences, health

sciences and arts and humanities. Lena is a researcher on the exciting multidisciplinary research project Earthquakes without Frontiers, which brings together physical and social scientists along with policymakers to better understand earthquake hazards and help vulnerable communities prepare for them.

Claire Horwell



DR CLAIRE HORWELL is a Co-Director of IHRR and Geohazards Theme Leader in the Department of Earth Sciences. She originally joined IHRR as a Research Council UK Fellow in 2007. Claire's research focuses on the study of respiratory health hazards from volcanic ash. She is a pioneer in her field as little research has been done on the short or long-term health effects of human exposure to volcanic ash. Crystalline silica in volcanic ash is of concern to public health because in industry it is well-known that breathing in crystalline silica can lead to chronic diseases in the lungs, such as silicosis and lung cancer, and people with pre-existing lung conditions like asthma are particularly vulnerable. In her research, Claire

studies the ash from a mineralogical and geochemical perspective to understand the different features of the ash that might affect its toxicity, including the size, shape and composition of volcanic ash particles, along with measuring the crystalline silica content of the ash. Scientific research of volcanic ash can help to better inform policy on protecting populations from exposure. As Director of the International Volcanic Health Hazard Network (www.IVHHN.org), Claire works closely with government agencies in rapidly assessing the potential hazard of volcanic ash after an eruption occurs, allowing appropriate actions to be taken to safeguard communities from potential volcanic health hazards.

Nick Rosser



DR NICK ROSSER joined IHRR in 2007 as a Research Council UK Fellow and now serves on IHRR's management board. As a physical geographer, Nick is interested in changes in the landscape that lead to slope failures causing landslides and rockfalls. His research has contributed to the aims and mission of Durham's International Landslide Centre. He investigates how slopes fail in both the lab and field, gaining important insights that can assist risk management of regions highly prone to landslides, such as Nepal.

In the UK Nick's research focuses upon coastal rock slope collapse, and innovative approaches to monitoring and modelling this process. Specifically, Nick employs the latest 3D laser scanning technology to monitor deformations in the rock that can lead to hazards. Much of this work can be used to develop low-tech applications for landslide early warning systems that can be used by local communities at risk, and conversely in real-time slope safety monitoring systems in large opencast mines.

Institute of Hazard,
Risk and Resilience

Institute of Hazard, Risk and Resilience Durham University, Mountjoy Centre,
South Road, Durham, DH1 3LE, UK www.durham.ac.uk/ihr

The Institute of Hazard, Risk and Resilience (IHRR) supports the capacity of researchers from across Durham University to make a difference to how we live with emerging hazards and risks. IHRR is a nerve centre for innovative, interdisciplinary approaches to hazard and risk research in the UK and throughout the world. We are championing key research programmes in hazards, vulnerability and resilience. The Institute operates through a growing array of research projects and fellowships with significant external funding from UK Research Councils and other major grant awards and donations. It is involved in policy engagement in risk and hazard debates across much of the globe, strategy development with industry and wider stakeholders and also research

consultancy. Our research aims to improve human resilience to geohazards such as volcanoes, earthquakes, landslides and floods as well as those associated with climate change, terrorism, financial crises and use of modern technologies. It focuses particularly on the nature of hazard, risk and vulnerability in the developing world as well as developed regions. The Institute aims to develop radical new insight with regard to hazard and risk. By adopting an approach which directly engages policymakers, local communities and other stakeholders in the co-production of knowledge, the Institute aims to develop innovative policy and to increase social capacity for reducing vulnerability and harm.



Focus

The Institute is developing three areas of activity through interdisciplinary research, allowing problems to be framed in different ways and new theoretical approaches and understandings to be developed in relation to existing problems.

Hazards: how hazards are produced, particularly environmental hazards and notably landslides, floods, droughts, volcanoes, sea level rise and earthquakes; but also hazards that emerge in surprising ways, such as socio-technological and financial hazards.

Vulnerabilities and Resilience: the vulnerabilities and resilience of communities that have to live with hazards, notably those communities whose vulnerabilities arise from poverty, changes in life course and social isolation, and where these in isolation and combination reduce resilience.

Frontier Knowledge: innovative and creative ways of learning to live with the pervasive nature of hazard and risk, through new ways of risk learning, new forms of risk sharing and new ways of risk forecasting.

Examples of current research activities

Landslides: exploring both the spatial and temporal distribution of landslides, and the impacts that they cause (Figure 1).

Secondary Hazards: examining the controls on secondary earthquake phenomena, particularly landslides and river basin changes, in space and time, while collaborating with social scientists to explore ways these hazards affect communities in developing countries, in order to build resilience.

Climate Adaptation: understanding the diverse array of influences climate change has on species including humans, especially in the preparation of infrastructure needed for vulnerable groups, such as older people.

Tipping Points: researching the physical and social complexity of so-called 'tipping points' in past climate systems, historical and contemporary banking crises, knowledge diffusion and mathematics.

Resilience: developing innovative ways to build resilience in communities to the hazards that they face, ranging from threats from natural disasters (e.g. earthquakes in the Himalayas) through to acute social impacts.

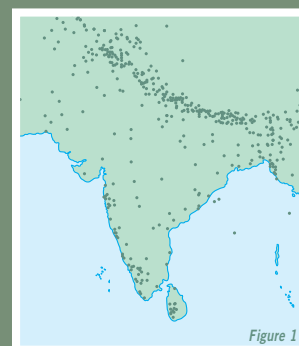


Figure 1



Jeff Orlowski, director of the groundbreaking film *Chasing Ice*, provides scale in a massive landscape of crevasses on the Svínafellsjökull Glacier in Iceland. James Balog, © 2008 James Balog/Extreme Ice Survey. chasingice.co.uk

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