







UK - Southeast Asia Scientists and Practitioners Seminar on Climate Change, Disaster Risk Governance and Emergency Management

# PAPERS AND PROCEEDINGS

02 - 03 December, 2008 Putra World Trade Centre Kuala Lumpar, Malaysia

Supported by



International Networking for Young Scientist (INYS) Programme British Council



Edited by Zaina Gadema Komal Raj Aryal

### Preface

We are delighted to introduce this set of Proceedings of the UK-Southeast Asia Scientists and Practitioners Seminar held at the 3<sup>rd</sup> Asian Ministerial Conference on disaster risk reduction in the Putra World Trade Centre, Kuala Lumpur, Malaysia. The seminar explored the linkage between climate change and disaster risk reduction. Many of the scientists used the opportunity to present pertinent issues elucidated from conducted research. In many cases, there was a strong sense of the need for greater cohesion between techno-centric and participatory approaches for capacity building, local governance, meaningful and equitable community participation, and structuralist institutions to help enhance local resilience.

Much was made of the social understanding of risk and resilience and the community perception of environmental change. Presentations from scientists and practitioners helped highlight emerging problems of increasing climate variability and climate severity as a direct result of anthropogenic climate change. Bangladesh, Taiwan and Malaysia focused on the problems of flooding from tropical storm, sea surge, and rivers. From the developed world context, the increasing number and severity of floods in the United Kingdom was explored and further confirmed the need for North-South collaboration in embracing adaptation strategies to mitigate the adverse and cross-border issue of climate change.

A range of models of good practice was presented, including a wide range of technological techniques for flood control systems, community based disaster preparedness and community based disaster risk reduction. Experience of professional practice upon emergency service encounters, largely in the developed world was presented. The importance of risk perception and governmental risk management in an uncertain climate was also explored. Approaches which facilitate the synthesis of formal governance structures with equitable community participation as models of good practice for emergency management systems and linking the academic to practice, was widely endorsed by those present.

Emergent themes of the conference surrounded the crucial and underpinning issue of squaring the circle between bottom-up and top-down approaches in disaster risk reduction. The central tenet of these approaches was the recognition of the need to urgently mobilise existing policy and quicken the rate of policy formation to readily address and enhance capacity, resilience, and vulnerability reduction.

We would like to thank all participants for their active involvement in the seminar. We would like to thank our hosts, the Malaysian Government and Universiti Putra, Malaysia, and representatives of the National Government of Nepal. Last, but by no means least, our sponsors, the DelPHE programme run by the British Council and funded by DfID, UK, and the ProVention Consortium.

We would like to thank the secretariat of the conference, Phil O'Keefe and Sam Jones who helped assemble these proceedings with great speed and accuracy.

Zaina Gadema and Komal Raj Aryal, Editors

## Contents

Julie Mennell: Welcome Addressiii
The Honourable Ram Chandra Jha, Minister, Local Development, Government of Nepal: Guest of Honouriv
Patrick Moody: Chief Guestv
Conference Papers1
From Vulnerability to Resilience: The Adaptation Continuum
Risk governance in Nepal: Reflecting on experiences with Risk and Resilience Committees 13
Climate change and infectious disease risk management: a localised health security perspective
Keynote Presentations
Climate Change and Disaster Risk Reduction in Korea
Session One 30
Climate Change and Urban Disaster Risk Reduction
Session Two
Risk Governance and Emergency Management 31
Session Three
Community based disaster and Emergency Management
Side Event
Strengthening Municipal and Village Disaster Risk Reduction Platforms through Risk and Resilience Committees in South Asia

## **Opening Address**

### Julie Mennell: Welcome Address

Honourable Ministers, distinguished guests, partners, and colleagues. My name is Julie Mennell. I am Dean at the School of Applied Sciences in Northumbria University. It is with great pleasure that I welcome you to the second UK Asia Scientists and Practitioner Seminar on Climate Change, Disaster Risk Governance and Emergency Management.

I am sure we all feel this conference is very timely, particularly given the terrible events in India last week, events, which shocked and saddened us all. These events make us fear for the safety of our families and ourselves and friends experience a similar feeling. As I myself was in India last week, during the and after the Mumbai attacks, these feelings are still very present.

As we made our way to Kuala Lumpar via Chennai, we found ourselves shocked once again by the scale and extent of flooding, which had claimed 50 lives, displaced many families and communities and devastated houses and businesses. These are examples I think, of the types of events, which happen around the world on a daily basis, that affect so many.

This is why it is particularly pleasing that we are here today to share our experience and expertise to influence disaster policy, practice, and actions. It is not just scientific discussions but the chance to forge new partnerships, which I am sure, will flourish and prosper for the benefit of many – now and in the future.

I hope that you will all find today and tomorrow informative, interesting and thought provoking. Finally, I hope to see you all at our fourth Dealing with Disasters Conference in November next year to be held in partnership with the Government of Nepal in Kathmandu.

I would now like to introduce an Honourable Minister Mr Ram Chandra Tha, Minister for Local Development, Nepal to say a few words.

# The Honourable Ram Chandra Jha, Minister, Local Development, Government of Nepal: Guest of Honour

On behalf of the Government of Nepal, I am delighted to formally open this session on Climate Change, Disaster Risk Governance and Emergency Management. I am particularly pleased that the Government of Nepal will host a similar conference, through my Ministry, in November next year.

The Government of Nepal considers disasters as a development issue. If a disaster management failure occurs, it will directly affect development. In turn, a failure in development will delay the attainment of the Millennium Development Goals (MDGs) which are the central plank of Nepalese development policy. A failure in disaster management delivery is simply a failure in a delivery of poverty alleviation.

An event such as this, where policy makers, practitioners and academics work together facilitates risk reduction initiatives. It is an opportunity to share and spread models of good practice in disaster risk reduction.

I wish to thank Northumbria University for organising this event and look forward to working with them on next year's conference. To all participants, may you have a fruitful conference here in Malaysia and I look forward to welcoming you next year to Nepal.

# Patrick Moody: Chief Guest

Honourable Ministers, Julie, ladies and gentlemen. I thank you for the opportunity to say a few words at this seminar. I am humbled by the academic firepower we have here today and I congratulate Northumbria University. Climate change is the defining issue of our era. Natural hazards are a perennial concern. This seminar brings the two issues together, and with good reason.

Better disaster risk reduction will also help us adapt to climate change. But reducing disaster risk is not a new challenge. Governments and communities in disaster prone countries have been adapting to a changing climate and managing disaster risk for a long time. Prudent policies and well informed community action could save lives and avert damage. For example, death rates from floods and droughts plummeted worldwide in the 20<sup>th</sup> century as a direct result of improved systems for river management, early warning and evacuation, and food security. Wise land use planning and the enforcement of sound building codes have also reduced impacts and costs. These are practical and cost effective every day solutions. However, as the pace of climate change increases, we need to intensify our efforts and support. No matter how much we do in the next few years to control greenhouse gas emissions – and we must do a lot – the global climate will continue to change.

More extreme weather is in store; more heat waves, drought and water shortages; more intense rainfalls, flooding and landslides and other changes, including disease. It is more urgent than ever to step up our preparations. The good news is that a natural hazard does not automatically have to lead to a disaster. Much can be done – good building design, proper land use planning, public education, community preparedness and effective early warning systems can also reduce the impact of severe weather events.

Risk reduction not only saves lives, it is also less expensive than responding to a disaster. A number of countries have reduced the impact of disasters by investing in measures such as flood control, hurricane proof building design, and protection of coastal ecosystems, including mangroves and coral reefs. We hope to hear more about such experiences and innovations from you today. New climate change adaptation strategies can learn a lot from existing work. The International Strategy for Disaster Risk Reduction (ISDR) and the UN Framework Convention on Climate Change (UNFCCC) both play a major role in bringing the climate change adaptation and disaster risk reduction agendas together, at both the national and international levels.

I am also heartened that the Bali Action Plan of the Framework Convention on Climate Change includes specific language on disaster risk reduction. The subject will also be the focus of a workshop at the climate change meeting in Poznan, which co-incidentally also begins today.

An important dimension of reducing disaster risk is making funding available. 10% of the funding the UK provides in response to a natural disaster goes to reducing the impact of future disasters. We are also committing over £35m (\$70m) for multilateral efforts, for example to the ISDR, the World Bank, UNDP and NGOs. This money supports disaster risk reduction programmes in countries such as Indonesia, Pakistan, Mozambique and Bangladesh. With additional funding from others, this work could be expanded and made more robust to help people adapt to the increasing impacts of climate change. But it's not too late. This seminar here today and the conference hereafter are evidences of our collective commitment to reducing disaster risk. It is by working together in this way that we can find innovative, robust solutions to address the problems created by a rapidly changing climate.

I commend all scientists and practitioners here today for your work and participation in this seminar.

## **Conference Papers**

# From Vulnerability to Resilience: The Adaptation Continuum

Phil O'Keefe, Geoff O'Brien\*, Zaina Gadema School of Applied Sciences, Northumbria University, Ellison Building, Ellison Place, Newcastle, NE1 8ST, UK. Tahia Devisscher, Stockholm Environment Institute, Suite 193, Banbury Road, Oxford, OX2 7DL, UK. \*Corresponding author email: geoff.obrien@northumbria.ac.uk

### Abstract

Accelerated climate change resulting in increasing variability due to anthropogenic greenhouse gas emissions is the single largest threat to the attainment of international goals of sustainable development and disaster risk reduction. Until recently, the main thrust in tackling this problem was the mitigation of greenhouse gas emissions. More recently, attention has focused on adaptation techniques to address climate change challenges faced by all countries, especially, poorer nations, as climate driven change and its adverse consequences are inevitable. Responding to that change means that adaptation must no longer be thought of as an add-on or ancillary to existing development programmes. It must be an integral part of our everyday decision-making; part of a continuum. This paper conceptually explores adaptation from a poverty perspective and argues that the thrust of adaptation must be to build resilient communities. The reason for this is straightforward. We argue that the first line of response to adverse conditions is the affected. Building resilience must start at this point. The key message is that resilience building to enhance community capacity to withstand and respond to adverse events must be a normative condition of development.

### Keywords:

Vulnerability; Poverty; Adaptation; Resilience; Sustainable Development; Disaster Management; Climate Change and Variability; Sustainable Livelihoods

### Introduction

Climate change leading to increased climate variability is the single greatest challenge to international goals. Failure to effectively address the anthropogenic climate change phenomenon will threaten the viability of future generations. Efforts to address this threat through the United Nations Framework Convention on Climate Change (UNFCCC) are welcome. However, until recently efforts have principally centred on greenhouse mitigation. This is future risk reduction. Though essential, it is only one of the two core elements embedded within the Convention. The second is adaptation, which is focused on current responses both to the long-term threat of

climate change and the urgent process of adjustment to the impact of increasingly severe weather events related to disturbances of the climate system.

The Convention wisely recognised the dual needs of responding to both current and future threats. However, until recently, mitigation received much, if not all the attention of the climate debate, while adaptation has featured weakly, much akin to the poor relation or "Cinderella". One of the perverse aspects of the UNFCCC Convention was the bundling together, in Article 4.8, the basis for negotiations on adaptation, the needs, and concerns of developing countries vulnerable to climate change and the adverse affects of climate protection measures on oil exporting countries. This effectively blocked progress on adaptation and it is only recently that progress on adaptation has been made. For instance, The Delhi Declaration on Climate Change and Sustainable Development in 2002 highlighted the need for all nations, not just the poor, to recognise the importance of adaptation. Arguably, high profile events such as the European heat wave of 2003 and hurricane Katrina in 2005, along with the economic analysis of the consequences of inaction, in the Stern Review of 2006 have cumulatively triggered and heightened greater interest in adaptation strategies.

Whatever the drivers, the Bali Road Map has set 4 distinctive pathways for negotiations leading to COP 15 (Conference of the Parties), due to be held towards the end of 2009 in Copenhagen. The 4 pathways are mitigation, adaptation, technological cooperation, and financial support. These categorised pathways form part of a comprehensive process, enabling full, effective, and sustained implementation of the UNFCCC through long-term cooperative action, now, up to, and beyond 2012 for the purposes of reaching agreed outcomes and adoption of a decision at COP 15. These pathways are to form 4 building blocks of the post-2012 regime. Adaptation has now been clearly and firmly placed on the international agenda. The question, however, remains: how is adaptation best achieved?

### Thoughts on Adaptation

A distinct lack of consensus exists on the meaning of adaptation. Nevertheless, views of adaptation definition are generally consigned to 3 broad categories including: (i) a process that would happen as part of societal development despite external interference; (ii) a distant, backburner type predicament requiring minimum intervention; and (iii) a process that deals with predicaments as a matter of urgency for the purposes of immediate action. UNFCCC does not define adaptation, though it is defined by IPCC in its third Assessment Report:

**Adaptation** - Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation (IPCC TAR, 2001).

Adaptation is not just adjustment to an average climate condition. It is a response to reduce vulnerability to extremes, variability, and rates of change at all scales (IPCC, 2001). This definition reflects the variety of views of adaptation ranging from an ecological concept in UNFCCC, to a series of actions and more recently, to a synonym for development (Schlipper, 2006).

Costs of adaptation are likely to be high, running at several billion US dollars a year for developing countries alone. Ensuring that climate change is mainstreamed into

development policy and international agreements is crucial. Meeting international goals such as the Millennium Development Goals (MDGs) will become more difficult unless adaptation measures are implemented. It is of equal importance that investment projects from whatever source are both "climate proofed" and "climate friendly."

To date funding for adaptation under UNFCCC and the Kyoto Protocol amounts to some US\$310m (Reid and Huq, 2007). Donors have provided bilateral funding of around US\$50m for adaptation activities for over 50 adaptation projects in 29 countries. The steadily increasing number of available funds prioritising adaptation as an integral component in dealing with uncertainties and consequences of anthropogenic climate change demonstrates the growing prominence of adaptation. Adaptation funds presently available are outlined in Table 1 below.

Fund	Purpose
SPA	The Strategic Priority on Adaptation (SPA) with \$50m of Global Environment Facility (GEF) funding supports demonstration projects. SPAs are intended to support projects that demonstrate ecosystem management concerns to show how climate change adaptation, planning and assessment can be practically integrated into national policy and sustainable development planning.
NAPA and LDCF	National Adaptation Programmes of Action (NAPAs) are available for Least Developed Countries (LDCs) through the Least Developed Country Fund (LDCF), which supports the development and implementation of NAPA projects, operationalised through GEF.
SCCF	The Special Climate Change Fund (SCCF), designed for finance projects directly related to adaptation activities in developing countries is a fund operationalised through the GEF.
The Adaptation Fund	The Adaptation Fund, established by the Parties of the Kyoto Protocol of the UNFCCC is a fund, which is aimed at stimulating adaptation projects and programmes in developing countries, though the fund is not expected to become operational until 2010 as it depends on a levy on projects realised through the Clean Development Mechanism.

Table 1.Funds Available for Adaptation

Source: UNDP, 2008

Inexorable linkages between climate change adaptation and development means that omission of adaptation from development is erroneous. Over a billion people are surviving on an income of less than a dollar a day (based on purchasing power parity (PPP)) (WFP, 2008). Poverty however, is more than a low-income indicator. People who live in poverty lack instrumental and substantive freedoms and are often forced to survive by any means possible (Sen, 1999). Daily survival in marginal areas poses a threat to human wellbeing (Kirkby and Moyo, 2001). Poverty means that livelihoods are unsustainable in the short term. It is therefore naive to assume that people living in poverty will, or are capable of, changing livelihood strategies solely in response to the threat of impending climate change.

In order for people, including those living in poverty, to meaningfully understand and address the impacts of climate change, it is important to realise that climate change and climate variability is an additional burden on poor people, and usually not the only or most significant. The Sustainable Livelihoods Framework in Figure 1 provides a useful depiction of the areas in which climate change can potentially exacerbate the range of stresses on people living in poverty. This illustrates the

linking context of vulnerability to that of livelihood outcomes by way of measuring livelihood assets and the need to transform structures and processes.



Figure 1: The Sustainable Livelihoods Framework Source: DFID, 2000

The framework describes livelihood assets and their relation to wider socio-economic, geopolitical and biophysical processes. Human assets include health, education and skills; financial assets include income, access to finance and insurance; physical assets include shelter, and other local infrastructure such as roads or hospitals; natural assets include the means of primary production as well as ecosystems; and social assets include access to groups through family or community. It follows that, if people have improved access to livelihood assets, they will have more ability to influence structures and processes so that these become more responsive to their needs (Ashley and Carney, 1999). Climate change has the potential to further reduce access to the entire range of livelihood assets.

Livelihood security and sustainability necessitates recognition of climate variability and severity as central factors shaping and underpinning the context of vulnerability as depicted in the sustainable livelihoods framework. The IPCC definition of vulnerability is as follows:

"Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC, 2007, p883).

The use of the term vulnerability is significant because it implies a human ethical dimension not found in the use of the term sensitivity (Downing and Lüdeke, 2002, in Reynolds and Smith (eds), 2002). Vulnerability and risk form chronic and cumulative burdens in situations, particularly where traditional coping strategies have eroded or collapsed. Impacts of maladaptive livelihood responses frequently include heightened mortality (death) and morbidity (ill-health), negative effects upon the economy and 'development', increased stress on environmental resources, and a large diversion of resources from other pressing needs due to environmental degradation (Holling, 2001; SEI, 2002).

It is of crucial importance to understand the vulnerability context of people's livelihoods, rather than suppose we are uniformly 'vulnerable' to climate change as a society or region. If parameters of analysis include the pre-existing vulnerability context of people who live in poverty, there is greater scope for addressing

immediate survival needs, as well as any future adaptation that may be necessary in the face of a changing climate.

### **Contextualising Adaptation**

Though vulnerability provides a departure point for thinking about adaptation, it is necessary to consider where we wish to travel. While we can characterise the type of threats that climate change and increasing variability will present, we cannot accurately predict occurrence of future events, their likely severity, scale or level of impact. Essentially, adaptation is about preparing for "produced unknowns". This means that we cannot develop risk reduction strategies as we cannot identify what the nature of the risk will be. As such, the most effective strategy is to enhance preparedness. In other words, building the capacity of communities to be able to respond to, and cope with, adverse events. Building adaptive capacity implies that communities will need to be more self-reliant. This can be contextualised as resilience building (O'Brien et al., 2008).

It is the current core assumptions within the disaster management paradigm that need to be questioned, namely that disaster response agencies are the first line of response. Indeed, agencies are the first line of institutional response, not the first line of *response*. The first line of response or assistance is not delivered by agencies. It is those "left standing" or "survivors" that are the first in-line to deliver pragmatic assistance and it is they that initiate response and recovery phases. Simply put, people do not lie around waiting for help to arrive. From this perspective, it is clear that efforts at enhancing response and recovery capacity need to start at the community-level. This is vital in risk assessment, often conducted by external agencies and typically expert-led rather than people-led. Whilst expertise is important, indigenous and local knowledge together with know-how, provides valuable insights into local vulnerabilities necessary for enhancing preparedness. Being involved with, and engaged in response and recovery is a necessary part of developing coping capacity for effective long-term adjustment to the aftermath of disruptive events.

Putting this into context is important. Simply dealing with a plethora of highly dynamic issues using existing techniques that are limited in scope, leads to inadequacy and inappropriate measures. Re-thinking adaptation from the perspective of those directly subjected to and who initially suffer adverse impacts, whether through rapid or low onset disruptions, requires a focus on enhancing coping capacity.

People-focused resilience building requires change. This can mean radical change as scale of change is dependent upon vulnerabilities. For instance, the presidentelect of the Maldives, Mohamed Nasheed, proposes creating a sovereign wealth fund to buy land elsewhere as a climate change adaptation option (BBC 2008). For many Small Island States this may be the only viable option. Stern argues that we need to act now to minimise future adversity (Stern 2007). This raises some challenging issues. For example, in the aftermath of hurricane Katrina should a city be recreated to previous specifications merely to restore the status quo, or should significant adjustments be made to create a new reality, one that recognises changed circumstances?

These are challenging issues for public policy. It is within this debate that we begin to see "climate proofing" not simply as an add-on or ancillary objective, but an integral part of policy. Adaptation occurs in a number of ways (autonomous, anticipatory and reactive) and at different spatial and temporal scales. For effective responses to produced unknowns, adaptation needs to be purposeful and aimed at enhancing preparedness through resilience building.

Resilience is used in many disciplines including ecology (Holling 1973), economics (Arthur 1999), sociology (Adger 2000), psychology (Bonnano 2004) and disaster management (Manyena 2006) to characterise the response of complex and dynamic systems to disruptions. Resilience is the capacity of a system to absorb and respond to changes (internal, external and different scales) whilst retaining its functionality, structure, identity and feedbacks (Walker et al., 2004; Gallopin 2006). Resilience is not focused on *"what is missing in a crisis (needs and vulnerabilities) but on what is already in place (resources and adaptive capacities)"* (O'Brien et al., 2006:71).

Resilience, vulnerability, and adaptation are inexorably interrelated and overlapping issues. Resilience counters vulnerability and resilience building is the purposeful process of enhancing capacity to respond to disruptive events. Resilience is defined by the UN/ISDR as:-

"The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures."

### (UN/ISDR 2004: Annexe 1)

Resilience building is a purposeful intervention aimed at enhancing capacity with learning as a cornerstone. Resilience is often described as a quality or state. In reality it is not a metaphor but process. It implies there is no steady state, no notions of equilibrium or end result. It does however imply that it is about outcomes. All outcomes are negotiated processes and therefore, require negotiation. At its core, negotiation is based on notions of entitlements (the right to a safe and secure environment) and obligations of governance (being part of, and engaged with, the process). In this sense resilience is the central point of a process or continuum that has vulnerability as its starting point and the development of resilient communities as its overall objective.

### The Adaptation Continuum

In poverty, people face the "vagaries of nature", no more so than when extreme weather events increase as an outcome of climate change. Development seeks, among other things, a natural environment that is more uneventful. Ironically it does this most effectively when it enhances both natural and social systems' diversity. Diversity is key to building resilience. Social diversity is key to building community resilience.

In attempting to link adaptation to poverty alleviation and development, particularly through Poverty Reduction Strategies (PRSPs), we need to drive the adaptation process forward, to reach a point where issues of resilience in development processes begin to arise. Interestingly enough, resilience success gives a positive feedback to questions of impacts and vulnerability, returning to the initial starting point in climate adaptation. This process is termed the "adaptation continuum" and is illustrated in Figure 2. The three key stages of this continuum are:

- 1. Vulnerability to Adaptation
- 2. Adaptation to Development
- 3. Development to Resilience

### The Adaptation Continuum



### From Vulnerability to Adaptation

Much of the literature recognises that reduced crop yields, expanded zones of vector borne diseases, eustatic rise (sea-level rise), and other effects of climate change will affect those most vulnerable as the most vulnerable are often the poorest with the least capacity to adapt. The key question regarding adaptation scope or coverage has to do with what matters to those who are most vulnerable to climate change impacts. Developing a framework to better understand the coverage needed in the shift from vulnerability to adaptation, concerns metrics of impact that focus on the direct effects on community or household assets. In other words, it involves considering what is at risk and what/how much is potentially lost. This is particularly true when thinking about financial, institutional, and social assets currently enjoyed but increasingly at threat without appropriate adaptation interventions. What matters in terms of developing adaptation measures are the livelihood assets and capital that characterise the Sustainable Livelihoods Approach; namely human, natural, financial. physical and social. Adaptation solutions need to relate to these assets. Hence, the scope or coverage for this transition segment of the adaptation continuum (i.e., from vulnerability to adaptation) implies careful consideration of the specific assets at risk.

In adaptation, scale is fundamentally significant as it is this spatial condition, be it, local, regional, national or international that shapes the extent to which (if at all), processes are delivered. While an impact assessment is limited to one scale, studies show that adaptation processes take place across different scales. Moving the debate from vulnerability assessments to adaptation requires the application of different set of tools and methodologies that allow for the integration of information and concerns. No single methodology fits due to the range and extensive nature of the problems that need to be tackled.

Perhaps the most critical element in the vulnerability to adaptation process is the integration of the obtained outputs in the political or policy dynamic. It makes little

difference to apply methods/tools to identify the most suitable adaptation initiatives, or to develop innovative communication protocols to transfer the results to decisionmakers, if these activities do not result in concrete outputs supported by budget line items, new legislation, and/or leverage of new financial sources. Affecting the political and policy dimensions must be the ultimate test of efficacy of the vulnerability to adaptation process.

Integrating the outputs in political and policy dynamics requires engaging politicians through lobbying, mobilising public support through information campaigns and steering the attention of powerful ministries (i.e., finance ministry, planning ministry) towards these outputs. Also, to effectively engage and affect the political and policy dimensions, questions about who is responsible for the implementation and management of adaptation projects/strategies in the country need to be considered.

Finally, measures that are generated in the vulnerability to adaptation process cannot be viewed in isolation. Consequences of an adaptation strategy may influence and shape sectoral policies, livelihoods and food security, social networks and so on. There is a need to reflect upon an adaptation strategy and provide feedback in order to integrate it into the broader context of development. The following section provides further insight on the process of integrating adaptation and development.

### Adaptation and Development

Attempt to steer the adaptation agenda firmly within development planning requires adoption of a new perspective. In many senses, the adaptation-development perspective is somewhat parallel to successful pre-disaster planning, but pre-disaster planning itself has rarely managed to engage with the development agenda. While there has been continuous discussion of the relief through development continuum, the debate has treated pre-disaster planning and development as separate entities, instead of focusing on their synergies and potential contribution to effective planning. A successful adaptation-development agenda could substantially reduce the cost of emergency disaster assistance. In the event of simultaneous disasters, increasingly likely as climate change accelerates, the increased demand on national and international disaster relief bodies could overwhelm local coping capacity. Selfreliance realised through effective pre-disaster and adaptation planning, as an integral part of development and aimed at capacity building for the most vulnerable. is a more effective means of disaster risk reduction. This approach builds resilience to respond to, and recover from climate change impacts, and is more effective than a reactive post event approach. Strategies for adaptation to climate change combine relief, reconstruction and rehabilitation, seeking to promote sustainable conditions and self-reliance.

Integrating adaptation into development planning broadens the metric of impact beyond direct effects (e.g., economic damages, lives lost) to health, social and economic effects (e.g., morbidity, livelihood security, economic investment and growth). The core metric is one where the reduction in mortality and morbidity are measured together with a reversal of the loss of livelihoods. The coverage in this transition can be defined, for instance, by the close inter-dependence between primary production systems, subsistence livelihood strategies, climatic conditions, food security, and income generation. In this sense, the impacts of climate extremes such as droughts, floods and heat waves are measured not only by how much is lost but also by the effects on development and livelihoods of people that depend on primary production for their subsistence. It is important to bear in mind that climate factors are not the only factors that stress subsistence systems. Issues of markets, subsidies, access and cultural norms add to the challenge of assuring food security and alleviating poverty.

### **Development to Resilience**

The development to resilience transition starts with the recognition that entitlement negotiations and good governance are essential departure points for sustainable development strategies. Key characteristics of enquiry are to improve coping mechanisms across a range of traditional and modern adaptation technologies, together with an analysis of community and socially centred bounce-back structures that ensure recovery and continuation of the development trajectory. Validation of the change to a development-to-resilience paradigm requires evidence that the negative impacts of adverse weather events and climate trends have been significantly reduced.

Development and, in particular, poverty alleviation seeks to reduce adverse effects of the impacts of variable events by building resilience. Resilience building focuses on improving coping mechanisms and the capacity to recover from disruptive events. This is also termed as bounce-back ability. As diversity is key to building resilience, bounce-back ability is achieved most successfully when both natural biological and social systems' diversity are maintained and enhanced. Together these processes will help in building livelihood capital and entitlements. However, the processes must be realised through negotiation. Negotiation should be seen as transparent and be led by the recipient. Imposed solutions will not work.

Resilience building requires a positive feedback process that reduces impact. Moreover, building bounce-back ability needs appropriate information sets, knowledge of the range, effect and cost of adaptation technologies (both modern and traditional), and access to technologies and recognition that technology, in the broadest sense, changes relations between people and between people and nature.

An enabling and learning environment for knowledge-based activities is essential for promotion of social resilience across a range of scales. Different settings can be more or less conducive to effective learning. Learning requires reflecting upon experience and considering values held by individuals and interest in the process of cognition and action. While 'single loop' learning increases the skills of an individual in an activity, 'double loop' learning begins to question the framework of assumptions and beliefs. It is this latter learning process that can be an instrument for change, and change can enable a paradigm shift. Reflection and an enabling learning context can allow for emerging knowing and new understanding. This builds social resilience. Table 2 highlights the change in understanding/structures required to inform adaptive management for the planning of a new resilience paradigm.

Table 2.	Changes Needed for a New Resilience	Paradigm
	5	

From	То
Isolated event	Development process
Risk is not normal	Risk is an everyday event
Centralised response	Participatory adaptive capacity
Low accountability	Transparency and negotiation
Status quo restored	Transformation

There are three main points sustaining this paradigm shift shown in Table 2. These are:

- 1) An understanding that the new paradigm is a dynamic process that has the quality to change and evolve over time;
- 2) The move from a top-down to a more bottom-up (participatory) approach is needed; and
- 3) The recognition that one perspective is not more credible than the other, but need to be integrated into an enabling framework.

The first point recognises that development can never be risk-neutral and that all technological changes have risks associated with them. As such, it acknowledges that risk is "normal" and part of the development process as opposed to an isolated, one-time event. Most important, this point recognises that building resilience to climate change is a process that can change and evolve over time. This means that coping mechanisms should not necessarily seek to restore the status quo of a system, but should develop the capacity to adjust to new kinds of future. One of the challenges that increased climate variability is bringing in the short to medium term and climate change in the medium to long term is the challenge of "produced unknowns". Though the likely outcomes of a rapidly changing world, driven by a shifting climate are broadly known, the actual outcomes cannot be predicted with any precision. This is particularly relevant at the local level where impact science has only produced a broad brush or sector focused output that is time bounded. Responding to produced unknowns is challenge that can only be addressed through strengthening coping capacity in ways that enable it to flexible and adaptive to the variable challenges it will encounter.

The second point supports the shift in understanding resilience from an outcomeoriented perspective, which is essentially a top-down and centralised approach that oftentimes lacks accountability; to adopting a process-oriented approach that allows for participation, learning, and bottom-up processes. The process-oriented approach has its focus not on needs and vulnerabilities, but on existing resources and adaptive capacities.

The third point acknowledges that while this paradigm shift is key in resilience building, it is important to keep in mind that both perspectives bottom-up/processoriented and top-down/outcome-oriented are necessary in the process and need to be complementary. In short, a top-down enabling framework that encourages bottomup resilience building is the most effective framework.

In short, the underpinning of resilience planning for adaptation includes sustainable development, risk avoidance, least cost intervention, organisational and social learning, and exploring environmental surprises and tipping points that lead to catastrophic change that moves systems beyond the limits in which resilience can effect a recovery. Resilience planning should be normalised as part of the development process as an issue of social justice. In this vein, resilience planning should be wholly embraced and considered fully as a central facet of resilience rather than an ancillary aspect. It must be measurable to ensure robustness, transparency and allow scope for ongoing improvement.

### The Adaptation Continuum Framework

The shift from an impact science to vulnerability is one of adding the social perspective, but the move from vulnerability to adaptation and development is one in which social perspectives are understood as dynamic actor-network processes in addition to traditional vulnerability analysis, often based on bio-geophysical indicators. It is this shift in perspective that places people at the entry point, and prompts the process to integrate socio-economic development and adaptation to bio-geophysical impacts. This process will lead ultimately towards building resilience that requires a paradigm shift.

Institutionally, NGOs can function on a number of scales that allow a shift from impacts to vulnerability and from vulnerability to an adaptation focus at the local, national and international level. The link between adaptation and development is mainly related to activities of national governmental institutions, and the transition from development to resilience is mainly achieved at the community level. This denotes the complexity and continually changing nature of scale in the adaptation continuum.

The complexity of the scale of action in the adaptation continuum can be better understood when analysing the sets of information required for the process. To assess impacts, biophysical data sets are necessary, whereas vulnerability analysis requires the addition of social data to inform the system. The key characteristics of problem statements of vulnerability, which occur at different scales, vary from impact statements that are defined for specific places and scales. The impact of climate change is conditioned by the variability of vulnerability across space, social groups and economic conditions. Social mapping of vulnerability reflects how vulnerability can be simultaneously constructed in different scales and across time.

### Conclusion

It is important to draw adaptation strategies from a wide range of traditional and modern interventions rather than take interventions from a single impact analysis that implies universality to adaptation that is not available. Building adaptive capacity requires moving forwards to consider actor-network dynamics. In this context, integration of adaptation and development needs to be informed by data on economic and institutional processes. Finally, moving from development towards resilience requires data that provide insight on coping mechanisms and a system to measure the positive feedback process of resilience that reduces climate change impacts.

### References

Adger, N. W. (2000) **Social and ecological resilience: are they related?** Progress in Human Geography, Vol. 24 No. 3, pp. 347-64.

Arthur N. W. (1999) Complexity and the economy, Science, Vol. 284 No. 5441, pp. 107-9.

BBC (2008) **Plan for new Maldives homeland**, BBC News Online 10<sup>th</sup> November 2008. Available at: <u>http://news.bbc.co.uk/1/hi/world/south\_asia/7719501.stm</u>

Bonnano G. (2004) Loss, trauma and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, Vol. 59 No. 1,

DFID, (2000), [online], Available at: www.livelihoods.org

Gallopin G.C. (2006) Linkages between vulnerability, resilience, and adaptive capacity, Global Environmental Change Vol 16 pp 293-303.

Holling C.S. (1973) **Resilience and stability of ecological systems**, Annual Review of Ecology and Systematics 4, 1–23.

IPPC (2001), **Third Assessment Report**, [online], Available at: <u>http://www.ipcc.ch/</u> and <u>http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-spm.pdf</u>, Accessed

Kirkby S.J. and Moyo S. (2001), **Environmental Security, Livelihoods and Entitlements. Negotiating Poverty New Directions, Renewed Debate.** Eds Middleton N, O'Keefe P and Visser R, Pluto Press, Chapter 9, 148-161

Manyena S.B. (2006), The concept of resilience revisited, Disasters, Vol. 30 No. 4, pp. 433-50.

O'Brien G. O'Keefe P. Rose J. (2008) The Vulnerable Society, Area 40.4, 520-521

O'Brien G. O'Keefe P. Rose J. Wisner B. (2006) Climate change and disaster management, Disasters, 30(1): 64–80, pp. 20-8.

Reid , H., Huq, S., 2007, Adaptation to Climate Change: An IIED Briefing, International Institute for Environment and Development. Available at: http://www.iied.org/pubs/pdf/full/17006IIED.pdf

Schipper, E., L., F., 2006, **Conceptual History of Adaptation in the UNFCCC Process**, Review of European Community and International Environmental Law, 15 (1) 2006. Blackwell. ISSN 0962 8797.

Sen, A., 1999, Development as Freedom, Oxford University Press, Oxford, UK.

Stern N. (2007) The Stern Review: The Economics of Climate Change, Cambridge Press

UN/ISDR (2004) Living with Risk: A global review of disaster reduction initiatives, UN/ISDR, New York. Available at: <u>http://www.unisdr.org/eng/about\_isdr/bd-lwr-2004-eng.htm</u>

UNDP, (2008), **The GEF Adaptation Funds**, [online], Available at: <u>http://www.undp.org/gef/adaptation/funds/04\_1.htm</u>, Accessed November, 2008

Walker B. Holling C.S. Carpenter S.R. Kinzig A. (2004) **Resilience, adaptability and transformability in social-ecological systems**, Ecology and Society 9 (2) art. 5. Available at: <a href="http://www.ecologyandsociety.org/vol9/iss2/art5">http://www.ecologyandsociety.org/vol9/iss2/art5</a>

WFP, (2008), **WFP Crisis Page: High Food Prices**, [online], Available at: <u>http://www.wfp.org/ENGLISH/?ModuleID=137&Key=2853</u>, Accessed November, 2008

## Risk governance in Nepal: Reflecting on experiences with Risk and Resilience Committees

Dr. Samantha Jones\*

School of Applied Sciences, Northumbria University, Ellison Building, Ellison Place, Newcastle, NE1 8ST, UK. \*Corresponding author email: samantha.jones@northumbria.ac.uk

### Abstract

This paper reports on fieldwork in Nepal, which produces a comparison between two communities of their perception and experience of risk. In particular, it explores contrasting ideas of risk governance based upon a community survey as well as in depth interviews with risk and resilience committee members. The paper moves to a tentative conclusion that suggests, in more urban areas the existence of a formal structure embedded in local government is a necessary but not a sufficient condition for disaster risk reduction; in contrast, in rural areas disaster risk reduction discourse is more difficult because of the overwhelming priority of maintaining livelihood security.

### Keywords:

Community based disaster risk reduction, Nepal, livelihoods, risk and resilience

### Introduction

This paper explores community based disaster risk reduction and locally based disaster risk reduction (embedded in local government) drawing on some 'action research' conducted in Nepal.

### Community Based Disaster Risk Reduction (CBDRR)

Community based disaster risk reduction emerges from the rationale that communities have the capacity and knowledge to reduce disaster risk. CBDRR was promoted by the Hyogo Framework and is consistent with the decentralization agenda. In Nepal, decentralisation has been facilitated by the local Self-Governance Act of 1999.

### Academic perspectives

There are four broadly related concerns that emerge in the academic literature.

First it has been noted that effective CB approaches need strong state support (Veron 2006) but DM in poorer countries is characterised by missing expertise of the state (Rajan 2002).

Second, in community driven development it has been argued that Poor and marginalised groups may not get their interests met as local elites may capture resources (Pelling 2007, Veron 2006).

Third, it has been suggested that CBDRR may be an added burden to communities, especially when not matched by resources (Allen 2006, Mansuri and Rao 2004) and where livelihood strengthening is a higher priority for local people than disaster preparedness (Paton and Johnson 2001, Chen, Liu and Chen 2006).

Finally, it has been noted that there is little research on effective institutional arrangements (Rajan 2002) or factors promoting/ undermining community institutions (Coombes 2007).

### **Research Questions**

These academic concerns have influenced the research questions for this project and these are as follows:

- 1. Where does 'the community' think responsibility for DM should lie?
- 2. To what extent do CBDRR institutions represent the interests of marginalised/vulnerable groups?
- 3. How are communities interested or motivated in DRR (are they only interested in livelihood strengthening)?
- 4. What institutional arrangements are most effective, sustainable and show greatest capacity for DRR?

### Introducing the Risk and Resilience Committees

The research case studies were facilitated through a DelPHE project awarded to Dr Andrew Collins in conjunction with Kathmandu University, entitled 'People centred hazard and vulnerability mitigation for DRR in Nepal and Bangladesh'.

The project has enabled a number of exchange visits and seminars, and has led to the establishment of two risk and resilience committees. Quoting Komal Raj Aryal, (Research Associate of Northumbria University, Newcastle): "*Municipal or village platforms that monitor, record and promote localised DRR and dialogue.*"

The two RRC case studies are quite different in that one can be regarded as an example of community based disaster risk reduction (as a CBO) while the other is an example of locally based disaster risk reduction (an independent group but embedded within local government).

The first of the two RRCs was formed in the Panchkhal Valley, approximately 30 km east of Kathmandu and is near to Kathmandu University. It is a relatively rural location and is an important area for vegetable production supplying Kathmandu. It was established through a series of participatory workshops which included: hazard and vulnerability mapping; identifying the most vulnerable groups; matrix ranking of risks; and spider diagrams to explore priorities for risk reduction.

A community based organisation was formed and committee members included a chair of the VDC and other local group leaders (women's, cooperative, scheduled castes).

Their activities have been overseen by Kathmandu University and academics have attended the RRC meetings. So far, the RRC has constructed a holding board to publicise their existence; they have established a relief and compensation fund for

people affected by disasters and they have planned a pesticide awareness training programme.

The second case study is from Dhankuta Municipality in the east of Nepal. It is an area which is slightly more urbanised. The establishment of the RRC there can be attributed to the interest and enthusiasm of the Acting Mayor who through connections made between Northumbria University and the Ministry, attended an early seminar at Kathmandu University. He decided to establish the RRC and integrated it into local government structures. As a result, he has been able to secure funds from the Ministry of Local Development. He selected the committee members himself. So far they have similarly established a holding board and relief fund. They are also actively engaged in keeping a register of risks/disasters and have reduced the risk of road accidents through improved traffic management. They are also planning some vulnerability mapping.

### Methodology

The two methods used were in-depth qualitative interviews with committee members of the two RRCs and a quantitative questionnaire survey of 200 members of the wider community in each location. RRC meetings were also attended. The research can be viewed very much as action research project in the sense that researchers actively shape the conditions in which they research, not only establishing the RRCs themselves but also feeding findings of the survey back to the RRCs.

### **Research Findings**

The first question 'With whom disaster management and disaster risk reduction responsibility should lie?' was asked directly within the community survey. It was expected that respondents' answers would reflect to some extent, their assessment of the capability of the government *vis a vis*, other institutions; whether disaster risk reduction would be considered an added burden for the community and the extent to which risk management is individualised.

The pie charts (Figures 1 and 2) show quite marked differences between Dhankuta and Panchkhal. In Panchkhal, DRR is seen to be much more of an individualised and family level concern, whereas, at Dhankuta, emphasis is placed on local government and village associations. It may be hypothesised that this has something to do with how the recent Maoist conflict has played in the two areas. In Panchkhal, people are quite secretive about their political allegiances and as a result, there has been a break down in trust in the area. In Dhankuta, people are very open about their politics and community cohesion seems not to have declined as a result. Perhaps in Dhankuta, also because the Acting Mayor is not affiliated with any political party, the local government apparatus has continued to function better. This may in turn have created slightly more favourable attitudes towards central government.



### Figure 1 and 2 'With whom should responsibility for disaster management/ disaster risk reduction lie?'

The second question: "To what extent does the RRC represent the wider community?" was explored in two ways; firstly, through the opinions of committee members and the caste and gender composition of the committee and secondly, through exploring the level of congruence between what the RRCs and what the wider community consider to be risk priorities.

Both committees were very mindful of caste and gender composition and as a result, representation of women and minority groups on the committee was strong. However, it was recognised that some individuals were quite silent in meetings.

In Dhankuta, an effort had been made to remedy this, and a women from a scheduled caste had been sent on a computer training course in an effort to raise her confidence.

In Panchkhal, however, one woman from a scheduled caste suggested she was only a token member of the committee. She argued that while some of the members of the RRC had the interests of the most vulnerable at heart, others did not. She said that so far, only relatively wealthy community members had benefited from relief money when their dwellings had been affected by fire. She thought that the pesticide awareness training was a good idea but it needed to be offered as a priority to landless labourers. She thought that it was more likely to be offered to people in the Central Valley who are wealthier farmers of higher castes.

In order to examine the third question about level of congruence between risk priorities of the community compared with the committee, the risk concerns to have emerged in the community survey were compared with what activities the committee have chosen to prioritise. In Panchkhal, the risk concerns were wide ranging (Figure 3). Deforestation is the main concern but in theory, this can be addressed by existing community forestry institutions. The RRC have decided to focus on pesticide reduction, which was only the eighth concern of the wider community. However, when these results were fed back to the committee, they argued that some of the disease/illness risk (ranked second) also related to pesticide use. Drought was another concern of the RRC, which was ranked fourth by the community after literacy,

which arguably would be outside of the remit of an RRC. Thus, the RRC may not be addressing the key risk concerns but these may be the responsibility of other institutions. The RRC are addressing concerns that are not addressed elsewhere.



# Figure 3: Community perceptions of risks, hazards and disasters in Panchkhal

In Dhankuta, a wide range of risks was also identified (Figure 4). The RRC so far has chosen to focus on road accident minimisation through speed limit setting, developing a one-way system in the town and bus driver training. This was the second concern to be ranked the highest after floods and landslides. While floods and landslides may be more challenging for the RRC to address, they had channelled relief funds to landslide victims, showing a high level of congruence between committee actions and community concerns.



# Figure 4: Community perception of potential risks, hazards and disasters in Dhankuta

Two indicators were explored to examine the level of motivation at the community level to engage in DRR. The first was the motivation of the committee members themselves and the second was the priorities of the wider community in terms of DRR relative to livelihood-strengthening activities.

In Panchkhal, motivation at the committee level was high among key male members who already held positions of authority in the community. However, it was lower among those who had to travel further or who were from more excluded groups.

Meetings had become more irregular and less frequent as some members would only attend if expenses were covered and unfortunately, funding through Kathmandu University to cover these expenses had not materialised.

In Dhankuta the members who had been selected by the Acting Mayor demonstrated a high level of social conscience. They were happy to be voluntary members but did not want to commit to much more than attending monthly meetings. In terms of what the RRC should do in Panchkhal (Figure 5), the community suggested many activities. Although awareness-raising featured as the main priority, many other suggested activities were about livelihood strengthening than DRR.



### Figure 5: What should the RRC do (Panchkhal)?

In Dhankuta, significantly greater emphasis was placed on awareness-raising relative to livelihood strengthening (Figure 6), suggesting a higher level of receptivity to DRR in the community.



### Figure 6: What should the RRC do (Dhankuta)?

The final question relates to the most effective institutional arrangements for DRR and includes issues of capacity and the importance of financial resources.

Both committees showed high levels of administrative capacity in terms of organising meetings, taking minutes, distributing minutes, etc., but some members of both committees were a little unsure about what RRCs should do. This was more

pronounced in Panchkhal. In Panchkhal, funding issues prevented the pesticide awareness training from happening, illustrating the necessity of securing funding for RRCs to work effectively. The link between Kathmandu University and the RRC had led to some confusion about who was driving the agenda and as such, a slow responsiveness to new key risk priorities such as drought, was reported. There has been some difference of opinion within the committee about whether to register as an NGO or to get approval to become embedded within the local government structure. Neither of these courses of action has yet been pursued and as a result, no additional funds have been secured. As a CBO, accountability and transparency mechanisms are not really in place although this may be facilitated by Kathmandu University's role.

In Dhankuta progress has been more significant, not least because further funding has been secured and the RRC has been allocated an annual budget through the Ministry of Local Development. At the level of the municipality, a disaster risk reduction lens is being applied to existing responsibilities, such as land use planning and traffic management. The municipality is well connected to the emergency services that are essential in disaster recovery, such as the police and the army. They are also well connected to community-based organisations, known as Tole Lane Organisations in Nepal. There was a sense though; that the municipality sees its role as feeding information down to community based organisations rather than adopting a bottom-up participatory approach with two-way communication. One god idea to have been implemented was to ensure that the RRC members represent different political parties so should political leadership change; the RRC members can stay the same. There is also a strong sense of local responsibility for disaster risk reduction at this level and accountability and transparency mechanisms are in place as part of the local government structure.

### Conclusion

To conclude, there is a lack of consensus on where responsibility for disaster risk reduction should lie, perhaps shaped by the uncertainty of political allegiance, which varies by place. Broadly, the committees were addressing communities' concerns. However these were to a greater extent produced risks – road accidents and pesticide risk – which perhaps the committees felt in a better position to influence than environmental hazards such as floods, landslides, which may be regarded as more 'everyday risks'.

In Dhankuta, there may have been some elite control in terms of developing the DRR agenda but patronage was dispersed equally among the population. However, in Panchkhal, there were signs that deeply embedded power relations may overshadow and inhibit true representation of marginalised and vulnerable groups thus leading to a poorer quality DRR process.

While disaster management capacity is not particularly strong, the institutionally embedded arrangements show greatest potential in terms of accessing resources and applying a DRR lens to existing responsibilities. By providing an annual budget to the RRC it suggests that resources as well as responsibility may be being devolved, presenting less of an 'added burden' to communities.

At the CBO level however, livelihood-strengthening activities may be more appropriate than addressing the infrastructural targets generated by community ranking of disaster risk in the municipality. However, both require a social understanding of risk rather than the simple provision of top-down engineering "blue light" responses.

### References

Allen, K. (2006) Community based disaster preparedness and climate adaptation: local capacity building in the Philippines, *Disasters*, 30, 1, 81-101

Bajeck, R., Matsuda, Y. and Okada, N. (2008) Japan's Jishu-bosai-sokshiki community activities: analysis of its role in participatory community disaster risk management, *Natural Hazards*, 44, 2, 281-292

Chen, L.C. Liu, Y.C. and Chen K.C. (2006) Integrated Community-Based Disaster Management Program in Taiwan: A case study of Shang-An village, *Natural Hazards*, 37, 1-2, 209-223

Coombes, B. (2007) Defending community? Indigeneity, self determination and institutional ambivalence in the restoration of Lake Whakaki, *Geoforum*, 38, 60-72

Paton, D. and Johnston, D. (2001) Disasters and Communities: Vulnerability, resilience and preparedness, *Disaster Prevention and Management*, 10, 4, 270-277

Pelling, M. (2007) Learning from others: the scope and challenges for participatory disaster risk assessment, *Disasters*, 31, 4, 373-385

Rajan, S.R. (2002) Disaster, development and governance: Reflections on the lessons of Bhopal, *Environmental Values*, 11, 2002, 369-94

Veron, R., Williams, G., Corbridge, S. and Srivastava, M (2006) Decentralised corruption or corrupt decentralisation? Community monitoring of poverty alleviation schemes in Eastern India, *World Development*, 34, 11, 1922-1941

## Climate change and infectious disease risk management: a localised health security perspective

Andrew Collins\*

Disaster and Development Centre (DDC), School of Applied Sciences, Northumbria University, Ellison Building, Ellison Place, Newcastle, NE1 8ST, UK.

\*Corresponding author email: andrew.collins@northumbria.ac.uk

### Abstract

Pathogenic risks in relation to climate change are not fully understood and to a large extent have to be regarded as unpredictable. It is therefore important to focus attention on human vulnerability and coping for which more certain influences on disease risk can be assessed. Despite commonplace environmental conditions for infectious diseases around the world, only some people are affected. This is because the larger proportions of disease risks are regularly a function of human socioeconomic and consequent biological susceptibility to infection rather than significant changes in environmental hazards. As poverty and environmental degradation exacerbate disease risks for billions, poverty reduction is the core issue in mitigating climate related infectious disease risks, but human impoverishment and climate change can be complexly interrelated. Studies in Mozambique and Bangladesh are used here to examine key issues in the complex association between climate change and health. Some evidence suggests that individual and community based health risk reduction can build community resilience and health security and overall wellbeing in the face of epidemics in locations prone to the effects of climate change. Success in this respect would offset health impacts of changes in climate. However, the association between climate and health will continue to demand pro-poor precautionary risk reduction investments and proactive national and global governance contexts within which this can succeed.

Key words: Climate change, infectious disease, complexity, resilience, health security, pro-poor risk reduction

# Introduction: current infectious disease assessments in contexts of climate change

There are many extreme predictions being made in relation to climate change but little clarity in specifying more precisely the ways in which human health will be compromised. If the International Panel on Climate Change (IPCC Fourth Assessment Report 2007) predictions are correct that there is likely to be a five degree increase in temperature by 2080 then change in health risks are certain. The report indicates that future climate change is expected to put close to 50 million people at risk of hunger by 2020. Coastal populations in Asia are flagged as also vulnerable to sea level rise, which is slightly higher than the global average. Projected sea level rise could flood millions of people living in the low lying areas of

South, Southeast and East Asia such as Vietnam, Bangladesh, India and China. Also, extreme weather patterns are already taking their toll on crop yields. The suggestion is clear that challenges in tackling global warming concerns is mounting pressures on developing countries that already have high infant and adult mortality rates, particularly from infectious diseases.

The World Health Report (2007, p.25) states that 'intensifying climatic conditions, together with a range of environmental, epidemiological and socioeconomic factors, are bringing about changes in the exposure of populations to infectious diseases', as illustrated by the example of Rift Valley fever. In this instance, above-normal rainfall associated with the occurrence of the warm phase of the El Niño Southern Oscillation phenomenon has been increasing the breeding sites of mosquitoes, with a consequent rise in the number of outbreaks of Rift Valley fever. Surprisingly, little more is mentioned of climate change in this year's report. However, the World Health Report of 2002 (p.72) addressed it in more detail stating that:

'Such a rise [in temperature between 1990 and 2100] would be faster than any rise encountered since the inception of agriculture around 10 000 years ago. Predictions for precipitation and wind speed are less consistent, but also suggest significant changes. Potential risks to human health from climate change would arise from increased exposures to thermal extremes (cardiovascular and respiratory mortality) and from increases in weather disasters (including deaths and injuries associated with floods). Other risks may arise because of the changing dynamics of disease vectors (such as malaria and dengue fever), the seasonality and incidence of various foodrelated and waterborne infections, the yields of agricultural crops, the range of plant and livestock pests and pathogens, the salination of coastal lands and freshwater supplies resulting from rising sea-levels, the climatically related production of photochemical air pollutants, spores and pollens, and the risk of conflict over depleted natural resources, ..... These effects will undoubtedly have a greater impact on societies or individuals with scarce resources, where technologies are lacking, and where infrastructure and institutions (such as the health sector) are least able to adapt.' For this reason, a better understanding of the role of socioeconomic and technological factors in shaping and mitigating these impacts is essential. Because of this complexity, current estimates of the potential health impacts of climate change are based on models with considerable uncertainty.'

Based on this type of recent, though uncertain, prediction Table 1 summarises the expected climate changes and their likelihood as indicated by IPCC alongside an indication of health impacts that have been commonly suggested in recent years from multiple sources, particularly the media. The basis is largely through observation of existing associations between health and environmental events and those observed in the past. Whilst the IPCC judgement of future changing climates would appear to be more reliable than ever before, the actual health impacts are presented here as merely hypothesised. Insufficient proof that these impacts will occur in the future can be provided. This paper however progresses to provide an indication of the disaster and development contexts within which such impacts appear certain, uncertain or improbable in Mozambique and Bangladesh. Further the use of infectious disease risk management to control the impacts of climate change and of health security in offsetting are introduced.

# Table 1Projections for extreme weather events for which there is an<br/>observed late 20th century trend and accompanying suggested<br/>impact on health

Climate phenomenon and direction of trend	Likelihood of future climate trend based on projections for 21 <sup>st</sup> century	Suggested health impacts
Warmer and fewer cold days and nights over most land areas	Virtually certain	Increase in infectious disease incidence through spread and persistence of disease vectors and pathogens in areas where the cold previously prevented them.
Warmer and more frequent hot days and nights over most land areas	Virtually certain	Increase in infectious disease incidence through spread and persistence of warm climate pathogens and vectors.
Warm spells / heat waves. Frequency increases over most land areas	Very likely	Increase in heat stroke in temperate climates. Increase in infectious disease risks from hot climate disease vectors and pathogens.
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	Very likely	Increase in flash flooding and related break down in infrastructure, increasing health hazards, injuries, vulnerability and displacement.
Area affected by droughts increases	Likely	Increase in food and nutrition insecurity. Climate related forced migration increases susceptibility and exposure to health hazards. Loss of livelihood assets increases socio-economic vulnerability to ill- health.
Intense tropical cyclone activity increases	Likely	Increase in rapid onset break down in infrastructure causes injuries and health hazards, vulnerability and displacement. Loss of livelihood assets increases socio- economic vulnerability to ill-health.
Increased incidence of extreme high sea level (excludes tsunamis)	Likely	Widespread flooding increases health hazards, vulnerability and displacement. Loss of productive land through flooding and salinisation increases food insecurity. Loss of livelihood assets increases socio- economic vulnerability to ill-health.

*Source:* First two columns are taken from IPCC (2007 p.7) Climate Change 2007: The Physical Science Basis, Summary for Policymakers, Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva: WMO and UNEP.

### Integrated infectious disease risk assessment

Human health and its relationship to the environment is a complex field and therefore precisely what might happen with predicted climate change is uncertain. This is particularly the case with major infectious diseases, which account for the greater part of health burdens in economically poorer parts of the world, reduction of which forms a core aspect of the Millennium Development Goals (MDG) due to be achieved by 2015. Whilst all of the MDG ultimately relate indirectly to improvements in health and serve to emphasise that health and poverty are closely linked, goal four to reduce child mortality and goal six to combat HIV/AIDS, malaria and other diseases directly target infectious diseases. But the precise linkages between poverty and infectious disease are also a function of a variety of environmental, social and economic influences. These tend to vary across space and through time and for individual pathogen types. However, ongoing evaluation of disease risks using an interdisciplinary assessment can provide guidance as where, when and with whom different types of risks are more predominant (Collins 1998, Collins et al. 2006). Based on this perspective, analysis of climate change and infectious disease presents an extension to an existing challenge to find ways of assessing multivariate health risks. Identifying what change might be expected for each health influence need not be an entirely speculative exercise. An enormous quantity of research output on infectious disease causality has been perpetually produced for the last 150 years that provides us guidance. When broken down into constituent parts we can extrapolate evidence of changes in local health risks with seasons, landscapes, economies, health or development policies, or ideas about health. A rich background of public health, epidemiological, microbiological, ecological, social, economic and behavioural work, and associated analysis frameworks, can contribute in the assessment of health disaster risk in the context of climate change.

For the case of health disasters one of the more obvious is to conceptualise disease threats as hazards, and the risk of an epidemic outcome a function of these in conjunction with human vulnerability. Hazard, vulnerability and capacity to mitigate disaster are a mainstay of disaster reduction more widely. (Blaikie et al. 1994, Wisner et al. 2004), and clearly so in the case of infectious disease mitigation (Collins 1994, 1996, and successively).

Beyond environmental threats, such as the earthquake, volcano, hurricane, flood, drought, and so forth, the same underlying rationale applies to threats of economic collapse, social decay or bio-terrorism. For studies of infectious disease disasters, development, risk and uncertainty an emphasis can variously be put on pathogenic hazards, disease transmission, or people's susceptibility to being infected. Ultimately each component is present, but here we consider which of these alters detrimentally in relation to climate change?

Using a vulnerability approach, theoretically, no infectious disease can be considered natural and no loss of life inevitable. We would consider epidemics (and for that matter most other disasters) as a function of being in the wrong place at the wrong time with inadequate forms of protection. Moreover, infectious disease hazards (here considered to be the pathogen itself), are organic and evolve over time spontaneously or in relation to changing environments, and variously get excluded from disaster risk monitoring. They present an ongoing, rapidly or slowly emergent hazard. Uncertainty prevails in that, to date, the world's microbiologists are unable to determine precisely the origin, spontaneity (i.e. random mutation) or more predictable evolutionary influences for some of the greatest of contemporary infectious disease threats. However, laudable progress has been made in identifying where the transfer of genetic material gives rise to new strains.

Studies on climate change impacts on infectious diseases have tended to focus on impacts on pathogens and their habitats (i.e. Patz and Olson, 2006). However, the mechanisms of a health impact may be through change in risks originating from multiple social, ecological and economic influences on infectious diseases and our ability to intervene in these changes early enough. Climate change can impact on the pathogens (the organism causing infection), the path through which it is transmitted (diseases vectors, environmental reservoirs and flows), directly on people making them more susceptible (i.e. through nutritional weakening), on the places upon which people's health depends, on the policy context of health (i.e. affecting prioritisation of investments), and on the way health and health risks are understood (perception). Such a health ecology approach is represented in Table 2. This lists the 'six p's', recognising aspects of disease ecology, epidemiology, political ecology, sociology, medicine, and the environment, but essentially here with indication of the climate change link to each of these.

# Table 2Climate related risks to health based on integrated health<br/>security approach

Health risk category	Process of change in health risk and resilience in relation to climate
Pathogens	Temperature and biogeochemical sensitivity.
Pathways	Distribution and viability of transmission routes of pathogens including via vectors (mosquitoes, flies, fleas, rats, snails, aquatic organisms etc) and environmental reservoirs (water, soil, phytoplankton, and living spaces). Hospitals (MRSA). Food.
People	Temperature and water. Nutrition security. Psychosocial wellbeing. Displacement. Exposure and susceptibility to infection, including through drought and flood. Socio- economic status and livelihood security.
Perceptions	Education. Fear. Experience. Conscience. Coping with uncertainty. Media representations.
Politics	Prioritisation of resources. Politics of humanitarian aid, trade and environmental issues including changing roles of international regimes, and conflict over natural resources.
Places	Environmental quality through drought and flood related changes to water, land, air, vegetation. Hazard modification in natural (i.e. land and water stability) and built environments (i.e. building, energy and water infrastructures).

# Application of integrated assessment for Infectious Disease Risk Management (IDRM) in the context of climate

Integrated health risk assessment may assist as an entry point in considering the complex realm of infectious disease risk management with climate change. The purpose here is to contribute to an analytical framework suitable for isolating strands

of causality for different diseases and contexts. This is to facilitate assessment of the extent to which prevention and control in the context of climate change might better address the hazards, vulnerability, or capability aspects of this confluence. The options supported by this framework would include;

- i) an assault on the pathogen (i.e. pathogen risks such as bacteria, viruses, protozoa, parasites)
- ii) interruption of transmission (i.e. pathway risks such as vectors and pathogenic reservoirs in the environment)
- iii) strengthening social, economic and physical aspects of environment and infrastructure (i.e. place risks including physical environmental quality, culture and local economies)
- iv) reducing susceptibility to infection (i.e. risks relating to people's basic and extended needs including nutritional status, access to appropriate health care and livelihoods)
- v) enhancing awareness and behaviour (i.e. perceptions based on knowledge and attitudes learnt through experience and through formal or informal education, personality changes and sense of community based action)
- vi) investing in policies that prioritise preventative health actions, including for an improved political economy of health, advocacy and lobbying, and the knowledge environment.

Identifying the contexts whereby different aspects of health ecology are prone to change through climate is key to deciding how much climate change may be tolerable or acceptable, what type of adaptation is necessary, who, how, when and where the costs might be borne, and the extent to which improved health security offsets climate impacts on health and wellbeing.

An IDRM study in Mozambique and Bangladesh and subsequent health security programme has found that community based strategies can integrate risk assessment and risk management of some of the above at the local level. There is also evidence that improved health security in this respect might offset some of the climate impacts on infectious disease risk. The presentation provided for this UK – Asia Scientists and Practitioners Seminar provides much of the lessons learnt from these programmes concerning people centred research approaches, capacity building and development of disease and health risk monitoring and analysis systems. Further information is available from the set of slides provided with these proceedings and is being published elsewhere.

### Conclusion: Addressing climate change and infectious disease

Integrated infectious disease risk assessment provides theoretical development that can strengthen an informed debate about the circumstances within which climate change may impact on health and those where it may not. As an essentially applied analysis, it suggests that varied interventions and adaptations are required. These are shown to need to vary from place to place and over time in relation to the nature of the risks identified. As pathogenic and environmental hazards would appear to be likely to be undergoing change, and also be in the ascendancy during these times of climate change, a precautionary approach is needed, including investments that lead to blocking transmission cycles of pathogens and their vectors. Where vulnerability factors are more clearly the main risk in the climate – health nexus, disaster reduction and development work in effect becomes a process of making people more resilient, and extending resilience to aspirations of wellbeing. Investing in sustainable development and vulnerability reduction are part of this agenda and, if addressing combined influences on health adequately, may offset the impact of climate change.

Reducing emissions that contribute to climate change is crucial whether or not proven impacts on health can be quantified at this point, as advocated by a precautionary approach. Climate related pollutants are in any event bad for health even before they may contribute to ill-health through climate change. Structural changes for better governance of development can bring about change internationally and locally within what we currently refer to as a health security approach (WHO 2007). Poverty reduction will however have a bigger positive impact on health than climate change modifications. It is not sufficient to await improvements in global or national level governance for sustainable development to be achieved. To this end community based programmes (human agency driven) must also be activated in the interests of addressing health security, for which infectious disease risk reduction constitutes a large part. What may start with the desire of the individual to achieve better health security in respect of local infectious disease risks, can progress to communities and beyond. One way in which this is evidenced is through the community based organisation, such as risk committees. Examples of this approach to assessment, management and governance of health risks have been experimented with through the programmes in Mozambique and Bangladesh that support this short overview.

### References

Blaikie, P., Cannon T., Davis I. and Wisner, B. (1994) *At Risk,* 1<sup>st</sup> edition, London: Routledge.

Collins, A.E. (1993) Environmental influences on the distribution of incidence of cholera: a case study in Quelimane, Mozambique. *Disasters* 17:4 321-40.

Collins, A.E (1996) The geography of cholera. In Drasar, B.S and Forrest, B.D (eds.) *Cholera and the ecology of Vibrio cholerae.* Chapman and Hall, London 255-94.

Collins, A.E (1998) *Environment, Health and Population Displacement: Development and Change in Mozambique's Diarrhoeal Disease Ecology,* Making of Modern Africa Series, Ashgate, Aldershot.

Collins, A.E., Lucas, M.E., Islam, M.S., and Williams, L.E. (2006) Socioeconomic and environmental origins of cholera epidemics in Mozambique: guidelines for tackling uncertainty in infectious disease prevention and control, *International Journal of Environmental Studies* Special Issue on Africa, 63:5, pp. 537-549.

ICRC (2004) World Disasters Report: Focus on community resilience, Geneva: ICRC.

IPCC (2007) Climate Change 2007: The Physical Science Basis, Summary for Policymakers, Contribution of Working Group 1 to the Fourth Assessment Report of the

Intergovernmental Panel on Climate Change, Geneva: WMO and UNEP.

Patz, J.A. and Olson, S.H. (2006) Climate change and health: global to local influences on disease risk, *Annals of Tropical Medicine and Parasitology*, 100:5&6, pp.533-549.

WHO (2002) World Health Report: Reducing risks, promoting healthy life, Geneva: WHO.

WHO (2005) World Health Report: Make every mother and child count, Geneva: WHO.

WHO (2007) World Health Report: A safer future: global public health security in the 21<sup>st</sup> Century, Geneva: WHO.

Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2004) *At Risk: Natural Hazards, People's Vulnerability and Disasters*, Second Edition, Routledge, London.

### Opening Session 09:00 – 11:15 Chair: Dr. Samantha Jones, School of Applied Sciences, Northumbria University, UK

### **Keynote Presentations**

### Climate Change and Disaster Risk Reduction in Korea

Dr. Park Yeon Soo, Deputy Head, National Emergency Management Agency (NEMA) South Korea

Following an introduction on the effects of climate change in Korea, a comprehensive presentation on how the phenomenon of climate change is principally changing the nature of disasters and risk in Korea was given. An explanation of the Government's role in dealing with and responding to climatic related disasters, namely through science, impact assessment, adaptation strategies, mitigation through, for instance, decarbonisation and alternative energy sources was detailed. Recommendations centred on the need to share local knowledge, climate information, and technological developments through transparent knowledge transfer via education and training.

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Climate Change and Disaster Risk Reduction in Korea.pdf]

### Building National Resilience for Development under Climate Change

Professor Phil O'Keefe, School of Applied Sciences, Northumbria University, UK.

Professor Phil O'Keefe began by explaining that anthropogenic climate change is the single greatest challenge in attaining the Millennium Development Goals. As such, achieving international goals of sustainable development and disaster risk reduction, essentially hinge upon the adoption of effective measures to combat adverse consequences of climate change. He revealed that only by recognising the need for and adopting adaptation in a holistic manner can people sufficiently bounce back from disaster. This "bouncability" forms an inexorable link with risk reduction, which are crucial factors for adapting to and mitigating risk as a central component in the adaptation continuum.

### [Presentation Slides]

### **Climate Change and Infectious Disease Risk Management**

Dr. Andrew Collins, Director, Disaster Development Centre, Northumbria University

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Climate Change and Infectious Disease Risk Management.pdf]

### Session One Climate Change and Urban Disaster Risk Reduction

Chair: Professor Fuad Mallick, BRAC University, Bangladesh

11:30-12:00 **Risk assessment of tsunami Inundation zone and evacuation route mapping for emergency response plan** Assoc Prof Dr Ahmad Rodzi Mahmud ,Universiti Putra Malaysia, Malaysia.

### [Presentation Slides]

12:00-12:30 Learning Lessons from the US beef crisis in Korea - risk perception and governmental risk management Dr. Chung, Jibum, Associate Research Fellow ,The Korean Institute of Public Administration, Prime Minister's Office, South Korea.

[Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Learning Lessons from the US beef crisis in Korea - risk perception and governmental risk management.pdf]

### Session Two Risk Governance and Emergency Management

Chair: Dr Ahmad Rodzi Mahmud, Universiti Putra Malaysia

13:30-14:00 **Community Based Disaster Preparedness: issues and challenges** Assoc Prof Dr Aini Mat Said , Universiti Putra Malaysia, Malaysia.

### [Presentation Slides]

14:00-14:30 **Climate Change and disaster management education in Taiwan** Professor Yih-Chi Tan, Executive Secretary, Disaster Research Center, National Taiwan University, Taiwan.

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Climate Change and disaster management education in Taiwan.pdf]

### Session Three

### Community based disaster and Emergency Management

Chair: Professor Yih-Chi Tan, National Taiwan University, Taiwan

14:30-15:00 **Dealing with Urban Climatic Hazards in the UK: Experiences from northern cities of England.** Mr. Trevor Tague, Senior Fire Officer, Tyne and Wear Fire and Rescue Service, UK.

### [Presentation Slides]

15:00- 15:30 Challenges of Communities Based Urban Disaster Management: Experiences from Butwal municipality (urban centres in western parts of Nepal) Miss Madhavee Pradhan, Tribhuvan University, Nepal/Field Program Officer,

Miss Madhavee Pradhan, Tribhuvan University, Nepal/Field Program Officer, Action Aid Nepal, European Commission Humanitarian Aid Department & Friends Service Council Nepal.

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Challenges of Communities Based Urban Disaster Management Experien ces from Butwal municipality.pdf]

15:30-16:00 **Special Lecture from** Professor Fakhru'l-Razi Ahmadun, Universiti Putra Malaysia (UPM)

[Presentation Slides]



3rd Asian Ministerial Conference on Disaster Risk16:00-<br/>16:15Reduction16:152-4 December 2008Kuala Lumpur, Malaysia

Concluding Remarks by Professor Phil O'Keefe, School of Applied Sciences, Northumbria University











Side Event

# Strengthening Municipal and Village Disaster Risk Reduction Platforms through Risk and Resilience Committees in South Asia

### Conference Venue: Level 2, Room No.7 03 December, 2008 12:30-14:00

### Session Leader

Disaster and Development Centre (DDC), School of Applied Sciences, Northumbria University, UK

### Session Co-leaders:

Ministry of Local Development, Dhankuta Municipal Risk and Resilience Committee, Dhankuta Municipality, Nepal

Disaster Management and Sustainable Development Center (DMSDC), Kathmandu University, Nepal

BRAC University, Bangladesh

### Background

Institutionalisation of disaster risk reduction at the local level through risk and resilience committees is emerging as one of the strategies of building disaster resilient communities in Nepal. With the frequency and severity of disasters triggered by epidemics, fires, storms, landslides, floods and earthquakes on the increase in recent years, efforts to reduce disaster impacts lies in the institutional capacity and resilience to prevent, prepare, mitigate

and respond to these destabilising events. The risk and resilience committee institutional framework which embraces government structures, traditions and customs, political practices and public awareness provides one of the best ways of enhancing local disaster resilience. The "People Centered Hazard and Vulnerability Mitigation in Disaster Risk Management in Bangladesh and Nepal" aims to enhance disaster resilience by the communities' self directed establishment of Risk and Resilience Committees (RRC), involving local knowledge sharing and training. Two Risk and Resilience Committees were established in Pachkhal Valley, Kavre District, and Dhankuta Municipality in 2007. In Dhankuta, individuals from local government, NGOs, political parties, academics and other bodies were introduced to the fundamentals of disaster reduction through participatory Localised risk records in which localised hazards, risks and training workshops. vulnerabilities are detailed were designed by the two RRCs. The participants worked in four heterogeneous groups and each group ultimately drafted a risk record based on their previous experiences and needs. The risk records marked the beginning of the new era where local people were taking the lead in building their capacity to manage their disaster risk reduction processes. It is expected that the risk records form the basis of producing municipality level disaster risk reduction policies and plans. The project experience, thus far, has demonstrated that participatory initiatives in communities with a wide-range of stakeholders can produce a high-level of acceptance, involvement and local knowledge sharing. This may be a key factor for other initiatives aiming to implement similar practices in other risk prone parts of the world or in other disaster risk areas.

### Professor Fuad Hassan Mallick, BRAC University, Bangladesh

Professor Fuad Hassan Mallick began with highlighting the context of climate change in developing countries and stated that in order to be prepared and to take into account the worst possible case scenarios, that education in developing countries is critical for the future. Professor Fuad Hassan Mallick agreed with the previous speaker in acknowledging the climate change phenomenon. He indicated that some consequences may involve changes in precipitation, risk of flood and drought and highlighted Bangladesh's vulnerability (by 2050 Bangladesh will be under water). He also covered a range of climate change consequences such as extreme weather, ecosystem changes, cropping pattern changes, inundation, migration, disease, food and livelihood security. He doesn't think the MDGs at present will be achieved as agreed by 2015. Precautionary and adaptation measures were pointed to as being the dominant approaches in present development projects. However, Professor Fuad Hassan Mallick argued the need for resilience. He gave an example of strengthening houses through capacity building and education, which contributed towards empowerment of local indigenous to undertake action that is more effective. The tertiary and research levels in the context of education were highlighted as important in creating a wider knowledge base to facilitate capacity in dealing with disasters within a social and economic framework. Professor Fuad Hassan Mallick stressed that nonformal education at the community level is critical in engaging people within disaster and risk reduction practice that can transcend local, regional, national and international boundaries whilst addressing issues from bottom-up, more robust, knowledgable and resilient approaches.

### Presentations

Mr. Yajna Prasad Gautam, Secretary, Government of Nepal, Ministry of Local Development.

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Institutationalisation of Good Practices and lessons learnt from the proje ct.pdf]

Dr. Samantha Jones, Northumbria University

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/SamanthaJones3rd AMCDRR.pdf]

Professor Fuad Mallick, BRAC University, Bangladesh

### [Presentation Slides: http://www.delphebangladesh-nepal3r.org/pdf/2008malaysia\_pr esentations/Fuad\_editedVersion.pdf]

Dr. Andrew Collins, DDC, Northumbria University

### [Presentation Slides]

# **Summing Up Comments**

Dr. Andrew Collins, Northumbria University

[Forthcoming]

Professor Phil O'Keefe, Northumbria University

[Forthcoming]

## **Final Discussion**

[Forthcoming]