

The Best of Intentions? Managing Disasters and Constructions of Risk and Vulnerability in Asia

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Abstract

Drawing on research on landslide risk reduction in Nepal and the impacts of the Indian Ocean tsunami of 2004 in southern Thailand, this paper considers how risk, in the context of natural hazards, is produced by processes of social and economic transformation; understood and experienced by vulnerable groups; and framed by governments and experts. In so doing, we propose an agenda for more effective disaster risk management. We open the discussion by exploring the spatiality of risk, vulnerability and opportunity in the two research contexts, in particular, why people live in hazardous places and the processes that explain the intersection of human settlement and livelihoods on the one hand, and risk on the other. The paper then turns to consider the way that “risk”—and the framing and prioritisation of risk(s) by governments, experts and by vulnerable groups themselves—plays a role in setting the disaster risk management agenda. Underpinning this is the hidden question of what evidence is used—and valued—in the identification and delineation of risk. In order to understand disaster vulnerability, we argue that it is necessary to look beyond the immediate “hazardscape” to understand the wider risk context both spatially and structurally. Effective disaster risk management requires not only an appreciation of the different framings and understandings of risk, but a true integration of knowledge and expertise.

Keywords: *Risk perceptions, vulnerability, resilience, Asia, tsunami, landslide*

Introduction

On 2 August 2014, a landslide occurred in the Sun Koshi Valley in Sindhupalchok District in the Central Development Region of Nepal. The landslide (known as the Jure or Sun Koshi event) killed more than 150 people, buried over 100 houses and destroyed a section of the strategic highway linking Nepal's capital Kathmandu with China (Khanal and Gurung, 2014). The landslide formed a dam across the Sun Koshi River, possibly putting communities downstream at risk if the dam was to breach (Petley, 2014). As well as the loss of human life, the local and regional economic costs were considerable, with the disruption to cross-border trade due to the blocking of the Arniko Highway estimated to amount to some US\$ 400,000 per day in lost economic activity (Shrestha *et al.*, 2014).

Within days of the Jure landslide, experts had rushed to the site to assess the damage, to investigate the causes of the landslide, and to suggest remediation measures and longer-term landslide management strategies. The latter were unsurprising: greater efforts to map landslide hazards, the monitoring of potential landslide sites, and enforcement of zoning and land-use planning to halt the construction of settlements and infrastructure, such as roads and hydropower dams in high risk areas (*ibid.*). More than 12 months on, two major earthquakes and multiple earthquake-triggered landslides later—including hundreds of slope failures near to the 2014 Jure landslide (EwF, 2015)—debates continue regarding how best to manage the ongoing landslide risk in the area (Khadka, 2015). What, for example, is the future for the residents of the valley, many of whom have fled to safety?

The Jure landslide disaster encapsulates several points that this paper seeks to address, in particular, how natural hazard risk is produced by processes of social and economic transformation; understood and experienced by vulnerable groups; and framed by governments and experts responsible for disaster risk management. We draw upon research undertaken into two very different hazards: *ex post* field studies into the 2004 Indian Ocean tsunami, unprecedented in the scale of its impact with over 227,000 people killed and 1.7 million displaced (OCHA, 2005); and *ex ante* research into landslides, a chronic hazard that between 1971 and 2010 killed 4,327 people in Nepal (or approximately 110 per year) and

affected 555,607 (AAN *et al.*, 2012). Landslides in Nepal are characteristically small magnitude events that generally result in one to two fatalities per landslide (Petley *et al.*, 2006). Not infrequently, however, there are locally catastrophic events that have a similar scale of impact to the 2014 Jure landslide (*ibid.*).

For the landslide case study we draw on research undertaken by the first author in Central Nepal in communities upstream of the Jure landslide known as the Upper Bhote Koshi Valley in Sindhupalchok District. The study, which set out to investigate the vulnerability and resilience of communities to landslides and debris flow hazards, was undertaken from 2005-2008.¹ The fieldwork undertaken by the second author, following the Indian Ocean Tsunami of December 2004, focused on southern Thailand, including Khao Lak on the Thai mainland, and the islands of Koh Lanta and Koh Phi Phi in the Andaman Sea.

While we were dealing with two very different hazards, with different scales of impact, we attempt in this paper to look across the two contexts for the reason that they *are* different: we are seeking to identify the rhymes that might have wider purchase. While not set up as a direct comparison², both studies set out to: (i) better understand the physical hazard or threat; (ii) explore local perceptions and interpretations of the hazard; (iii) illuminate the vulnerability and resilience of householders and how these varied within and across communities; and (iv) investigate the role of formal and informal governance arrangements in

¹ This was followed by a pilot study in the same locality in 2011, led by the first author, exploring rural resilience in seismically active areas (Oven *et al.* 2011); and an ongoing trans-disciplinary research project called *Earthquakes without Frontiers* that addresses earthquake resilience at the national and local levels in Central and South Asia, including Nepal (see: <http://ewf.nerc.ac.uk/>). The subsequent fieldwork has informed the discussion presented in this paper.

² The landslide study began as an interdisciplinary doctoral research project undertaken by the first author (Oven, 2009); the tsunami research was undertaken by the second author as part of a United States National Science Foundation-funded multi-disciplinary research project (see Rigg *et al.*, 2005, 2008).

disaster risk reduction (DRR)/disaster response. Reflecting on the findings from semi-structured interviews and focus group discussions with a range of stakeholder groups³ including local people, community leaders, local government officials, scientists and the wider development community, both studies offer insights into the multiple ways in which risk and vulnerability are produced and understood.

We open the discussion by exploring the spatiality of risk, vulnerability and opportunity in the two research contexts focusing, in particular, on why people live in hazardous places and the processes that explain the intersection of human settlement and livelihoods on the one hand, and risk on the other. The paper then turns to consider the way that “risk”—and the framing and prioritisation of risk(s) by governments, experts and by vulnerable groups themselves—plays a role in setting the disaster risk management agenda. Underpinning this is the hidden question of what evidence is used—and valued—in the identification and delineation of risk. Finally, we reflect on the opportunities for knowledge co-production for more effective disaster risk management.

³ A total of 81 interviews were undertaken as part of the tsunami study in Thailand with tourism employees, hotel managers and restaurant owners, fisher-folk, NGO workers, volunteers, village leaders and villagers. For the landslide study in rural Nepal, 165 householders were interviewed across six settlements (including three roadside settlements $n = 67$; and three settlements in the hinterland $n = 98$); along with informal interviews with key informants, including village elders and local government stakeholders; and participatory mapping exercises with key community stakeholders. A total of ten semi-structured interviews were undertaken with government representatives, technical specialists engaged in road construction and representatives from multi- and bi-lateral agencies and NGOs; along with a focus group discussion with landslide experts and engineering geologists. The findings from the study were also disseminated at a knowledge-sharing workshop involving 24 stakeholders in the field of road construction, landslide mitigation and management, and disaster risk reduction.

Spatialities of risk, vulnerability and opportunity

Disasters arise from the interaction between geophysical processes and social vulnerability (Wisner *et al.*, 2004). Viewed as the “internal side of risk”, vulnerability is “the pre-event, inherent characteristics or qualities of social systems [in this case, households or communities] that create the potential for harm” (Cutter *et al.*, 2008: 599). Cutter *et al.* (2008: 600) identify three distinct themes and approaches to vulnerability research:

- Vulnerability as an underlying social condition that may be remote from the initiating event.
- Vulnerability as exposure to hazard events whereby vulnerability is simply a function of proximity to the source of risk or hazard.
- Vulnerability as a function of biophysical risk and social response and how it manifests itself locally.

For both the tsunami and landslide research projects, the hazard provided our entry-point and framed our research questions. Through in-depth empirical research, we were looking to produce a “nuanced and fine-grained interpretation of the range of social and economic factors that are at work in producing vulnerability” (Rigg *et al.*, 2012a: 190) in given localities. This involved an understanding of the hazard (the physical risk), social responses to that hazard, and grounding these responses in the underlying social conditions or what Wisner *et al.* (2004) call the “root causes” of a disaster. Our research, then, integrated the three themes identified above by Cutter *et al.* (2008).

It became clear in both our studies that while the physical footprint or signature of the hazard or potential hazard was often quite localised, the causes and effects were not. One was visible and highly evident (the hazard footprint); the other was often hidden and not altogether clear until after an event (the vulnerability footprint). Only then did the tendrils of association and dependency reveal themselves, with the occurrence of hazards and the state responses to these events often becoming stressors for vulnerable groups. The exposure of our study settlements in Nepal and Thailand to hazards was not an accident, part of the natural order of things; it was a product of a set of policies and processes put in place and set

in train by successive governments in those two countries. These played a role in creating the superstructure that played a significant part in shaping, even determining, the spatialities of the hazard/risk context that emerged.

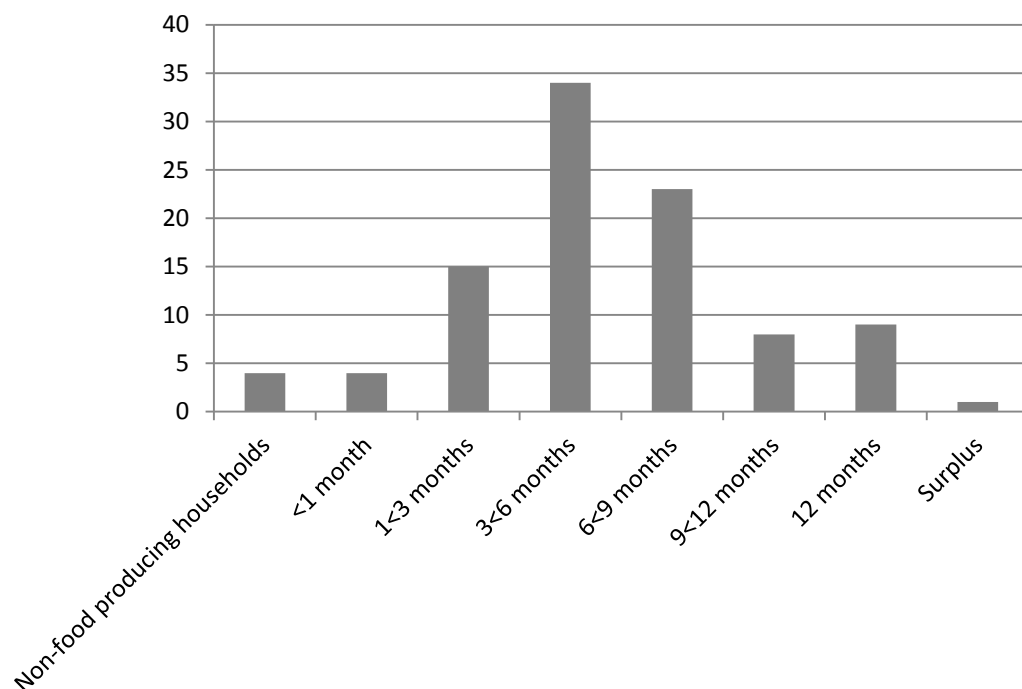
In his book, *Slow Violence and the Environmentalism of the Poor* (2011), Rob Nixon writes that “by slow violence I mean a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed over time and space, an attritional violence that is typically not viewed as violence at all” (2011: 2). He links slow violence to Galtung’s (1969) notion of structural violence but emphasises the temporality of violence wherein its gradualism can be such that it becomes decoupled from its roots (p. 11). The result is that we lose sight of how and why the poor and the vulnerable face the dilemmas they do—and the causalities that lead to this state of affairs. That cause-and-effect are separated out over time is, to be sure, part of the reason why the culprit and victim are difficult to connect; this is compounded, however, by a geography that also disconnects cause-and-effect over space. As we researched in our very different field contexts, piecing together people’s life histories, it became clear that the immediate “hazardscape”, to use Cutter, Mitchell and Scott’s (2000) phrase, was just one part of the story.

Placing landslides in Nepal

What was clear from the beginning of the research in Nepal is that in order to understand the vulnerability of householders, it was necessary to look beyond the immediate area at risk of landslides, and beyond a single physical hazard. This is because people’s “livelihood footprints” (Rigg *et al.*, 2012a) are no longer geographically constrained in a way they once were. In the Upper Bhote Koshi Valley, for example, Owen (2009) found that small farm households were common away from the road, with 83% operating farms of less than 0.75 ha in area. The result was that just one in ten households surveyed met their subsistence needs from farming alone due to the combination of their small landholdings and the low agricultural productivity of the land, the majority of which is rain-fed or *bari* land (see Figure 1). With poor access to markets in the hills, even when households were able to generate a surplus, they were unable to get this surplus produce easily to market. They therefore relied

on non-farm activities, both *in-situ* and *ex-situ*, to meet the livelihood shortfall. Out-migration to the roadside to set up small hotels or shops and petty trade were common, along with family members migrating for employment to bigger cities or even overseas to the Gulf States, and remitting funds back to their families.

Figure 1. Sufficiency of subsistence food production amongst the sampled off-road households.



Source: Author's surveys, May 2007; $n = 98$.

Why out-migration has come to be such a feature of Asian lives cannot be addressed here in detail (for an overview of the wider debates around rural livelihoods and pluriactivity in developing countries, see Ellis, 2000; and for an Asia-specific discussion, see Rigg *et al.*, 2012b) but the explanation lies in a coincidence of processes and factors: the inability of traditional rural livelihoods to deliver a “decent” living due to land fragmentation and shifting terms of trade; the changing cultural and social preferences and priorities that require people to become “connected”, whether to access education, health facilities or urban centres; the

market imperative and the marginalising effects of market integration, not infrequently linked to the instrumentality of certain policies; and, sometimes, the processes of dispossession that drive capitalist accumulation. These are just some of the root causes that help to explain, at a higher level, why families come to live in hazard-prone areas and can be seen to resonate with the views of the householders interviewed in the Upper Bhote Koshi Valley in rural Central Nepal (see Table 1).

Within the Upper Bhote Koshi Valley, the physical hazard can be quite precisely delineated within the landscape. Settlements located in the hills were found to be susceptible to large, slow moving failures that destroy property, infrastructure and agricultural assets, but usually without the loss of human life. By comparison, the roadside settlements located in the valley bottom were constructed at the foot of steep, unstable slopes and on colluvial and alluvial deposits commonly adjacent to incoming stream channels. Here, the landslide hazard is acute and potentially catastrophic, given the susceptibility of these channels to damming and breaching by upslope landslides. It is just this type of settlement that was devastated by the landslide described in the opening paragraphs. Based on exposure assessments undertaken along the road, it is possible to argue that the out-migration observed from the hills to the roadsides in the valley bottom—for the reasons outlined above—is putting *more* people at risk of potentially fatal landslides. The root causes, however, mainly lie elsewhere and from the standpoint of the expert at the roadside are only partially visible, usually spatially distributed, and invariably silent in their operation. These processes, nonetheless, are a critical component in understanding the production of landslide risk in the hills and valleys of Nepal.

It is important to note that the households exposed to landslide hazard at the roadside in the Upper Bhote Koshi Valley were both relatively rich and relatively poor, and from different caste and ethnic groups—challenging the assumptions often made in the literature that such high risk zones are occupied by the most marginalised groups. It was also clear from interviews that householders had a very good understanding of the causes and triggering mechanisms of landslides and were usually aware of the vulnerability of their particular

Table 1. Migration and mobility in the Upper Bhote Koshi Valley: Factors driving out-migration from the hills to the roadside.

Category	“Push” factors from the hills	“Pull” factors to the roadside
Resources and environment	Low productivity of farmland Unreliable water supply Women forced to walk further to collect firewood and fodder Loss of land due to erosion and landslides	Reliable water supply
Economic	Low agricultural productivity Few, if any, employment opportunities beyond agriculture	Opportunity to establish small-scale businesses, e.g., tea houses, small hotels and shops, trade and transport businesses Expansion of employment opportunities in India and the Middle East – attraction of remittance economy The potential accumulation of a degree of wealth Road access
Social	Village life is difficult Limited opportunities Desire for betterment	Growing wants driven by consumerism/modernisation (Better) education for children
Political	Decade-long civil conflict has driven households from Maoist-controlled rural areas into government-controlled population centres	

Source: Author’s surveys, October 2006 and May 2007.

location to not infrequent landslide hazards.⁴ The point being that landslide hazard needs to be contextualised within the wider hazard-opportunity setting. For the majority of householders in this Nepal study, landslide risk was a low priority concern and immediate, more tangible needs dictated local perceptions of risk. While moving to the roadside might increase landslide exposure, it also increased livelihood and human development opportunities that could not easily be realised in the hills. As one respondent explained:

“Landslide awareness programmes wouldn’t be effective. The land’s too steep. There’s no point because you cannot stop the landslides ... We need a literacy programme—none of the adults in the village can read or write. We need to improve the quality of education for our children—we only have six teachers for eight classes. We need a sanitation awareness programme—there aren’t any toilets here [in the hill village]. We need a reliable water supply.” (Representative of a Women’s Group, 2008)

These sentiments were generally held amongst householders in the Upper Bhote Koshi Valley; they were aware that they lived in landslide prone areas but landslides were placed in the context of wider societal concerns. To the local people interviewed, these risks were hard to compare and weigh: one related to landslides that were considered to be inevitable in such steep terrain; and the other to day-to-day livelihood security that had an immediacy that was generally absent in relation to landslide hazard. Landslides, then, were just one of a multitude of stressors facing vulnerable groups in the Upper Bhote Koshi Valley but, importantly, these other stressors could often be productively addressed, while landslides were frequently regarded as acts of God.

⁴ Gaps in local understanding of landslides were noted, however, when people were exposed to new, comparatively infrequent hazards and where they might not recognise the warning signs associated with these hazards. The occurrence of a debris flow in the Upper Bhote Koshi Valley is one such example where householders did not recognise the warning signs—in this case, a stream that had stopped flowing having been dammed by a landslide upstream and out of sight of householders at the roadside. The landslide dam breached overnight inundating the village and killing 54 people.

In general, householders were adopting “risk avoiding” strategies but these were undertaken in the context of the everyday risks they faced, rather than the comparatively infrequent geophysical hazards. These local interpretations were not a misunderstanding of the potential severity of the macro-scale landslide hazard, but were indicative of a different understanding of hazard and risk—one that situated landslides in the context of a range of social and economic factors that influenced both immediate and future livelihood security. To be sure, there were some destitute households who had little choice but to occupy such marginal, exposed land. But there were also many householders who were occupying these seemingly “at risk” sites through choice (albeit limited or constrained choice) in some instances because the advantages of a roadside location outweighed the risks associated with landslide hazard. In some cases, it was the accumulation of capital from family members working overseas that made this out-migration to the roadside possible in the first place.

What was clear from the interviews was that risks do not map onto each other. In moving to the roadside some risks increase—for example, the risks associated with landslide and debris flow activity—while others are reduced. Roadside households have access to a clean and reliable water supply; have opportunities for non-farm employment to earn enough money to meet their subsistence and other needs; they can send their children to the nearby secondary school and thereby improve their prospects; and have access to the local health post. While it was never articulated in quite this manner, householders were in effect willing to trade one type of risk for another; their relatively safe—in landslide risk terms—former hill communities for settlements by the roadside. They did not see any future in remaining off-road. All this needs to be set against the reality that Nepal has no state-woven social security net to support the elderly or protect the vulnerable. This lies with the initiative, acumen and hard work—and a willingness to take risks—of individuals and individual households.

Placing the tsunami in Thailand

We can follow much the same line of argument in the case of the Indian Ocean tsunami but here we can trace not only the processes that caused people to be living or residing in a

hazardous context in the first place—on that fateful morning of 26 December 2004—but also how the effects of the event itself also reverberated across national and international space.

In Phang Nga province, over 4,000 people lost their lives and some 1,700 were recorded as missing following the tsunami; most of these occurred in Takua Pa District, where the tourist resort area of Khao Lak is situated (see Table 2). This coastline facing the Andaman Sea has evolved in a manner that can be understood through the lens of globalisation processes, or neoliberal market integration. There were, certainly, some communities with a long presence in the area—Buddhist and Muslim fisher-folk, in particular. But far more numerous were relatively wealthy tourists, most from Europe; migrant workers from other regions of Thailand who were attracted by jobs in the tourism economy; and migrant labourers, often undocumented, from other countries, especially Myanmar, who were working in the least well remunerated and attractive industries—such as seafood processing and construction. Like the case of Nepal, those residing in this hazardous littoral space at that moment were varied in terms of class, ethnicity, age and occupation. But, unlike the Upper Bhote Koshi Valley, where the migration patterns were mainly local (within the valley), we see here a much more geographically dispersed set of migration streams.

The fact that as many non-Thai as Thai nationals died (see Table 1) led some commentators to write about the tsunami in terms of its “indiscriminate” impact (e.g., Grewal, 2006; Faiia, 2005). But of course the narrative of the tsunami and its effects is far from indiscriminate; it is highly structured (Rigg *et al.*, 2008). There is a political economy to the migration streams that brought people from other areas of Thailand and from neighbouring Myanmar to Takua Pa in the first place. Who moved, where they moved to, under what circumstances they moved, what work they undertook, and how they lived were not a series of accidents. It was precisely because the human context of that particular place, *before* it became a “hazardscape”, was discriminate that we need to avoid the notion that such large-scale events are indiscriminate in their effects.

Table 2. The 2004 Indian Ocean tsunami – Casualty data for Thailand

Province	Deceased				Injured			Missing		
	Thai	Non-Thai	No info	Total	Thai	Non-Thai	Total	Thai	Non-Thai	Total
Phang-nga	1,266	1,633	1,325	4,224	4,344	1,253	5,597	1,428	305	1,733
Krabi	357	203	161	721	808	568	1,376	329	240	569
Phuket	151	111	17	279	591	520	1,111	256	364	620
Ranong	156	4	0	160	215	31	246	9	0	9
Satun	6	0	0	6	15	0	15	0	0	0
Trang	3	2	0	5	92	20	112	1	0	1
TOTAL	1,939	1,953	1,503	5,395	6,065	2,392	8,457	2,023	909	2,932

Note: Casualty data as of 24 March 2005.

Furthermore, even amongst the population who found themselves residing in that hazardscape, there was discrimination in terms of who was killed and injured, and who survived—and, it should be added, also in their treatment following the disaster. As studies from Tamil Nadu (India), Sri Lanka and Thailand show, many more women were killed than men, sometimes at a ratio of as high as 4:1, mainly for the reason that gender divisions of labour and the timing of the tsunami meant that women were at a greater of risk of exposure (Oxfam, 2005; Falk, 2012; and see MacDonald, 2005). As Falk says, “Disasters occur in gendered contexts, and in disasters women are generally defined as being more vulnerable than men” (2012: 184). The tsunami struck in the morning when women were more likely to be at home, exposed to the wave, while men were either working inland on their fields or out at sea, on their fishing boats (see Figure 2). Men were also less encumbered by clothes and children as they tried to escape the wave, than were women. As to their post-event treatment, it was widely noted at the time that the treatment of tourists was noticeably different from that provided to Burmese migrant labourers: “Burmese migrant labourers ... were harshly treated. They were concentrated in a “crime screen center” for screening; the illegal ones

were to be deported, while the registered ones were promised, but not really given, help ... the authorities showed complete indifference to their fate” (Cohen, 2009: 188). Both the disaster event and the state responses to the event were therefore stressors for vulnerable migrant labourers.

Figure 2. The rebuilt village of Ban Nam Khem, on the site of the original village and in a similarly exposed position



Photo: Author

Finally, the effects of the tsunami were felt across Thailand, the region and internationally (see Rigg *et al.*, 2008). Clearly the trauma of the event touched people emotionally and psychologically from many different national contexts, but it did so materially too.

Households from other regions of Thailand and in Myanmar had become dependent on work in this area of Takua Pa as livelihoods have become progressively delocalised. The death and injury of such workers, particularly in a context where there is either no or only a loosely woven social safety net, can be catastrophic. Krishna's work (Krishna, 2010) has shown how in much of the poorer world, people are only "one illness away" from poverty given the absence of universal healthcare provision. They are also only one disaster away from poverty.

The argument we are making is the need to link disaster research with wider work on the changing nature of livelihoods in the global South, migration and mobility studies, and critical engagements with policy-induced vulnerability, using approaches such as multi-sited ethnographies and network studies. These encourage us to place the production of vulnerability within its wider spatial and structural contexts (exemplified in the Nepal case), while also recognising how the material, as well as the emotional impacts of an event ripple and resonate across space and borders.

Whose knowledge and what evidence counts?

The second theme that we address concerns the nature of knowledge and its application in policy and practice, and evidence and its validity in academic terms. The first of these will be addressed mainly with reference to the work on landslides in Nepal and the latter with reference to the tsunami in Thailand. Both, we argue, are important mechanisms by which problems are framed and understood, and their soundness demonstrated. This then goes some way to determining how landslide and tsunami risks are viewed and, therefore, how they are tackled. There is a connection here, as we will explore, between the framing of risk in policy/practice and in academia.

Interpreting vulnerability and governing landslide hazard in Nepal

Landslides, such as the Jure event, are not uncommon in tectonically active mountain chains, such as the Nepal Himalaya (Petley *et al.*, 2006). To some extent, therefore, the human occupation of landslide prone areas in Nepal is inevitable, reflecting the natural risk associated with a dynamic mountain environment. However, it is well documented that

landslide occurrence has been exacerbated by human activity, principally road construction (Barnard *et al.*, 2001; Petley *et al.*, 2006; Owen *et al.*, 2008). Road access levels in Nepal are one of the lowest in South Asia, with 57% of the rural population of Nepal in 2007 without year-round access to roads (ADB *et al.*, 2009). In a developing country such as Nepal, where emphasis is placed on economic growth and development, road construction projects—a mainstay of market integration—are set to continue.⁵ How, then, should landslide risk be managed? And how is landslide risk viewed by the different stakeholder groups engaged in landslide risk management?

Nepal has traditionally adopted a top-down, response-led approach to disasters with a focus on actions that can be taken during or after a disaster occurs (Jones *et al.*, 2014). Little emphasis has conventionally been placed on landslide risk management either by identifying and reducing the landslide hazard or by reducing the vulnerability of those “at risk”. However, with Disaster Risk Reduction (DRR) increasingly being seen as a pre-condition and an integrated aspect of sustainable development (UNISDR 2002), such ideas are beginning to filter down to the national policy level (National Planning Commission, 2002, 2007, 2013).

According to the Government of Nepal’s policy documents, reducing disaster risk is best achieved through the mainstreaming of disaster management into the development process (MoHA, 2011), very much in line with the international Hyogo Framework for Action (UNISDR, 2005) and the newly-agreed Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). In addition to ensuring that there is an effective governance and legislative context for DRR, and a more effective coordination mechanism between stakeholders working in this sector, there is also recognition of the need to “enhance the capacity to carry out disaster preparedness and response activities in order to face the

⁵ In 2011-2012, Nepal received development assistance totalling US\$ 1.04 billion from over 40 donors. This equated to 26% of Nepal’s national budget. The top five sectors receiving development assistance were education, local development, road transportation, electricity and health (MoF, 2013).

exigencies of disaster” (National Planning Commission, 2013: 118). This is perhaps unsurprising given Nepal’s reliance on international aid and the priority accorded to DRR by the international development community (Jones *et al.*, 2014). As highlighted in the context of the Jure landslide at the beginning of this piece, emphasis is placed on the importance of hazard mapping to identify hazard prone areas (with an explicit mention of the usefulness of these maps for local communities and planners); as well as the use of “local and modern means” in landslide and flood prevention (National Planning Commission, 2013). Common approaches to slope stabilisation include bioengineering and the construction of gabion walls.

In 2005, when this research began, Nepal lacked the resources and expertise at the local level to address landslide risk in a systematic manner. As a representative of the District Development Committee in Sindhupalchok District explained:

“We focus on development activities like road construction, irrigation and other activities. We have to think about landslides but we have so little money we cannot do anything. We should also undertake a geological study but we don’t have the specialist expertise.” (Sindhupalchok District, June 2008)

Jones *et al.* (2013) reported similar findings in their study of local level risk governance in Nepal, including weak capacity in, and limited funding for, disaster management at the local level. At the national level, the then Ministry of Local Development (MoLD)⁶ highlighted similar issues:

“We say people directly affected by disaster will be resettled but it takes years and years to find alternative land and to resettle people. The policy is there but it is difficult to implement because of the lack of resources” (Representative of the MoLD, June 2008)

More recent interviews with government representatives in Nepal in 2013 and 2014, as part of the follow-on earthquake-focused study, suggest that little has changed.

⁶ Now the Ministry of Federal Affairs and Local Development (MoFALD).

In Nepal, landslide risk is attributed not only to the country's geophysical setting, but also to the socio-economic processes that generate vulnerability. Earlier development plans (National Planning Commission, 2002)⁷ attributed the vulnerability of the population to "backwardness", "illiteracy" and "lack of knowledge". While such sentiments are less explicit in the *Approach Paper to the Thirteenth Development Plan* (National Planning Commission 2013: 117), the emergence of risk from the way individuals behave is still present:

"Nepal is at high risk of disasters because of the nature of its steep geographical terrain and fragile soils; high levels of seismic activity; natural change, including erosion, river meandering and climate change; and disasters induced by human activities like farming steep slopes ... The haphazard construction of houses and physical infrastructure and the adverse impacts of human activity on the environment have exacerbated risks."

The tendency for the higher reaches of government and policy making in Nepal to see vulnerability as the product of "ignorance" and "fatalism", was reinforced to some extent by landslide experts who spoke about villagers' fatalistic attitudes and their lack of knowledge about landslides:

"They believe in God in the rural area and so they say if God is angry it will happen, otherwise it will not happen." (Engineer, focus group participant, June 2008)

"... now they are building hotels [small shops selling food] in the same place after that disaster—it clearly shows how naïve rural people are." (Engineering geologist, focus group participant, June 2008)

⁷ The *Tenth Development Plan* (2002-2007) was the last five-year development plan to have been drafted by the Government of Nepal's National Planning Commission. A *Three-Year Interim Plan* (2007/08-2009/10) was published in December 2007 and the *Approach Paper to the Thirteenth Development Plan* (FY 2013/14-2015/16) in July 2013. We refer here to the unofficial translations of these planning documents.

However, as the following discussion will show, the gap between “expert” and “lay” understandings of landslide risk is perhaps less than these quotations suggest.

The participatory turn in development studies and research is not, often, seen reflected in government departments or the more natural/physical science quarters of the academic community. It has, however, become a dominant theme in development planning in the country, a reflection, perhaps, of the wider international development agenda that has come to dominate in Nepal (Jones *et al.*, 2014). One engineering geologist remarked in a discussion about the use of local knowledge and participatory approaches to road construction:

“I dislike this [participation] and maybe it is my biasness ... but all of the donors are for that and I am against that ... the fundamental basic knowledge from the disciplines [geology, hydrology etc.] is gone forever ... Scientists have been working for 300 years developing the discipline and they [local people] deny everything. So it is called people’s participation ... but without the knowledge how can you guide people the [right] way, [down] the right track? You have to have the participation of people that is very nice but first you have to train them, teach them what has to be done and not be done.” (Engineering geologist, focus group participant, June 2008)

The geologist was referring here to a road alignment that had been chosen by the community and which followed a dry river bed. The road and the bazaar, which had grown up along it, were washed away by a flood event some months later (as anticipated by the geologist).

There are several key points that we wish to make here. First, it can be argued that a pure science and engineering-led approach excessively narrows down the issue of road construction and disaster risk management. It becomes, in effect, a practical problem, informed and illuminated by scientific knowledge, requiring a technical solution. In doing so, it necessarily marginalises other ways of corraling or defining the problem; limits the scope of knowledge that might be deemed to be applicable, relevant or legitimate; and discounts the possibility that the solution might be socio-political as much as technical. If local knowledge is regarded as of limited use and if local people are stereotyped as “naïve” or “backward”

then this creates a propensity to ignore or discount their knowledge and experience on the one hand, and overlook the wider (spatial and structural) conditions that lead to vulnerability in the first place, as discussed in the foregoing section.

However, there is another side to this debate that we argue should also not be dismissed. The engineering geologist quoted above challenges what has become the new development orthodoxy and in doing so questions the increasingly normative position taken on the role of scientific knowledge in DRR, and development more generally. While the broad aim of participation in development is to involve the socially, politically and economically marginalised, and to harness “‘local’ people’s perspectives, knowledge, priorities and skills” as an “alternative to donor-driven and outsider-led development” (Cooke and Kothari, 2001: 5), studies have also highlighted the local knowledge gaps that exist around comparatively infrequent hazards, or hazards to which individuals are newly exposed (Halvorson and Hamilton 2007, 2010; Oven *et al.*, 2008; Shaw *et al.*, 2009; Oven *et al.*, 2011), suggesting that, while important, local knowledge alone may not be enough for DRR (see also Gaillard and Mercer, 2013). When it comes to participatory development interventions, the World Bank’s review of its own participatory projects has highlighted the tendency for such projects to suffer from a combination of elite capture and participatory exclusions (Mansuri and Rao, 2013).

What was clear from the focus group discussion with local (Nepali) scientists is that they do not isolate landslide risk from the wider risk context and have a nuanced understanding of the competing pressures under which people make decisions. Their pragmatic understanding of landslide risk can be seen to reflect not only the dynamic geophysical environment, but also the high levels of poverty and underdevelopment that are characteristic of Nepal. While there was general agreement amongst actors that hazard maps were a useful tool for delineating high-risk areas, it was also felt that vast areas would fall under the category of “high hazard”, limiting their usefulness for development planning. As a focus group participant explained:

“If we produce some accurate mountain hazard maps then I do believe the whole of the mountain area will come under high hazard. There’s nowhere to do any development work. The people in Nepal have to live with some risk ... and that is the reality.” (Geologist, focus group participant, Kathmandu, June 2008)

There was certainly a recognition amongst the technical experts interviewed that the transfer of scientific knowledge and expertise alone was unlikely to reduce landslide risk. As one focus group participant explained:

“People think the risk [of living in a landslide prone area at the roadside] is worth taking because ... the facilities, infrastructure in the village is so low ... if you quantify it, I would have to say that the risk is worth taking. At the roadside where you have better access to hospitals, schools, business, transporting goods, I would start thinking, yes, there is a risk but is it worth taking and most people would say yes.” (Geologist, focus group, Kathmandu, June 2008)

Valuing evidence in the natural and social sciences: Reflections after the tsunami

The tsunami work raises a related but wider question about how scholars from different disciplinary persuasions attach varying levels of confidence to different types of evidence. This emerges from the epistemologies that underpin research traditions in the natural and social sciences (Bracken and Oughton, 2006; Jones and Macdonald, 2007) and can be seen reflected in the quotation above from the engineering geologist who admitted to “disliking participation” because it is “participation without knowledge”. That knowledge, of course, is based on a very particular tradition: it emerges not from the everyday experience of living in a hazardous place and knowing the local context firsthand, but from years of training and study, often in other places. As summarised by Luna (2014), the scientific community can provide “comprehensive, objective, rational and relevant information and assessment of the hazards and the vulnerabilities of communities. They are equipped with the advance competence in providing the people with the data for risk identification and analysis” (p. 46). Specialist knowledge, in a sense, trumps everyday wisdom.

The multi-disciplinary project of the US National Science Foundation that funded the tsunami work in southern Thailand was, at first sight, a good example of inter-disciplinary working. The natural and social scientists operated very well as a social unit, and the project was highly successful if numbers of “deliverables”, in the form of papers and other publications, is a measure of success. But it also demonstrated how hard it is to translate the experience of working together into scientific publications that attempt to cross disciplinary divides. In the process of the research, the social scientists in the team interviewed some 46 people affected by the tsunami from hotel owners to village headmen and ordinary fisherfolk; we also conducted semi-structured interviews with a further 35 people caught up in its aftermath. The natural scientists, meanwhile, took measurements of local topography, collected mud and organic debris from trees, and recorded water marks from building walls all to determine the depth and direction of the wave. While we certainly worked together, and to some extent engaged in knowledge collaboration, whether we also co-produced knowledge in the process is more questionable. The issue—and the difficulty—here would seem to relate to three questions (see Le Heron, 2013): How is knowledge produced? What is the saliency of this knowledge for different groups? And what is the societal impact of such knowledge? Two examples serve to illustrate the difficulties in translating that smoothly-crafted term “co-production of knowledge” into something more than rhetoric.

Since the tsunami, Carl Grundy-Warr (one of the social scientists in the original NSF-funded research team) has returned multiple times to the site of the disaster in Southern Thailand to track its long-term effects on development planning and transitions. In a forthcoming book contribution, we write this about the legacy of the tsunami and the numerous interventions that followed the event:

“Standing proudly on a beachfront near to Tubtawan [in Khao Lak] is the virtually unused space of the Tsunami Building, symbolic of a flurry of relief and humanitarian, and disaster-risk management interventions immediately after the tsunami. Sadly, this building has the increasing feel of a ‘museum’ rather than an active site for developing strategies in the event of future calamities affecting the coastal zone. ...[M]emories of the [2004] tsunami are fading as fast as the signs and symbols of it are along the coastal zone, and with the current boutique

resorts and other land developments we are witnessing the emergence of human-built ‘spaces of risk’ for future generations.” (Grundy-Warr and Rigg, forthcoming)

This extract summarises the frustration of researchers in the face of the exigencies of the development imperative and the power of political elites. But frustration also exists within the academy. Drawing on our interviews with multiple stakeholders in the months following the tsunami, we submitted a paper to an international, peer-reviewed “disasters” journal. What struck us in the referees’ reports was the sharply differing assumptions regarding appropriate methods and evidence. One reviewer was happy to accept that interviews and a broadly qualitative approach were appropriate, writing that the paper was “rich, illuminating, sensitively written and in many ways relevant”, concluding that it “is a very good paper ... [and] will be an excellent contribution”. The second reviewer, however, felt that the paper had “more in common with journalism than solid research”, viewing the sampling frame as “opportunistic”. While we appreciate that reviewers often disagree, these comments reflect, we argue, a fundamental difference in the underpinning epistemologies that guided how each reviewer assessed the submission. The second reviewer discounted qualitative research and instead contended that evidence needed to be generated from a “large, homogeneous sample of people”; only in this way can “credible” statements be made. The first reviewer, by contrast, was willing to take the case studies not as representative of a wider (“homogenous”) population, but rather as offering an insight into the experiences and responses of affected individuals and groups from which valuable insights might be drawn.

Rather ironically, many of the affected people we met in southern Thailand also seemed to hold physical science in high esteem. Our natural scientist colleagues with their sophisticated equipment were sought out, and closely questioned as to when and whether there might be another tsunami. The social scientists on the team, with their notebooks and pencils, were largely ignored. Why this was the case, we suggest, was because social scientists were uncovering what local people knew and had experienced; the natural scientists on the team, however, were injecting new knowledge into the local arena, knowledge that local people were anxious to access. This was also true of the landsliding research in Nepal.

While the social science research may have been of limited direct and immediate benefit to communities, we were in a position to share our findings with government, and humanitarian and development organisations, with a view to informing future policy and planning.

Conclusion: The traction and tyranny of comparison

In this paper we have brought together two very different hazards and risk contexts. One, the recurrent problem of landslides in a low income country with slow growth and weak governance; the other, a once-in-a-lifetime hazard event—a tsunami—afflicting a middle-income, ‘miracle’ economy with relatively high governance capacity. It might be said that we have been comparing apples and oranges but, as McFarlane *et al.* note in their paper on sanitation and comparison, “difference [can be used] as a route to ... more plural understanding” (2014: 1008). What is significant is that we have found points of intersection even in the context of such difference. In this concluding section, we reflect on these resonances in the light of the objectives of the paper, namely to consider how natural hazard risk is produced by processes of social and economic transformation; understood and experienced by vulnerable groups; and framed by governments and experts.

Our first objective was, in essence, to prompt a re-spatialisation of how we view and understand hazard and risk. In both the Nepal and Thailand cases, we showed how the risk signature did not map onto the hazard. The challenge is particularly acute because of the tendency to take a Ground Zero approach to hazards: That our object of attention is the point and immediate surroundings of an event, be it a landslide, tsunami or earthquake. But both the production of risk in the first place and the human impacts in the aftermath of an event make subtle traces to other, sometimes distant, geographical contexts. When these other worlds are brought into the explanatory mix, only then are we in a position to understand, for example, why people choose to live where they do—in a hazardous place.

This highlights the question of how we delineate the spatial and social boundaries of risk: Where do we draw the line and where and what do we research? As the experience of landslide risk in Nepal and the Indian Ocean tsunami disaster in Thailand show,

understanding why people find themselves at risk in the first place requires that we see the hazard context being contained within a much wider risk milieu. Risk and vulnerability are increasingly spatially and socially distributed, due to the nature of contemporary processes of social and economic transformation. Linking disaster research with wider work on the changing nature of livelihoods in the global South would provide, for example, a more inclusive understanding of the impact of contemporary social and economic transformations, and to some extent customary practice, on household vulnerability and resilience. Only by knowing this can we attempt to address the root causes of disaster.

Following a disaster event, it seems all too obvious who was at risk; before such an event this is far less clear. Many of the processes and the explanations lie off-stage, and are situated in the quiet structural violence of the operation of the market economy; the illumination of these structural processes was our second broad aim. The inequalities and inequities that explain and frame vulnerability and, therefore risk, are the outcome of structural processes that are often policy-induced. Even in a country like Thailand, where extreme poverty has been almost eradicated, issues connected with rural-urban relations, the conditions of migrant work, sectoral terms of trade, and social exclusion have an important bearing in determining who is “at risk” in the first place. It is by ignoring such structural forces that we become tempted into the belief that such “acts of God” are indiscriminate.

In the section above on “Interpreting vulnerability and governing landslide hazard in Nepal”, we reproduced an extract from a recent document of the National Planning Commission that offers an explanation as to why Nepal is at risk of disasters. We see in this extract two overt explanatory elements, one hidden element and, we suggest, one significant omission. The omission, we further contend, is emblematic of much DRR. Taken together, these serve to illustrate how a hazard and its causations are, often, quite narrowly packaged. The extract highlights that disaster risk in Nepal is created by natural conditions exacerbated by the actions and activities of ordinary people in the context of their prevailing (but inadequate) knowledge(s). In building their livelihoods, populations expose themselves to risk by “farming steep slopes” and the “haphazard construction of [their] houses”. Behind

this, but usually stated *sotto voce*, is also the role of the market mechanism in the production of risk. The significant omission is the role that policy plays in the creation of risk. This extends from high-level policy, most obviously a commitment to the market as the key means to drive development, to individual policies, such as those that may shift terms of trade against farming, thus creating the conditions for migration to the roadside. Physical processes and conditions clearly do play a role in producing risk, particularly in a country such as Nepal. But it is all too easy in constructing policy frameworks for DRR to overlook the policy-induced or accentuated risks and vulnerabilities that contribute to risk production in the first place (Rigg and Owen, 2015). Risk is not just a product of natural hazard and human frailty set within the operational ambit of market forces, as the Nepal National Planning Commission would seem to suggest; policies also importantly shape the risk context. They steer development in particular directions; cause investments to be made in particular places; and encourage individuals and households to live and work in particular ways.

But even this is not entirely satisfactory in explanatory terms. It is not simply that processes of contemporary change lead to marginalisation, which accentuates vulnerability. Those people residing along the roads of Nepal or the coastline of Thailand were often at risk because they were *non-poor*. The truly poor, at least in income and amenity terms, were situated off-road and in other places and were less vulnerable to landslides and tsunamis. At the same time, however, they were more vulnerable to many other threats to human well-being. In a recent commentary on the 2013 Uttarakhand flood in India, Ziegler *et al.* (2014) write: “While these post-event [policy] recommendations come easily, it is much more difficult to understand why and how the current vulnerability has developed and how change can be effected in the current political economy.” It is just this disconnect between self-evident policies on the one hand and hidden causations on the other that we have been intent on revealing.

Finally, and in response to the third broad aim, both of our two cases make clear that, notwithstanding the calls for more inter- and trans-disciplinary working, quite rigid and operationally exclusive professional knowledge framings mean that our approaches are

problematically deterministic in how the object (hazard, risk) is viewed, what evidence is regarded as legitimate in its illumination, and how best the problem, so identified, might be addressed or tackled. The fact that disasters are not natural is widely recognised, as is the need for an integrated approach to DRR that addresses both the hazard and vulnerability. This requires local, practitioner and scientific (both natural and social) knowledge—from the quantitative to the qualitative, and from the evidenced to the anecdotal. It is this body of knowledge as a whole that is required to address both chronic and acute hazards currently threatening people's lives and livelihoods. Calls to bridge local, practitioner and outside scientific knowledge and disciplinary-specific knowledge are nothing new but moving from theory to practice remains a challenge. Such approaches are thwarted by uneven power dynamics between decision-makers, researchers and the people “at risk”; a clash between context specific local knowledge and more objective global science; and limited capacity for DRR at the local level (Mercer, 2012; Gaillard and Mercer, 2013). The case studies from Nepal and Thailand do, however, demonstrate a modest shift beyond the contours delineated by government policies and academic tendencies—be they landslide experts in Nepal grounding the decisions made by rural householders to occupy landslide prone locations, or policy makers recognising the role of local knowledge in disaster management. The next step is for this acknowledgement of “other” ways of knowing and framing problems to be turned into action. For example, communities working with geologists to identify road alignments that both meet community needs whilst minimising the landslide risk. Knowledge co-production such as this requires financial support and capacity building at the local level.

In his book *The Tyranny of Experts*, William Easterly writes that “the technocratic illusion is that poverty results from a shortage of expertise, whereas poverty is really about a shortage of rights” (2014: 7). DRR also continues to pay court to a similar technocratic illusion, notwithstanding attempts to empower local people, value their knowledge, and devise participatory methods to transform them from objects into the subject of development. What is required, we argue, is not only an appreciation of the different framings and understandings of risk, but a true integration of knowledge and expertise.

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