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Report: Building Rural Resilience in Seismically Active Areas

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Introduction

Explaining the basics of earthquake science

A multi-disciplinary team comprising academics and practitioners from the UK and Nepal have undertaken a four-month scoping study funded by the UK government's Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC) ***to identify the key research needs across the natural and social sciences with the aim of increasing the resilience of rural communities to seismic hazards***. The research, led by the Institute of Hazard, Risk and Resilience (IHRR), Durham University, was undertaken in collaboration with three local partners: the National Society for Earthquake Technology (NSET), the International Centre for Integrated Mountain Development (ICIMOD) and the Nepal School of Social Work.

The study comprised three components:

- bottom-up engagement with two communities in Central Nepal to develop an understanding of the interface between natural hazard science, the concerns of the community relative to seismic risk and their perceptions and understandings of earthquake-related hazards;
- a one-month consultation with the project partners to identify the relevant initiatives that are already underway and the key research needs from the perspective of the practitioner community; and
- an invited workshop at Durham University involving our local and regional partners, and additional academic experts from the US and UK, with the aim of contextualising the findings from the study.

Key Findings

Our findings fall under four major themes:

1. *Local understandings and perception of earthquake hazards*

It must be recognised that geophysical hazards are always placed ***in the context of wider societal concerns***. In a risk ranking exercise undertaken with eight community groups, landslides were prominent, but earthquakes were not. Rare, high-magnitude geophysical hazards were viewed differently from the everyday pressures and hardships associated with economic and social insecurities. While some individuals and households have little choice but to live in 'risky', landslide-prone locations, others were willing to substitute a safer existence from landslides for what was, in their terms, a better quality of life (with access to health care, education, and business opportunities). People are therefore unlikely to strengthen their resilience to infrequent hazard events if doing so compromises their resilience to everyday risks. ***In developing practical steps to increase resilience, we need to better understand people's priorities as well as recognise their agency and decision-making within the wider risk context.***

Using a 3D model of the valley to identify hazard-prone areas

Risk ranking exercises

2. *Uneven local knowledge*

We found that there was a highly ***uneven local knowledge*** in the context of ***different earthquake-related hazards***. Rather than being viewed as part of a continuum of possible hazards, recurrent events, such as pervasive monsoon-triggered landslides, and infrequent high-magnitude events, such as catastrophic earthquakes, were considered as separate and unconnected. Knowledge of high-magnitude events in this area was limited by little or no social memory. In general, respondents did not make the link between small, regular tremors that are experienced and large, high-magnitude earthquakes. Additionally, associations between related hazards, such as landslides triggered by earthquakes, were rarely made. Conversely, and potentially advantageously, respondents were found to have good understanding of the causal factors and triggering mechanisms of seasonal landslide activity, and the characteristics of slope failure types (rates and styles of movement), and were able to identify areas that have or could be affected by landslides in the future. Landslides in this area affect people every year and have wide-reaching impacts upon livelihoods. ***Landslides therefore offer a possible entry point into discussions around comparatively rare, high-magnitude events such as earthquakes.***

3. *Forecasting primary and secondary seismic hazards*

Improving scientific understanding of earthquake hazards with the ultimate aim of ***forecasting earthquakes*** will provide practitioners with much needed information regarding the possible location, and the magnitude and frequency of future events. In addition, ***forecasting the distribution and magnitude of secondary effects*** including earthquake-triggered landslides and other mass movements, is vital for preparedness, planning and response. Local involvement and a better understanding of seismic science is more likely to induce people to prepare themselves and their property in the event of a

high-magnitude earthquake.

4. *Science communication and the governance of earthquake risk reduction activities*

A wide range of earthquake risk reduction activities are already underway at the local, national, and regional level in earthquake-affected countries e.g. NSET's schools-based earthquake safety programme in Nepal and the regional training programmes on community-based disaster risk reduction and earthquake vulnerability reduction organised by the ADPC. However, it is important to note that not all earthquake-prone countries have government departments or NGOs actively engaged in earthquake risk reduction. Governments and NGOs may prioritise other concerns over comparatively infrequent earthquake hazards (as was the case in Haiti); they may not have readily available information about seismic hazards or know how to interpret the information available. ***Resilience-building activities must set up robust and pre-arranged communication pathways between scientists, relevant government agencies and the practitioner community. Developing these pathways, along with ensuring that scientists, government officials and practitioners are aware of and engaged with them, should be a priority for research.***

Comments and recommendations

1. As recent events have shown, it is essential that we increase our understanding of, and preparation for, a high-magnitude earthquake in Nepal and elsewhere along the Himalayan Arc.
2. It is vital that we improve the scientific understanding of both primary and secondary hazards associated with earthquake activity. Building resilience to the shaking alone is not enough.
3. We must ensure that the scientific and social scientific questions being asked reflect the needs of the practitioners on the ground.
4. We must recognise the vulnerability of rural areas to seismic hazards in addition to urban areas and mega-cities. As past earthquakes in Kashmir and Sichuan have shown, a significant proportion of the population affected were in rural areas.
5. There is a pressing need for tracking the use of outside 'expert' knowledge by stakeholders and for assessing its impact on the ground. All too often research is handed over to governments and NGOs to implement without advice, support or appraisal.
6. We must establish what knowledge is required at the local level in order to deal effectively with primary and secondary earthquake hazards, in order to support and extend existing efforts to build resilience to earthquakes.
7. As past development activities have shown, a one-size-fits-all approach to earthquake risk reduction should be avoided. In some countries, working through national and local level government may be the most effective way of engaging communities and rolling out wider initiatives; but for countries without a stable or able government platform, NGOs or community groups may be the most effective conduits for resilience building activities.
8. It is essential that we identify suitable entry points through which to engage vulnerable populations. Focusing on rare, high-magnitude events of which there is little community awareness or experience, and for which there are limited strategies available, is unlikely to be effective. These entry points may be defined, for example, in terms of specific earthquake-related hazards (e.g. landslides) that can introduce the populace to earthquake effects as well as to specific activities that they can undertake to increase resilience.

We welcome comments from the wider practitioner community on the above with a view to shaping future natural and social science research in this area.

More information about the activities involved in the scoping study is available on the **IHRR's blog**.