URBAN
PREPAREDNESS

Lessons from the Kathmandu Valley

Acknowledgements

Cover photo: Building density in Kathmandu City.
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Boxes and tables

Acronyms and abbreviations

CDMC	Community Disaster Management Committee
DFID	UK Department for International Development
DiPECHO	Disaster Preparedness ECHO
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
EPS	Earthquake Preparedness for Safer Communities programme
GFDRR	World Bank Global Facility for Disaster Reduction and Recovery
GoN	Government of Nepal
GIS	Geographic Information Systems
HFA	Hyogo Framework for Action 2005-2015
ICRC	International Committee of the Red Cross
IDPs	Internally Displaced Persons
INSARAG	International Search and Rescue Advisory Group
IOM	International Organisation for Migration
JICA	Japan International Cooperation Agency
KAP	Knowledge, Attitude, Practice
MoHA	Ministry of Home Affairs, Government of Nepal
MoHP	Ministry of Health and Population, Government of Nepal
NCDM	National Council on Disaster Management, Government of Nepal
NDMA	National Disaster Management Agency
NEOC	National Emergency Operations Centre
NGO	Non-Governmental Organisation
NRCS	Nepal Red Cross Society
NSET	National Society for Earthquake Technology, Nepal
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
RCC	Reinforced Cement Concrete
ULP	British Red Cross Urban Learning Project
UN	United Nations
UNDAC	United Nations Disaster Assessment and Coordination Committee
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USAR	Urban Search and Rescue
VCA	Vulnerability and Capacity Assessment
VDC	Village Development Committee
WHO	World Health Organisation

Executive summary

Kathmandu is one of the fastest growing cities in South Asia, with a population of around 2.5 million people. It is situated on a major fault line, placing it at significant risk of an intense earthquake. Out of 21 cities worldwide that lie in similar seismic zones, Kathmandu is at the highest risk in terms of impact on people. Moreover, rapid, haphazard urban development including non-compliance with the building code, failure to use qualified engineers or trained masons, encroachment of buildings on open space and depletion of the water table is increasing vulnerability at a significant rate. Kathmandu's critical infrastructure and essential services are also extremely vulnerable.

In the event of a major earthquake, the presence of only three access roads into the Kathmandu Valley and lack of heavy equipment to remove rubble will be serious barriers to an effective large-scale response. It is predicted that if an 8.3 magnitude earthquake hit Kathmandu today more than 100,000 people would be killed, 300,000 injured and 1.8 million displaced.

However, an unprecedented multi-stakeholder effort to prepare for such an earthquake is underway. As well as outlining the hazards and deepening vulnerabilities affecting Kathmandu, this report explores that work – focussing on the Nepal Red Cross Society (NRCS) and British Red Cross Earthquake Preparedness for Safer Communities programme (EPS). This programme provides a vital learning opportunity. Urban preparedness has received less attention than response and recovery operations in evaluations and learning reviews of humanitarian action in urban areas. As part of the British Red Cross Urban Learning Project, this study aims to enhance the understanding within the NRCS, the British Red Cross and our partners in and outside the Red Cross and Red Crescent Movement (hereafter, Movement) of the particular challenges and opportunities of urban preparedness. More specifically, the study focuses on identifying key learning points on community engagement and local and national action in a complex urban disaster management system.

Learning points for the Nepal Red Cross Society and other agencies in the Kathmandu Valley

The study outlines 12 key learning points on urban risk management and preparedness for response in the Kathmandu Valley, to be used by the NRCS and other operational agencies. These learning points address topics affecting all levels of the organisation, from volunteers in the field to senior leaders. They cover actions and processes within the National Society as well as interactions with affected communities and other actors before, during and after a major earthquake.

1. Understanding urban space, land and the built environment: Risk management, preparedness and response planning and operations must be developed to take account of the physical and social differences between and within urban areas and the different risks and opportunities they present. Preparedness and risk reduction models and approaches cannot be simply transferred from rural programmes.

2. Understanding mobility and its operational implications: Daily and seasonal patterns of mobility to, from and within the city are important to understand as they affect the availability of people for participation in assessments and preparedness activities (with additional implications for the sustainability of those activities), as well as the number of victims, the level of panic and the presence and gender of first responders. The disaster and the response itself will also affect normal mobility, raising complex land rights issues. All this needs to be carefully considered in risk management, preparedness and response planning.

3. Raising the awareness of the population: Urban areas are noisy, with many stimuli and messages competing for people's attention. Given the high-impact but lower day-to-day probability of an earthquake, agencies must co-ordinate their communications and awareness-raising activities to ensure their messages are heard, understood and contribute to sustained behaviour change. Where messages are delivered in person, education levels and gender issues should be considered, and where messages are delivered via mass media, those channels should be selected to ensure maximum impact and that different demographic groups are reached, both now and in the future.

4. Institutional analysis and the importance of 'connectedness' in a complex urban system: Nepal's urban disaster management system is crowded, complex and continually evolving. Knowing in advance where to go to seek guidance, instructions and to coordinate (both for individuals and the NRCS at all levels) is critical. Partners may not be the usual go-to actors; urban disaster management requires engagement with diverse actors such as the NEOC, militaries, Nepal Police and Armed Police Force, fire brigade, utility providers and the private sector. This requires investment of time and resources in institutional analysis and co-ordination, which should be undertaken in a gradual manner, addressing priority sectors and thematic issues in turn.

5. Leadership: Urban disaster management requires trained leaders who are sensitised to the likely needs of their staff and the population at large. Lines of authority and chains of communication must be clear given the complex and evolving nature of the disaster management system in the Kathmandu Valley. Leaders also require the physical means to operate and remain credible in a large-scale urban disaster.

6. The role of technology: Urban areas present exciting opportunities for risk awareness raising and disaster impact and response mapping. It is important both to develop a 'scientific' understanding of risk and vulnerability now and to be ready to harness the transformative potential of technological devices and applications. Crucially, however, at the time of disaster, technology must either be fully mastered or more traditional methods

used. This is critical in the event that information networks and communications systems are down.

7. Ensuring redundancy – preparing to manage operation in a degraded mode: Preparedness and readiness for response to a large-scale urban disaster involves the ability to operate in a degraded mode. Redundancy must be built into the system through fall-back positions in communications, human resources, transportation, logistics and media. This requires a combination of technical investments and training.

8. Local leadership in the first phase response: In the face of limited national response capacities and major logistical challenges likely to delay international humanitarian assistance, local capacity to lead the first phase response will be critical. The focus here should be on limited light search and rescue interventions, first aid, evacuation and linkages to remaining functioning health structures.

9. Domino effects – dealing with sequential crises: Urban areas present a heightened risk of an earthquake triggering other secondary disasters. The potential for an earthquake to trigger fires, chemical contamination, social unrest and mass displacement should be at the heart of all preparedness and response planning.

10. Co-ordination and co-operation in a complex multi-actor response: Effective co-ordination and co-operation is core to an efficient response that draws on the capacities of all actors involved in the urban disaster management system.

For the NRCS, co-ordination and co-operation in the following areas should be prioritised: first aid and triage, blood banks, dead body management and delivery of relief items. Overall, in coordinating the response, the Red Cross must be ready to work with diverse actors from national and international militaries to the Nepali diaspora.

11. Information and communications management: The NRCS is a key node between communities and the multi-sector, multi-agency urban disaster management system. Effective information and communications management will be vital in getting the information required to assess needs and plan the response and get out key messages on search and rescue, first aid and behaviour in the aftermath of the disaster.

12. Being alert and agile: Nobody knows what the exact impact of, and operational constraints imposed by, a large-scale earthquake will be. Therefore the focus of DRM and preparedness efforts should not be on prediction, but on building a state of alertness and agility, in order to respond effectively to a range of scenarios.

Learning points for the British Red Cross Urban Learning Project

As this study is part of the British Red Cross Urban Learning Project, it also features nine learning points for the wider Red Cross and Red Crescent Movement and humanitarian sector. These are intended to guide learning, training, and the embedding of good practice and innovative approaches in current and future programmes. Further detail and supporting

analysis on all the learning points can be found in the main report.

1. Urban space and mobility – Implications for assessment, preparedness and response: Risk management, preparedness planning and response management must be developed to take account of the 1) physical and social differences between and within urban areas and 2) peoples' movements to, from and within urban areas. These factors create different risks, vulnerabilities and opportunities with attendant implications for assessment, preparedness and response planning. The risks, vulnerabilities and capacities of communities can only be effectively understood through high-quality assessments that use secondary and technological sources to supplement participatory methodologies, while also taking account of change over time.

2. Understanding the urban population: Understanding the political, socio-economic and cultural characteristics of the urban community you are working with is essential to effective programming. This will have important implications for how preparedness, awareness raising and training activities are organised. Similarly, a detailed and nuanced understanding of the power dynamics, leadership and decision-making processes in the community is vital to maximising the reach and impact of risk management and preparedness activities.

3. Identifying and mapping critical infrastructure and services: One of the features of urban areas with a high level of exposure to disasters is that part or all of their critical infrastructure can be destroyed with the onset of a disaster event. As part of urban preparedness, it is important to keep an up-to-date map of infrastructure and their distances to Red Cross or Red Crescent branches. Strategic development of the area should therefore incorporate the need for redundancy, for example in health, water and communications systems, within core urban planning objectives.

4. Institutional analysis in complex urban systems: A clear understanding of roles and responsibilities is particularly important given the complexity of urban disaster management systems. Urban disaster management requires engagement with diverse actors such as national disaster management agencies, militaries, emergency services and the private sector. This requires investment of time and resources in institutional analysis.

5. Multi-scenario planning: A number of variables, including location, time, season and political and institutional context, will significantly affect the impact of a large-scale urban disaster and the challenges and opportunities presented by the response. Multi-scenario planning is, therefore, essential. This should involve a collective, participatory and cross-organisational process, which aims to build a state of alertness and adaptability in order for the National Society to respond to whatever the disaster may throw at them.

6. Using new technologies: The proliferation of new technologies and the potential for private sector partnerships in urban areas is leading to new opportunities for disaster risk management, needs assessment, co-ordination, monitoring and evaluation and relief assistance. It is important to remain both fully connected to the emerging possibilities of new technologies, but also to continue to build a capacity to maintain operations without them.

7. Leadership: Large-scale urban disasters lead to tense, complex and uncertain situations where the rapid insertion of strong leadership is essential, both at the national and local levels. Training is not the only requirement to fulfil the responsibility of leadership. Equally important are the basic equipment necessary to remain operational and credible, as well as resources to ensure that staff and volunteers and properly cared for.

8. Building readiness for co-ordination and co-operation is essential to an effective response that draws on the capacities of all actors involved in the urban disaster management system. This requires clear responsibilities for relationship management within the National Society, including co-ordination with actors such as the military and the diaspora.

9. Getting the communication right is essential to urban response given the rapidity of information flows and the potential for rumour and panic to create secondary disasters. A clear communication strategy should be in place as a preparedness measure, whilst mechanisms should be in place to ensure effective information gathering, verification and communication on the situation, where to go and how to get assistance.

1. Introduction

Kathmandu – a city at risk

Kathmandu is one of the fastest growing cities in South Asia, with a population of around 2.5 million people. It is situated on a major fault line, placing it at significant risk of an intense earthquake. Out of 21 cities worldwide that lie in similar seismic hazard zones, Kathmandu is at the highest risk in terms of impact on people. Moreover, rapid, haphazard urban development including non-compliance with the building code, failure to use qualified engineers or trained masons, encroachment of buildings on open space and depletion of the water table is increasing exposure and vulnerability at a significant rate. Kathmandu's critical infrastructure and essential services are also extremely vulnerable.

In the event of a major earthquake, the presence of only three access roads into the Kathmandu Valley and lack of heavy equipment to remove rubble will be serious barriers to an effective large-scale response. All these factors are combining to increase risk and vulnerability every day. It is predicted that if an 8.3 magnitude earthquake hit Kathmandu today more than 100,000 people could be killed, 300,000 injured and 1.8 million displaced.

However, an unprecedented multi-stakeholder effort to prepare for such an earthquake is underway. As well as outlining the hazards and vulnerabilities affecting Kathmandu, this report explores that work – focussing on the Nepal Red Cross Society (NRCS) and British Red Cross Earthquake Preparedness for Safer Communities programme (EPS). This programme provides a vital learning opportunity. Urban preparedness has to date seen less attention than response and

recovery operations in evaluations and learning reviews of humanitarian action in urban areas.

Study purpose and methodology

As part of the British Red Cross Urban Learning Project (ULP), the purpose of this study is to enhance the understanding of the NRCS, the British Red Cross and their partners in and outside the Movement of the challenges and opportunities of community and National Society engagement in risk management and strengthening preparedness for a large, sudden-onset urban response. The study focuses on identifying key learning points on community engagement and local and national action in a complex urban disaster management system. It is intended to support the current NRCS and British Red Cross' EPS programme, policy and practice within the Kathmandu Valley and embedding, training and learning within the ULP.

The ULP aims to contribute to the continual improvement of the relevance, quality and impact of British Red Cross and Movement programmes in urban areas through operational learning and innovation. The first year of the project (2012) constituted an inception phase, which involved the scoping of the project through the *Learning from the City* study, published in December 2012, alongside an array of internal learning activities (see Kyazze et al. 2012 and Carpenter 2013).

In 2013, the ULP has gone further in building a primary evidence base by documenting British Red Cross' operational learning through in-depth, field-based case studies. This study forms part of that process. In addition, the second year of

the project has begun to develop the link between the collation of operational learning and the British Red Cross' current and future programmes in urban areas, with plans for the evidence developed to inform technical and monitoring and evaluation approaches and tools, roster training, and programmes[1]. Further developing this organisational change and programme development focus will be the priority for the ULP in its third year.

As the study comes after an initial scoping study, *Learning from the City* (Kyazze et al. 2012), it was intended to be informed and inspired by the five ways forward for the British Red Cross identified therein, namely:

1. sharpening context analysis and assessments

2. understanding cash and markets better

3. engaging and communicating with complex communities

4. adapting to the challenges of land and the built environment

5. engaging with urban systems and partnering with local groups and institutions.

The study team included François Grünewald, Groupe URD (team leader) and Samuel Carpenter, British Red Cross. The NRCS and British Red Cross EPS Programme, funded by the UK Department for International Development (DFID), was used as an entry point for understanding the urban specificities of community and National Society engagement in preparedness for response. However, the study is not an evaluation, rather a learning review to influence operational

practice and programme policy. The methodology used involved two key steps.

1. Literature and document reviews, including:

   > a literature review of academic and practitioner studies on urban risk and disaster management in the Kathmandu Valley

   > a document review of programme materials provided by the British Red Cross and materials produced to date within the ULP.

2. Interviews and participatory exercises (conducted in Kathmandu in July 2013), including:

   > individual and group semi-structured interviews with key members of the Movement, GoN, UN agencies, local and international NGOs and target communities

   > participatory mapping and scenario exercises with all three NRCS chapters in the Kathmandu Valley, as well as with three community disaster management committees (CDMCs).

Initial findings were validated by a debriefing with the British Red Cross head of delegation.

2. Urbanisation and risk in the Kathmandu Valley

The Kathmandu Valley can be understood as a complex urban system created through an historical process and encompassing interconnected flows of goods, services, people and energy. Two elements of this complex urban system are essential to understanding the environment in which effective policies and activities for urban preparedness must be designed, namely processes of urban development, change and transformation and the urban disaster management system. These relate to the hazard exposure and vulnerability, and the capacity components of risk, as illustrated in Box 1 below. This sub-section addresses hazard exposure and vulnerability in the Kathmandu Valley as they relate to processes of urban development. The following sub-section then goes on to look at capacity to address these challenges, namely through national policy and institutions and international assistance.

Box 1: Calculating disaster risk

Disaster risk can be understood as a combination of hazard exposure, vulnerability and (coping and adaptive) capacity, as follows:

$$Risk = \frac{hazard\ exposure \times vulnerability}{capacity}$$

Hazard exposure

Nepal is exposed to a range of different natural as well as man-made hazards. A wide variety of geological, physio-geographical, ecological and hydro-meteorological factors contribute to the high level of hazards faced. On top of this, social, political and economic factors – such as rapid population growth, urbanisation, post-conflict political stasis, rampant poverty and widespread unawareness of the possibilities and means of mitigation – heighten exposure and vulnerability, making the country one of the most disaster prone in the world.

Nepal's geology makes it highly prone to seismic events and landslides. Climatic phenomena related to the monsoon rains (which take place from June to August) can also cause extreme weather events such as floods and landslides. Current disaster data, impacts and lessons are well detailed in the GoN Ministry of Home Affairs (MoHA) Nepal Disaster Report 2011 (GoN 2011). Over 23,000 people were killed by natural disasters in Nepal between 1983 and 2010, while between 1998 and 2008 economic losses totalled over one billion US dollars (GoN 2011).

But as seismic risk is the only intensive hazard that can bring about a sudden-onset large scale disaster in the Kathmandu Valley, it is the focus of this study. Many scientific studies have been carried out to assess seismic risk in the Himalaya Range and evaluate the earthquake risk facing the Kathmandu Valley (for example, Bilham et al. 1997 and Upreti et al. 2009). Earthquakes of varying magnitude occur almost every year in Nepal. A full history of the country's seismic activity, and resultant deaths and damages, appears in Appendix 2. The country's most destructive earthquake to date happened in 1934 when the fault line beneath the Kathmandu Valley slipped, causing an earthquake with a magnitude of 8.3 on the Richter scale[2]. Even though the city was much smaller than its current size at that time, the disaster killed 4,296 people and affected 55,000 buildings (40 per cent of total stock) in the Kathmandu Valley alone (Upreti et al 2009; NSET cited in GoN 2011). The most recent major earthquake to hit Nepal happened in 1988. It had a moderate magnitude of 6.5 and mostly affected the east of the country, killing 721 people (GoN 2011). From 1971 to 2007 the country experienced 22 earthquakes with magnitudes ranging from 4.5 to 6.5, which destroyed about 34,000 buildings (DesInventar cited in GoN 2011).

Furthermore, important disaster risk reduction (DRR) studies have been produced as a result of growing awareness of the risks faced by this rapidly growing urban centre. The most notable of these was the *Study on Earthquake Disaster Mitigation for Kathmandu Valley* conducted in 2002 by the Japan International Cooperation Agency (JICA) for the Ministry of Home Affairs (JICA 2002). Building on these findings, the National Society for Earthquake Technology (NSET) estimates that a large-scale earthquake in mid-Nepal would displace over 1.8 million people, kill over 100,000 and injure a further 300,000 (NSET 2010).

Urban development and vulnerability

The Kathmandu Valley comprises three districts; Kathmandu, Lalitpur, and Bhaktapur and five municipalities; Kathmandu Metropolitan City, Lalitpur Submetropolitan City, Bhaktapur Municipality, Kirtipur Municipality and Madhyapur Thimi Municipality. The Kathmandu Valley is a complex urban system made up of a core city surrounded by peri-urban areas and satellite cities and towns, and their economic and human flows are increasingly integrated (Muzzini and Aparicio 2013). Kathmandu Metropolitan City (hereafter, Kathmandu) is one of the
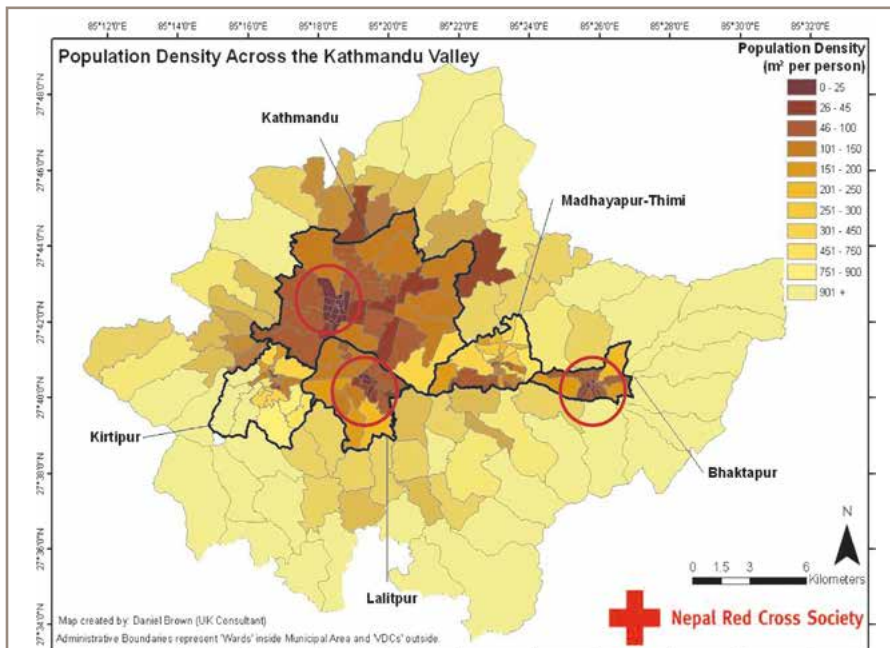
Figure 1: Population density across the Kathmandu Valley. Source Brown (2012).

Figure 2: 3D visualisation of access challenges for urban disaster response. Source: Bhattarai and Conway (2010).

the key factors affecting vulnerability to earthquakes, as well as the response to such a disaster. Areas of particularly high population density within the valley are circled in red in Figure 1 to the left.

Land use and settlement patterns

The rapid urbanisation process is shaping land use and settlement patterns and construction practices in Kathmandu, its suburban peripheries and satellite towns. Unplanned urban development and poor enforcement of regulations is leading to increasing density within the city and uncontrolled urban sprawl on its margins. Informal settlements are increasing, with squatting particularly prevalent in vulnerable areas such as the valley's riverbanks, temples or rubbish dumps (Muzzini and Aparicio 2013). Haphazard urban development has also led to irregular, substandard and inaccessible housing patterns, further heightening vulnerability to disasters (Muzzini and Aparicio 2013).

Open spaces are being lost rapidly, and what remains is inadequate to protect people from earthquake risk. However, the Ministry of Home Affairs and the International Organisation for Migration (IOM) have designated 83 open spaces for protection from development so they can serve as centres for humanitarian assistance in the event of a major earthquake. International militaries and consulates will also be seeking their own sites for evacuation. Furthermore, patterns of land use and construction mean that access for emergency services and relief agencies will be extremely challenging given the debris that will accumulate on the city's narrow roads (see Figure 2 to the left).

The Ministry of Physical Planning and Works has, however, implemented a system of voluntary land pooling in the Kathmandu Valley to compensate

fastest growing cities in South Asia, with an estimated population of 2.5 million growing at four per cent a year. Urbanisation has been driven by uncontrolled densification of urban areas, conversion of rural space into urban areas and accelerating rural to urban migration. People are pulled to the city for economic reasons, particularly employment and educational opportunities.

As the World Bank argues, the Kathmandu Valley could be the engine of growth for Nepal, increasing its international competitiveness and moving it away from a volatile, remittance-dependent economy (Muzzini and Aparicio 2013). Yet, to date increased vulnerability is the one of the main results of this rapid population growth. Building density, accessibility and topography are

for the historic lack of prior land-use planning. Under the scheme landowners looking to create new developments sacrifice a portion of their private land to be used for proper roads and other infrastructure, including public open space, with the return of an increase in the remaining land's value (International Federation 2011). The idea is that public safety is enhanced with improved access for emergency vehicles, whilst the earthquake hazard from falling buildings is reduced through wider streets and increased open space for evacuation (International Federation 2011).

Donors and the United Nations Development Programme (UNDP) have explored other aspects of risk-sensitive land-use planning, for example preventing the depletion of the water table in the north of the valley and working with private sector actors on urban regeneration (for example, retrofitting structurally vulnerable roadside buildings in return for revenues from shops). Effective implementation of such risk-sensitive land-use planning and management initiatives is essential to the longer-term reduction of urban risk and vulnerability in the Kathmandu Valley. Yet preparedness is also needed in land rights documentation, as shown by the aftermath of the 2010 Haiti earthquake. The Land Revenue Office in the Ministry of Land Use and Management holds land rights records, which are starting to be digitised for the Kathmandu Valley, but interviewees suggested the database was incomplete with many lost documents and some record centres destroyed in past events.

While there is understanding of some of the key vulnerabilities fostered by current developments in planning and land use, the full complexity of evolving land use and occupancy, land tenure and rental patterns are

Proportion of buildings that are mud based

Proportion of buildings that are RCC

Figure 3: Building types across the Kathmandu Valley. Source: Brown (2012).
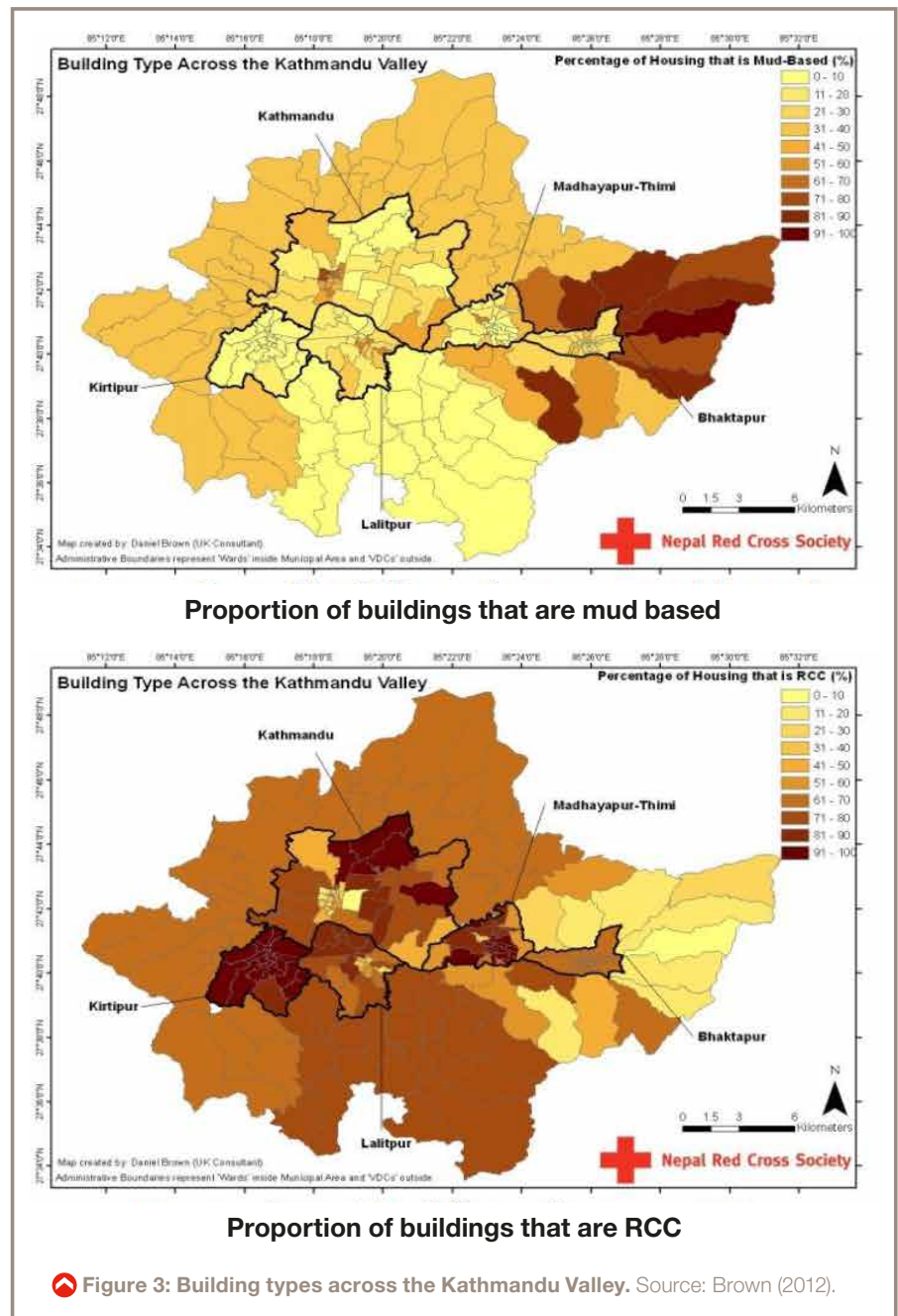
still not adequately understood and require further in-depth study. At the physical level, the impacts of the on-going road-widening process within the city borders, especially in the old areas, is important to understand. This process is affecting both house occupancy and the structural integrity of buildings that have been only partly demolished. At the social level, gaining an improved

understanding of the diverse forms of land tenure (statutory, customary and religious) through mapping exercises is a critical preparedness measure to facilitate rapid tenure assessments, which are vital to effective humanitarian response.

Moreover, the situation of Kathmandu in the valley, the lack of access and evacuation roads (only three

at present, which are likely to be rendered impassable due to landslides in the event of a major earthquake) and the limited capacity of Kathmandu's international airport mean that staging a major response to a large-scale earthquake will be extremely challenging. The World Food Programme logistics cluster lead in Nepal reports that if the airport was closed and all access roads impassable, then their organisation would only be able to bring in enough food to feed 100,000 people for a week. This is just an eighteenth of the estimated displaced population (OCHA 2013).

Building standards and materials

Urbanisation in Kathmandu has been largely uncontrolled and the building code implemented in 1994 is rarely enforced. Risk is increasing every year due to inadequate construction practices, limited use of trained masons, or qualified engineers, and poor quality materials. High levels of corruption in the construction sector also came to light in 2012 during the road expansion drive, when the GoN demolished structures that were built illegally but later approved by local authorities (Chamlagain 2013). In addition, non-structural vulnerabilities are prevalent in residential and office buildings across Kathmandu. Post-conflict security concerns mean windows are covered by iron bars that cannot be removed from inside buildings, which generally have only one evacuation staircase. In the event of an earthquake, and the likely collapse of narrow internal staircases, inhabitants would find themselves trapped.

🔴 **The narrow lanes of Kathmandu Valley's old district centres will hamper any urban response effort.**
© Nepal Risk Reduction Consortium.

🔴 **Inadequate construction practices in the Kathmandu Valley.**
© Nepal Risk Reduction Consortium.

Understanding building materials and their quality are critical to assessing the vulnerability of neighbourhoods: mud-based buildings increase the risk of suffocation from mud dust, as Iran's 2003 Bam earthquake showed, whilst reinforced cement concrete (RCC) buildings increase the risk of head injuries, broken bones and heavy blood loss amongst the wounded, as was seen in the Haiti earthquake of 2010.

Given the array of different building types in the Kathmandu Valley, it is not necessarily the poorest that are most vulnerable. Reinforced cement concrete is the most common building type across the valley, although more than 60 per cent of buildings in a small cluster of wards in the centre of Kathmandu District are mud-based. This area coincides with Wards 18 and 19 to the West of Ratna Park, as displayed in Figure 3 on the previous page, and is one of the most densely-built parts of the valley. Interviewees from the NRCS Kathmandu branch noted that these older structures often housed more people per room than the city's newer homes.

Overall, less than 30 per cent of buildings in most Village Development Committees (VDCs) outside of the urban centres are mud-based. Yet in the areas to the north and east of Bhaktapur more than 70 per cent are mud-based. Over a million people live and/or work in a building that will not withstand a significant seismic event.

Limited open spaces in the Kathmandu Valley. © Nepal Risk Reduction Consortium.
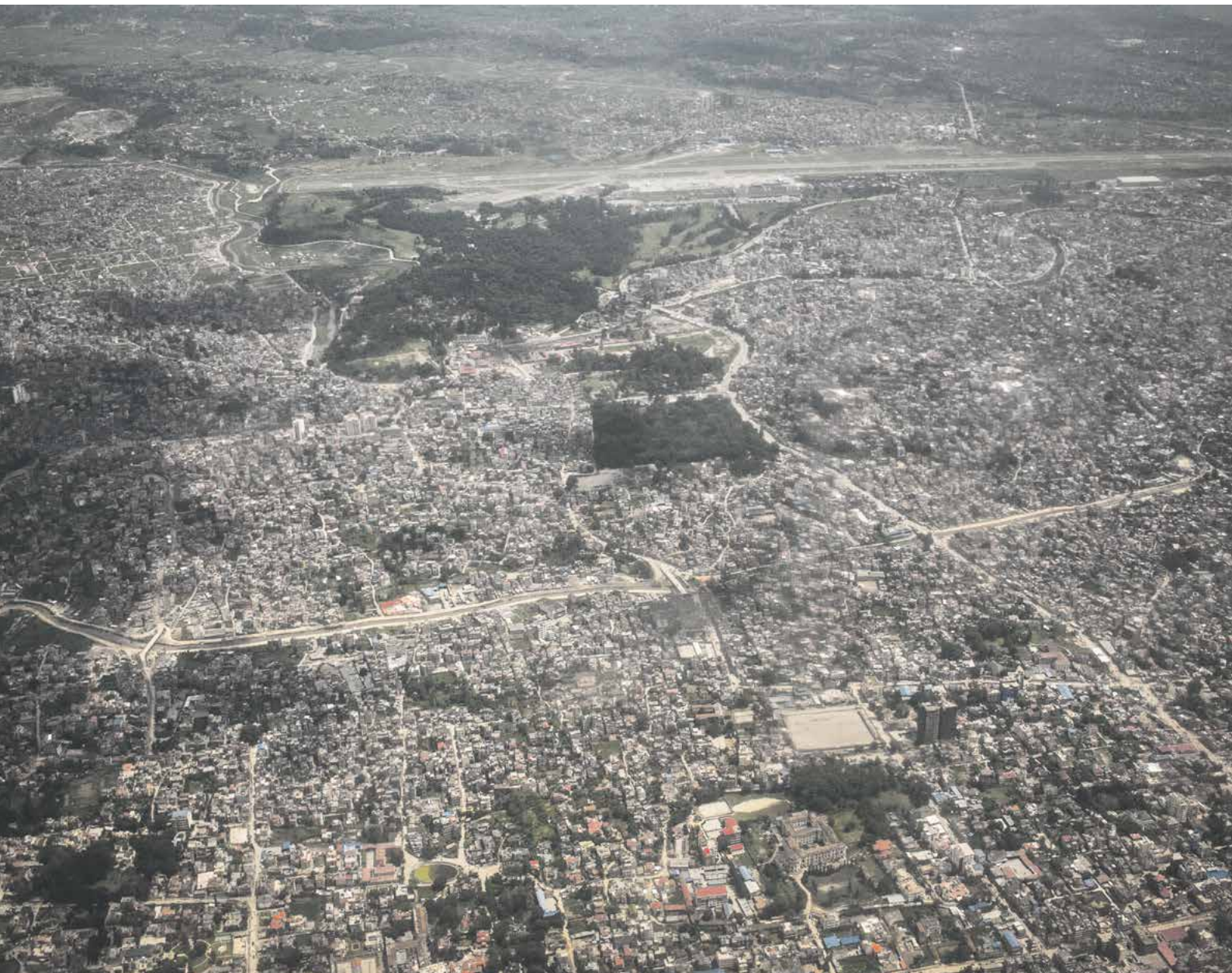
Children, the elderly and the infirm are patricularly at risk given the vulnerability of schools and hospitals caused by the use of inadequate building materials (PDC and EMI 2005).[3] Red Cross buildings are of course not immune from seismic risk, and their structural vulnerability should also be addressed as an essential organisational preparedness measure.

Basic services and critical infrastructure

Urban development has dramatically increased demand for housing, water, electricity, drainage, roads and other utilities in Kathmandu Valley. The supply of utilities has not kept pace with this demand. For example, access to piped water fell from 68 per cent to 58 per cent from 2003 to 2010, while solid waste management remains a major problem (Muzzini and Aparicio 2013). Development plots are unaffordable for most people. Therefore, many are forced to buy cheaper raw agricultural land without access to basic infrastructural services. Three and four-storey buildings are being built on this agricultural land and open spaces to accommodate the influx of people. Plots are also being subdivided, with some houses built on blocks of land as small as 15 to 45 square metres (Muzzini and Aparicio 2013). This all means that open space per household is decreasing, placing pressure on the space needed for safe escape in the event of an earthquake (Bhattarai and Conway 2010).

Central government agencies and local authorities (with financial contribution from local communities) are responsible for providing basic services, but even if issues of institutional co-ordination and responsibility can be reconciled, they are generally not in a position to expand utility networks due to shortage of funds and lack of proper planning and administrative system.[4] Local elections have not been held since 1997. The resultant lack of basic services and low quality infrastructure serves to heighten the vulnerability of the valley's residents, particularly low-income groups.

Along with poor enforcement of regulations, the practices outlined above have consolidated the process of environmentally unsustainable urban sprawl. For example, the valley's population has responded to the water shortfall by simply extracting groundwater themselves, depressing the groundwater table in an unsustainable manner. As an interviewee from one international NGO working on urban water supply put it, "everyone's poking holes in the ground"; there is no effective control of local wells or bore holes. In addition, liquefaction in the event of an earthquake may, amongst other damage, cause wells and water tanks to become choked with sand, particularly as such critical infrastructure has not been planned with the seismic hazard in mind (Piper 2012).

In summary, urban development, population growth and associated changes in land use and settlement patterns, building standards and materials and strains on basic services and critical infrastructure are serving to drive up vulnerability in the Kathmandu Valley. In addition, the challenge of strengthening resilience in urban areas is further hampered by the tension between compartmentalised urban policy environments and the principle of systems thinking that is integral to resilience (Bahadur and Tanner forthcoming).

3. Urban disaster risk management capacity: National institutions and international aid

National policy, law and response capacity

With a backdrop of great natural hazard exposure, Nepal was one of the first countries in South Asia to create a policy and legal environment for DRM. However, Nepal remains in political transition after a decade of armed conflict which ended in 2006. On-going negotiations over a new constitution and possible move to a federal system of autonomous provinces have slowed overall legislative reform, including that addressing DRM (International Federation 2011). Meanwhile, the absence of district and local elections for over a decade has weakened the involvement of those critical levels of government in DRM (International Federation 2011).

Disaster policy and legislation in Nepal dates back to the early 1980s, specifically to the Natural Calamity (Relief) Act of 1982. This document formalises disaster response as a responsibility of the government, as well as designating authorities at the central and district levels as the co-ordinators of the rescue and relief efforts of various response agencies. Yet, it does not cover preparedness and DRM measures and mechanisms. The experience of the past three decades has clearly shown that this structure is only capable of co-ordinating small to medium-scale disasters, failing to effectively manage the Udayapur earthquake of 1988 or the flood disaster in south-central Nepal in 1993.

Learning from the devastating 1988 Udayapur earthquake, the GoN

drew up the Nepal National Building Code, which was completed in 1994. The code included provisions for making buildings earthquake-resistant and addressed the problems not only of engineered buildings but also houses in rural, peri-urban and urban areas (which are mostly constructed without the input of qualified engineers).

However, the building code was not immediately enforced. Only in 2003 did the GoN decide to make compliance with the building code mandatory in all government buildings and encourage its implementation in all municipal areas. Compliance remains a major problem, with a clear lack of robust enforcement measures, although UNDP is developing an automated building permit approval system to enhance compliance across the valley and other urban areas (planned to be ready by 2015). Further, the issue of risk-sensitive land use planning has been much slower to take hold in national strategies, and is only now being promoted at the insistence of donors. Interviewees suggested that risk awareness, planning and regulation are even more minimal in secondary cities outside the Kathmandu Valley.

To cope more broadly, proactively and practically with disaster risks, Nepal elaborated its National Strategy for Disaster Risk Management in 2008 (endorsed in 2009),[5] based on the Hyogo Framework for Action 2005-2015 (HFA).[6] The strategy attempts to capture the opportunities of DRM in Nepal in line with current international understanding, scientific progress and regional initiatives. The strategy is expected to provide the road map for all sectors to prepare DRM programmes and to formulate

the necessary policy directives for mainstreaming DRM into the development process.

At an operational level, the Central Natural Disaster Relief Committee (CNDRC) is the highest level institution involved in DRM under the chairmanship of the Prime Minister. The Minister of Home Affairs is the deputy chair and council members include ministers, the Chief of Staff, Chief of Police and civil society representatives. However, DRM must also be a local priority. Following the Local Self Governance Act of 1999, local authorities have been empowered to take action on DRM. But due to the current vacuum in terms of elected representation at the local level, authorities have not been able to deliver effectively. Moreover, other legal tools such as regulations and by-laws to support the implementation of the provisions of the act have not been in place, which has hindered progress.

Yet, advances have been made with the development of the Local Disaster Risk Management Planning Guideline in 2011 by the Ministry of Federal Affairs and Local Development (MoFALD). Under the guideline, the NRCS has also supported the development of a Community Disaster Management Committee (CDMC) formation guideline, approved in February 2013. This is essential to facilitating community engagement in the national DRM architecture and will help to support the sustainability of community-level structures. For example, one of the three CDMCs visited as part of this study highlighted that this newfound engagement from the GoN had already facilitated access to meeting spaces and funding.

An act to bring all of this together into a coherent legislative framework

has been proposed but has stalled as a result of wider political stasis in Nepal. The key details of this proposed act are set out in Box 2 below.

The National Emergency Operations Centre

In the absence of an NDMA, the current national command and control centre in the event of an earthquake is the National Emergency Operations Centre (NEOC), which sits under the Planning and Special Services Division of MoHA. The objective of the NEOC is to work as a co-ordination and communication point for disaster information across the country, including government agencies and other response and recovery stakeholders. Twenty-six district and five municipal emergency operations centres in turn sit under the NEOC (including Kathmandu, Lalitpur and Bhaktapur within the Kathmandu Valley), while the NRCS is an ex-officio member.

The NEOC operates from a standalone pre-fabricated building situated at the MoHA premises in Singha Durbar. The building has been built to earthquake standards and is completely self-contained, including multiple back-up power supplies. Municipal centres, however, have structural safety issues and need more equipment, according to interviewees. The NEOC's working time is 24-hours during a disaster, although communication equipment is still relatively rudimentary. The centre operates with nine members of staff under the leadership of the Under-Secretary. From discussions with staff, it is clear many would welcome additional training in large-scale disaster management and co-ordination set-up, including training with UN Disaster Assessment and Co-ordination (UNDAC) members and international military that might be deployed in a major disaster. Such training is essential given that the NEOC, and MoHA more generally, are key nodes linking the GoN to providers of international

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Box 2: Nepal's proposed Disaster Management Act

The proposed Disaster Management Act aims to enhance the effective management of risk throughout the disaster management cycle. The proposed act calls for replacement of the existing Natural Calamity (Relief) Act, 1982. Its key elements are:

> provision for National Council for Disaster Management (NCDM) to be chaired by the Prime Minister of Nepal with clear mandate and functions, duties, responsibilities and authority

> proposal to set up the National Disaster Management Authority (NDMA) under the NCDM, to act as the focal point for disaster management functions in Nepal from formulation of appropriate strategies and plans to implementation and supervision of disaster management activities

> clarification of the role, responsibility and functions of security forces including the Nepal Army, Nepal Police and Armed Police Force, institutions, industrial sector and private sector organisations

> provision to streamline operational procedures by having a strong NDMA with the capacity to function under executive order from the highest level of state

> provision to facilitate and coordinate overall management of the international humanitarian response in the event of a mega-disaster such as the predicted earthquake in the Kathmandu Valley.

But with the country in a state of legislative stasis, no constitution in place and on-going disputes over the pros and cons of identity-based federalism (ICG 2013), the act has still not been passed. At this stage, there is no formal NDMA in Nepal. The creation of this indispensable institution has been envisaged to work as the secretariat of the NCDM. The Disaster Management Act must be passed urgently in order to prepare the country for challenges to come, including meeting the challenge of disaster management in urban areas. More specifically, it is critical in order to help reinforce inter-ministerial co-ordination in disaster management (supporting stronger engagement of the ministries of defence, health, foreign affairs, urban development etc).

assistance, including Movement actors and the cluster system.

Urban search and rescue

In a large-scale urban disaster, one critical element of the response is the speed at which people can be rescued from the rubble. Three capabilities are central to this:

> a cadre of highly trained formal Urban Search and Rescue (USAR) specialists capable of undertaking collapsed structure interventions, particularly for high buildings and risky situations

> medium-level capacity through a network of equipped fire brigades with a standby capacity

> largely decentralised light and very light search and rescue capacity able to operate rapidly in all areas, even if communication and transportation lines are cut.

There are currently only mid-level USAR teams and a limited dog search capacity in Nepal. Most of this capacity lies with the Nepal Army, Nepal Police and the Armed Police Force.[7] The network of fire brigades is insufficiently developed. There are some efforts to move towards capabilities compliant with the International Search and Rescue Advisory Group (INSARAG) guidance for collapsed structure USAR and to develop a group of INSARAG-light trained instructors who can enhance the capacities of the army, police and fire brigades.[8]

The NRCS, the International Committee of the Red Cross (ICRC)[9] and NGOs such as the National Society for Earthquake Technology, Nepal have trained a large number of people in first aid and light search and rescue and have distributed some equipment. However, the number of kits distributed to wards and sub-wards (two, as well as six first aid boxes, per CDMC) is too low to have much of an impact if something serious occurs. This measure will at least give communities a sense there are people who are equipped and are trying to take action after the disaster, which should ease anxiety and tension.

For the time being, and probably until a new collaboration takes places after the Disaster Management Act is finally passed, Nepal will have to rely on rapidly despatched international USAR teams. These will probably be deployed under regional (India and China) and international (USA, UK and UNDAC) auspices. The critical factor in this situation will be the status of the airport and road and bridge network to India and neighbouring Nepali provinces. This will dictate whether it is possible to bring in heavy equipment. There are very few bulldozers and little heavy duty equipment within the valley.

Ultimately, even highly-skilled USAR teams can only do so much. In Haiti, the largest search and rescue effort ever, 160 lives were saved (Piper 2011). This shows that preparedness alone is not enough; preparedness must be complemented by on-going risk reduction in development processes, primarily the enforcement of the building code and the initiation of risk-sensitive land use planning.

Geopolitics, the aid landscape and disaster risk management

Nepal came out of a decade of conflict in 2006 and, while still relatively fragile politically, is firmly on the road to development. Because of its location in a complex political landscape surrounded by China and India, Nepal has found itself at the centre of a geostrategic equation which has seen it given significant international aid. During the last 15 years Nepal has received USD 8.3 billion in official development assistance, the 39th highest total among 175 recipient countries (Development Initiatives 2011). Securing development gains through improved risk management is a core component of this assistance, as seen in the UN Development Assistance Framework 2013-2017 (United Nations Country Team 2012).

The Nepal Risk Reduction Consortium

After the cessation of the conflict in 2006, the international development community strongly re-engaged with actors in the country to stabilise the peace and deliver peace dividends. Disaster preparedness attracted a lot of interest in a country so frequently affected by disasters, and the role of Disaster Preparedness ECHO (DiPECHO) programmes in strengthening DRR systems and structures, including through replication, are one very important example of this.

Years of conflict and the high frequency of disasters mean Nepal's humanitarian and CRR communities are quite dynamic. They include a fully developed Humanitarian Country Team; a complete set of clusters; many national and international agencies working on disaster management; and a strong donor commitment to DRM and resilience-building. DRR activities continue to focus on rural areas (particularly the Terai Plain), however, although this has begun to change since the inception of the Nepal Risk

Reduction Consortium (NRRC) in 2009.

The NRRC is the unique aspect of Nepal's current international aid architecture.[10] It is an ambitious initiative arising from the commitment of the GoN to the HFA, and supported by the NSDRM. The NRRC brings together the GoN, aid agencies donors and international financial institutions to support national efforts in DRM. It was formally launched in 2011. The NRRC has provided a common vision to rally around, and has been perceived by the GoN as a wide international effort without political overtones (Taylor et al. 2013). It has been driven by high-level, motivated individuals within the government and key agencies, especially the United Nations Resident and Humanitarian Co-ordinator and two key donors – the UK Department for International Development (DFID) and the United States Agency for International Development (USAID).

Table 1: The Nepal Risk Reduction Consortium flagships and urban disaster management

Flagship	Examples of relevant urban preparedness or DRM activities
1 – School and hospital safety: Coordinated by the Ministry of Education (MoE)/Asian Development Bank/World Health Organisation (WHO)/Ministry of Health and Population (MHP); focuses on reducing mass casualties and damage in schools and hospitals through retrofitting, training and raising awareness.	Retrofitting; structural and non-structural mitigation and lifelines (e.g. water or electricity to hospitals); a mass casualty management plan; not looking at other critical infrastructure e.g. water, telecommunications and roads.
2 – Emergency preparedness and response: Coordinated by MoHA (and OCHA to end 2013); focuses on enhancing GoN's response capacities at national, regional and district level, in co-ordination with all available resources and capacities, including humanitarian and military actors.	Institutional capacity-building of national and humanitarian partners, including fire and ambulances services in 58 urban centres, USAR and airport capacity; disaster preparedness and response-planning guideline (2011) and activities; warehouse construction, infrastructure, logistics, and stockpiling; and preparedness for the facilitation of international humanitarian assistance.
3 – Flood management in the Koshi river basin: Coordinated by Ministry of Irrigation/World Bank GFDRR; focuses on management and mitigation of water-induced disaster risk in the Koshi river basin.	Not urban.
4 – Community-based DRM: Co-ordinated by MoFALD/International Federation; focuses on co-ordination of and advocacy on community-based DRM activities.	Minimum characteristics for disaster-resilient communities; and adopting a minimum package of common elements; co-ordination and advocacy mechanism, including workshops and task forces; information platform and project mapping; and learning events on urban community-based DRM.
5 – Policy/institutional support for DRM: Coordinated by MoHA/UNDP; focuses on minimising additional risk arising from development, working at the institutional, legislative and policy levels to embed DRM into Nepal's development efforts.	Risk-sensitive land-use plan for Kathmandu; electronic verification of building permits; preventing the depletion of the water table in the north of the valley; and working with private sector actors on urban regeneration.

Source: NRRC Secretariat (2012) and Taylor et al. (2013).

The political context (reconciliation, preparation of a new constitution and uncertainty about the future of local government structures) made introducing the NRRC very challenging, but also created an important platform for dialogue. The arrangement also highlights the shifting dialectic of state sovereignty and humanitarian action that has been an increasing topic of discussion amongst humanitarians in recent years (Harvey 2009; Kahn and Cunningham 2013). The consortium has five flagships, or areas of work. Each flagship has one lead GoN agency and one lead international agency, as detailed in Table 1 left.

The Nepal Red Cross Society in the disaster management system

The NRCS was created in 1963.[11] It is now the largest national humanitarian organisation in Nepal, and a key actor in disaster preparedness and risk management. For this purpose, the NRCS fully

assumes its role as auxiliary to the government in disaster management and sits on all of the country's national disaster management institutions, including the CNDRC and, when required, in the NEOC.

Every year, the NRCS develops a contingency plan to ensure a rapid, appropriate and effective response to a major earthquake centred on the Kathmandu Valley (NRCS 2013), updating all its procedures, both for its own operations and its role in the national disaster management system. The organisation has developed first aid training programmes in all areas of Nepal. These programmes are a vital part of the preparation for a large-scale response to a disaster in the Kathmandu Valley, which would create a need for mass casualty management.

In addition, NRCS has established many programmes and partnerships within and outside the Movement, including some with donors and local and national NGOs. It is in

that central position in the disaster management system that the NRCS is working with the British Red Cross on the EPS programme, as well as within the wider rubric of the NRRC.

The Earthquake Preparedness for Safety Communities programme

The British Red Cross is working with the NRCS to implement the DFID-funded EPS programme in 66 wards and VDCs of the Kathmandu Valley. The programme operates across three NRCS branches in the Kathmandu Valley. It is directly involved in implementing NRRC flagships two and four and is closely linked to flagships one and five.

The EPS programme is an entry point for gaining a better understanding of community engagement in preparedness for response in urban areas, including

the role of the National Society in providing the critical link between the community and the rest of the disaster (risk) management system. The project has two key streams of activity:

> **Support to first responders – the affected populations themselves:** Those affected by a disaster are inevitably the very first to respond to the needs of others around them. The programme aims to help communities identify, understand and manage the risks they face through mass awareness raising (reaching two to four million people) and the work of volunteer-led CDMCs. This work includes household-level risk reduction, planning and preparedness activities. A critical component

of this activity stream is the training of volunteers from at-risk communities in first aid (14,460 people) and light search and rescue (4,752 people). These critical lifesaving activities are closely linked to national and international disaster management efforts in the health and education sectors.

> **Support the organisational preparedness of the Nepal Red Cross Society:** Experience from around the world shows that after a disaster, Red Cross and Red Crescent National Societies and their volunteers are often the only organised network able to deliver relief. Because of this, a second stream of activity focuses on strengthening

NRCS' capacity to respond to disasters – including volunteer capabilities, management, planning, co-ordination, logistics and warehousing – in-line with its earthquake contingency plan.

Understanding the specific challenges and opportunities of such a programme in an urban setting can provide important learning, not only for policy and practice in the Kathmandu Valley, but for urban preparedness for response more generally. This is the focus of the following two sections.

⌄ **Street theatre in Lalitpur, Kathmandu where the Nepalese Red Cross and a local theatre group are using performance to break down language barriers to educate local residents about the need to prepare for earthquakes.**
© Matthew Percival/British Red Cross.

4. Lessons for the Nepal Red Cross Society

This section outlines 12 key learning points for the NRCS on urban risk management and preparedness for response in the Kathmandu Valley, focusing on the organisation's role and how it must interact with the rest of the disaster (risk) management system. The analysis is divided into three sub-sections relating to different phases of the disaster management cycle: understanding urban risk and complexity, strengthening preparedness and managing the response.

Understanding urban risk and complexity

Understanding urban space and systems

The Kathmandu Valley is an urban space constructed not only through the buildings that shape its topography, but also by historical, economic, social, religious and cultural factors. In understanding urban risk, it is important not only to comprehend physical but also social differences, and how the two interact to create differing urban vulnerabilities (Bhattarai and Conway 2010). Furthermore, the valley's communities are very complex. This is due to their demographic and ethnic diversity, recent creation and lack of internal cohesion. This overall heterogeneity has created different levels of vulnerability and capacity within communities.

Physical differences between areas of the city can be understood in the context of risks and opportunities. These include:

> Differing risks: Some buildings sit on solid bedrock and others on ground susceptible to liquefaction. The area also features variations in construction processes;

population density and labour mobility; internal heterogeneity of communities; status of critical infrastructure, particularly water and sanitation; and the presence of religious buildings.

> Differing opportunities: Different parts of the valley vary in the availability of Red Cross branches (and thus trained first responders); emergency and security services (USAR capacity); open spaces; disaster-resistant water supply sources, hospitals and capacities to host large numbers of Internally Displaced Persons (IDPs) in secondary evacuation spaces.

Urban areas like the Kathmandu Valley are hugely diverse, but also extremely different to the rural areas in which many of the sector's preparedness and risk reduction models and approaches developed. It is important to emphasise that preparedness and risk reduction models and approaches cannot be simply transferred from rural programmes to urban areas.

The risks faced by urban communities and the opportunities for response can only be effectively understood through high-quality assessments of urban spaces and systems that take account of change over time. However, this

need for continual assessment, given the dynamism of the city, can be exhausting for implementing agencies, particularly in light of the challenges of mobility and migration addressed in the next sub-section. Information gathered through participatory approaches, secondary data from government sources and geographic information system (GIS) mapping data should all be triangulated to ensure a robust approach to urban assessment.

The collation of this data using Open Street Map is an interesting opportunity that is being pursued by the World Bank, building on the post-disaster experience in Haiti to further develop the tool for risk management purposes. Mapping parties have been used to build-up a risk profile of schools across the valley, using the input of students and young people to map buildings' vulnerability.

The ultimate aim of this work, however, needs to be kept in view. Risk information is only of value to the extent that it can enhance evidence-based decision-making to increase preparedness and manage risk. There are also outstanding questions as to how much the Nepali establishment trusts online sources, leaving significant concerns about the verification, utilisation and sustainability of this approach still to be addressed.

Learning point 1
Risk management, preparedness and response planning and operations must be developed to take account of the physical and social differences between and within urban areas and the different risks and opportunities they present. Preparedness and risk reduction models and approaches cannot be simply transferred from rural programmes.

Understanding the special features of each urban area is essential to understanding the impact of a disaster and the behaviours people are likely to exhibit in response to it. Training should therefore be undertaken in different areas, for example mock-up rubble fields where debris presents physical access and safety challenges.

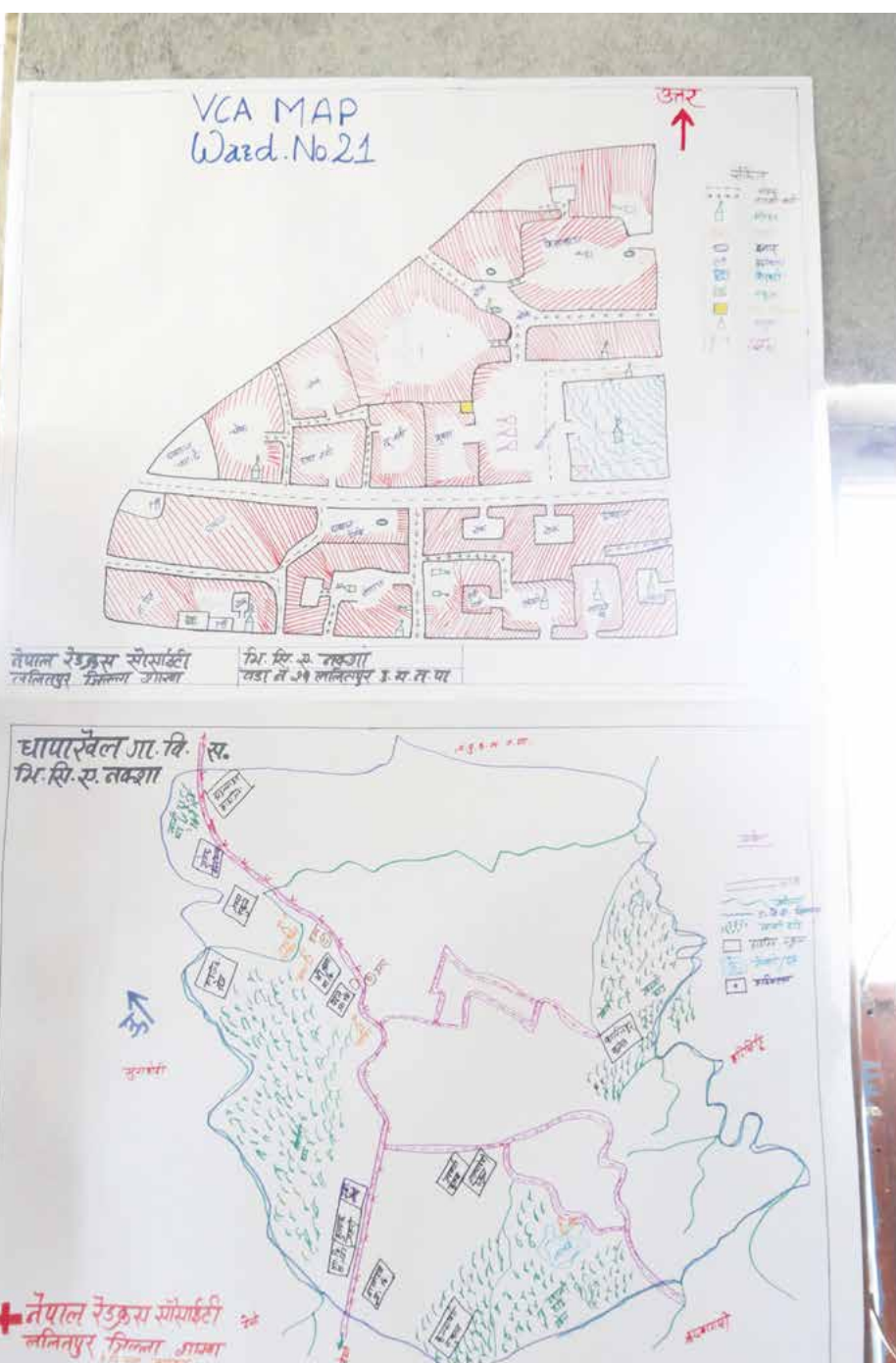## Understanding mobility and its operational implications

Daily and seasonally, people move both between rural and urban areas and within urban areas themselves.

This has challenging operational implications for undertaking assessments, community-based DRM activities in urban areas and preparedness and readiness for response.

The participatory approach of Vulnerability and Capacity Assessment (VCA) is inherently less practical when key decision-makers cannot attend sessions as they are at work;[12] where daily labourers face significant opportunity costs in engaging in voluntary activity; and/or where migration patterns undermine community coherence. These factors result in lack of a clear 'community' to work with; challenges in maintaining contact with the same group over a significant period of time (due to seasonal labour-driven migration, and thus attrition); difficulties in historical profiling relating to recent migration; and a lack of common interest or cultural of mutual help and support (Cannon and Kirbyshire 2011. Further, the array of different national and international agencies implementing preparedness and risk management programmes in the Kathmandu Valley places untenable competing demands and pressures on communities themselves. Red Cross social mobilisers noted that people are often hesitant to give information about their houses as they are concerned that staff could actually be from the government tax office. This clearly calls for greater outreach and sensitisation within certain urban communities of NRCS' distinct mandate and role, ideally working through social mobilisers who are local to the area and have the necessary profile to gain access, information and trust.

As suggested above, urban areas call for the adaptation of approaches to community-based disaster risk assessment. A comprehensive

Vulnerability and capacity assessment map, Nepal Red Cross Society Lalitpur District Chapter. © Samuel Carpenter/ British Red Cross.

approach is to combine secondary data such as local government or geospatial databases and primary Knowledge Attitude and Practice (KAP) surveys with structural/engineering assessments and the mapping activities of other agencies (for example, schools and hospitals, open spaces and water supply sources). The VCA itself should only be used to gain the particular perspective of an individual community and to facilitate community-led preparedness and risk management actions.

The particularities of urban areas also call for the adaptation of approaches to preparedness and community-based DRM. This is an area that is only now starting to fully develop. In Nepal, NRRC Flagship 4 has identified nine minimum characteristics for disaster resilient communities. Although these were initially designed with rural areas in mind, their applicability to urban areas is currently being tested.[13] Urban areas have important particularities that need to be addressed, and the applicability of models conceived for rural settings can be questionable. For example, it is difficult to gather people in urban areas due to working patterns, commuting and the other demands on peoples' time urban areas present. Approaches to the planning of participatory preparedness activities therefore have to be adapted, with agencies taking a more flexible approach.

Activities should be planned during holidays or in offices or business, hospitals or schools, while extra care must be taken not to leave anyone behind, for example tenants who may be given less attention by CDMCs than permanent residents. Similarly, longer-term mobility patterns, including migration of young men for labour, need to be considered in activity planning and programme strategy. Engaging a higher number of women in preparedness and training activities can prove useful in this regard (although this can bring other challenges, as noted below).

Important gains have been made in mobilising youth, highlighting the utility of first aid to manage 'everyday risks', as well as the potential contribution of volunteering to their university studies, with social work often forming a requirement of academic courses. Refresher training, simulations and drills are other ways to help retain

Search and rescue and first aid kits, Kathmandu District Community Disaster Management Committee. © Samuel Carpenter/British Red Cross.

volunteers, but these need to be regularly organised in order to ensure sustainability. Expectation management is another challenge that is more pervasive in urban than in rural areas, with NRCS social mobilisers often asked by households for structural support to retrofit their houses, or at least daily expenses for engagement with community-level activities.

It is also extremely important to understand that 'gatekeepers' can have a significant impact on the effectiveness of the programme by ensuring that key decision-makers within the community are reached through mobilisation of their networks and contacts. NRCS branches have been working at ensuring participation through targeting local leaders who can in turn influence working people to facilitate their attendance at meetings and trainings. Yet, significant gains could also be made through closer engagement with power holders and decision-makers in the private sector and political parties, broaching links through NRCS chapter presidents or the targeting of rotary clubs or other local business networks. Here, there is a need for applied political economy analysis (see Box 3 below) to help understand the most appropriate programme entry points to maximise the effectiveness of community-based DRM activities.

The implications of human mobility are also vital to preparedness for response. Every day, large numbers of people commute to and from the city, as well as within its limits, for work or schooling. Between 6am and 9am and between 2pm and 7pm many people are on the road. Therefore, the time of the disaster will have a significant impact on exactly where the valley's population is. This will in turn significantly impact mortality and have implications for the gender and age of first responders (depending on, for example, whether children are at school and men are at work or at home). The latter point is especially important given that NRCS has trained more women than men in first aid and light search and rescue due to the challenge of ensuring male participation in the programme.

Box 3: Applied political economy analysis for urban disaster risk management:

Understanding political economy dynamics is essential to effective DRM programming. In Nepal, the understanding of power dynamics and political economy within communities is well developed in rural areas through years of DRR and development programming at the local level. However, the political, economic and social complexity of urban areas presents particular challenges in identifying 'gatekeepers' and entry points for facilitating change. The range of networks and institutions present in urban areas with formal and informal roles in relation to vulnerable groups, and different responsibilities and goals, including vested interests and unwritten rules, needs to be well understood (Creti 2010).

The CDMCs set-up in Kathmandu, for example, include diverging arrangements of appointed officials and representatives of line ministries, local businesses, community-based organisations and women's groups. Understanding the political-economic dynamics between the members of such groups, and with other local and national actors, as well as the incentive structures for action, is essential to appropriately directing efforts towards risk awareness raising and participation in preparedness activities.

The local knowledge of volunteers and staff of Red Cross and Red Crescent National Societies is vital here. But understanding these dynamics is not an end in itself. Political economy analysis should be applied – identifying specific problems and operational and policy responses. Here one may look at areas where poor outcomes or failure to adopt reforms have persisted (problem identification); identify the structure and agency barriers to improved outcomes or reforms (problem diagnosis); and identify practical actions to facilitate potential change processes (change process identification) (Harris 2013). Using this three-stage approach, Harris (2013) has developed a structured and concise framework that can be used by practitioners to deliver applied political economy analysis.

However, there are significant challenges in the use of political economy analysis by humanitarian agencies. Gaining information may not only be a sensitive undertaking, but may also be dangerous in terms of perceptions of adherence to humanitarian principles, and, therefore, staff safety and security (Kyazze et al. 2012). There are also questions over the reliability of the information gathered. These challenges notwithstanding, political economy analysis can be a vital tool in better understanding the barriers to, and entry points for, effective DRM in urban areas.

One international interviewee noted that women are not necessarily seen as responders, and, in all likelihood, it will be the men who are expected to lead the response. On the other hand, there may be greater sustainability in training women as they are less likely to leave the city to work overseas.

The variables of time and movement can lead to an immense difference in mortality, levels of panic and management options for the response. The British Red Cross and NRCS have therefore used the Landscan Database to understand average population density over the 24-hour period (where people move, not just where they live). Such time-sensitive mapping has the potential to facilitate more appropriate preparedness measures and a better-informed response. Yet, ultimately, predicting where people will be and what they will do in the event of a large-scale disaster is extremely difficult, if not impossible. For example, will people follow the division of their areas into wards (supporting the response through their local CDMC), or will they simply work with their neighbours? History shows that people don't necessarily follow political or administrative boundaries in crisis situations.

The disaster impacts and the response itself will also affect normal mobility. As Piper (2011) highlights, most people will aim to move out of the valley at the first opportunity, returning to their original rural villages. Therefore planning support for rural host communities (peoples' relatives and old neighbours) will also be essential. This is a vital component of understanding mobility and the urban-rural linkages, particularly around markets and livelihoods, which will develop in the aftermath of a major seismic event. As the 2010 Haiti earthquake showed, the relief effort for a disaster that occurs in a city should not be restricted to the city itself. Similarly, urban preparedness cannot be thought of in a vacuum, but instead should be connected to rural risk management efforts where appropriate.

Displacement will also create challenges in the recovery phase around land rights. Support for improved record keeping and digitisation within the Land Revenue Office, and building resilient management information systems to minimise data loss after the disaster, could be important preparedness measures. Authorities and agencies will need to be agile enough to respond to an extremely complex post-disaster land situation. This

is especially important in ensuring that shelter and other forms of assistance reach the most vulnerable. Overall, it should be anticipated that the damage caused by the earthquake and the reaction to it will alter normal mobility, through a combination of disaster-induced and aid-supported factors that act as push and pull forces on affected people.

Raising the awareness of the population

With the significant development of DRR programmes in Nepal, awareness raising activities are plentiful. Ministries such as MoFALD have developed over 48 guidelines, including guidance on Local Disaster Risk Management and District Disaster Risk Management. Communication and dissemination mechanisms to ensure operationalisation are, however, still lacking, although progress is being made through the NRRC's Communications Group. Beyond the challenges noted in the preceding sub-section around ensuring effective participation in community-based DRM, urban areas present three additional difficulties in awareness raising These are education levels, gender considerations and the 'noise' of urban areas.

First, social mobilisers implementing the EPS programme at the local level noted that people with higher levels of education (a group more common in urban areas) often showed an air of superiority to Red Cross volunteers. These people felt they already had an advanced knowledge of seismic risk, and so were reluctant to listen and engage. Some residents may also be suspicious of those willing to work for free. Moreover, varying education levels make it more difficult to pitch

Learning point 2
Daily and seasonal patterns of mobility to, from and within the city are important to understand as they affect the availability of people for participation in assessments and preparedness activities (with additional implications for the sustainability of those activities), as well as the number of victims, the level of panic and the presence and gender of first responders. The disaster and the response itself will also affect normal mobility, raising complex land rights issues. All this needs to be carefully considered in risk management, preparedness and response planning.

direct awareness-raising activities at a single level that is appropriate for the whole community.

Second, the gender of those individuals providing the messages is important. As noted above, due to work and travel patterns, more women than men have been more involved in direct, participatory preparedness activities within the EPS programme. Red Cross social mobilisers highlighted that women would be able to circulate messages through the family very quickly, sensitising other members of the household and helping to prepare an evacuation plan. However, the impact of this activity on women's unpaid household labour should also be considered within programme implementation, which should not just focus on time demands affecting the daily work of the city's male residents.

Third, the array of messages emanating from a diverse range of media in Kathmandu means that people may overestimate the accuracy of their understanding of the risks to which they are exposed. NRCS staff members highlighted this point in relation to the proliferation of information on earthquake risk accessible via the internet. NRCS, NSET, Handicap

International, Oxfam and others have developed material, curricula, and drills and rehearsals to explain the types of risks (making scientific knowledge more available and accessible), as well as explaining ways to reduce risk and what to do if something happens. Yet, historically these activities have not been developed in a coherent, co-ordinated and strategic manner. Messaging has often been left to NGOs' local implementing partners, although broadly based on the MoFALD Local Disaster Risk Management Plan (BBC Media Action 2012).

This is likely to lead to disarray for any population exposed to such a range of different messages. The effect is particularly profound in an urban centre where levels of 'noise' are higher, with attendant risks of information overload (OCHA 2013: 38). Further, local media tend to simply report the impacts of disasters, and not what to do if the hazard occurs again. Therefore in urban areas it is all the more important for agencies to co-ordinate their communications and awareness-raising efforts in order to increase the 'signal to noise ratio'.

The NRRC Secretariat has helped MoHA develop key standardised

messages for earthquakes (which are extensive at nine pages in length), as well as floods and landslides. Agencies are free to choose the ones they feel fit their needs most closely, but the aim is to increase overall coherence of the messages disseminated by different agencies.

Different mediums are also important in reaching different segments of the population. The use of a KAP survey (which is statistically significant across the entire Kathmandu Valley) has been vital in helping NRCS and BRC to understand what target communities know about earthquake risk, the significance they attach to preparing for it and what they are doing to manage the risks they face. This will help to ensure the relevance and appropriateness of activities, messages and their means of implementation and communication.

The results show that 64 per cent of respondents got their earthquake messages from old media sources, with television the most popular source followed by newspapers, then radio (British Red Cross and NRCS 2013).[14] But this does not mean the opportunities to use new technologies and social media presented by economic development within the valley should be discounted. Internet sources were only identified as the primary means of receiving earthquake messages by 15 per cent of respondents, but Facebook already has one million users in Nepal. SMS messages may also be used, although one respondent highlighted the challenges of text messaging in Nepali given the phonetic structure of the language.

It is also possible that tools such as television may be less effective in urban areas. One interviewee

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Learning point 3

Urban areas are 'noisy', with many stimuli and messages competing for people's attention. Given the high-impact but lower day-to-day probability of an earthquake, agencies must coordinate their communications and awareness-raising activities to ensure their messages are heard, understood and contribute to sustained behaviour change. Where messages are delivered in person, education levels and gender issues should be considered, and where messages are delivered via mass media, those channels should be selected to ensure maximum impact and that different demographic groups are reached, both now and in the future.

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suggested that in cities people often watch television individually rather than communally, and therefore the impact of messages may be limited given that people will not be able to discuss them, and thus reinforce their meaning and implications. However, options such as television series with local comedians, while expensive, can be powerful means of conveying messages.

In communicating mass awareness messages, the full array of media options should be considered against current and projected audiences and user figures (for example, taking into account the growth of the smart phone trade with China and India in the next five to ten years). The Infoasaid Nepal media and telecommunications landscape guide is an important starting point to guide decision-making in this area (Infoasaid 2011).

Strengthening preparedness

Institutional analysis and the importance of 'connectedness' in a complex urban system

In Nepal, the NRCS is the critical link between between the affected communities and the disaster (risk) management system. Yet Nepal's disaster management system is extremely complicated and still evolving, particularly in the Kathmandu Valley, where the recent focus on the risk of a major earthquake is driving a plethora of projects and investments. It is also important to remember that there is still no NDMA in Nepal.

Knowing in advance how to seek guidance and instructions and co-ordinate activity in the event of an earthquake is critical for individuals and all levels of the NRCS, and this fact is strongly recognised by the organisation's senior management.
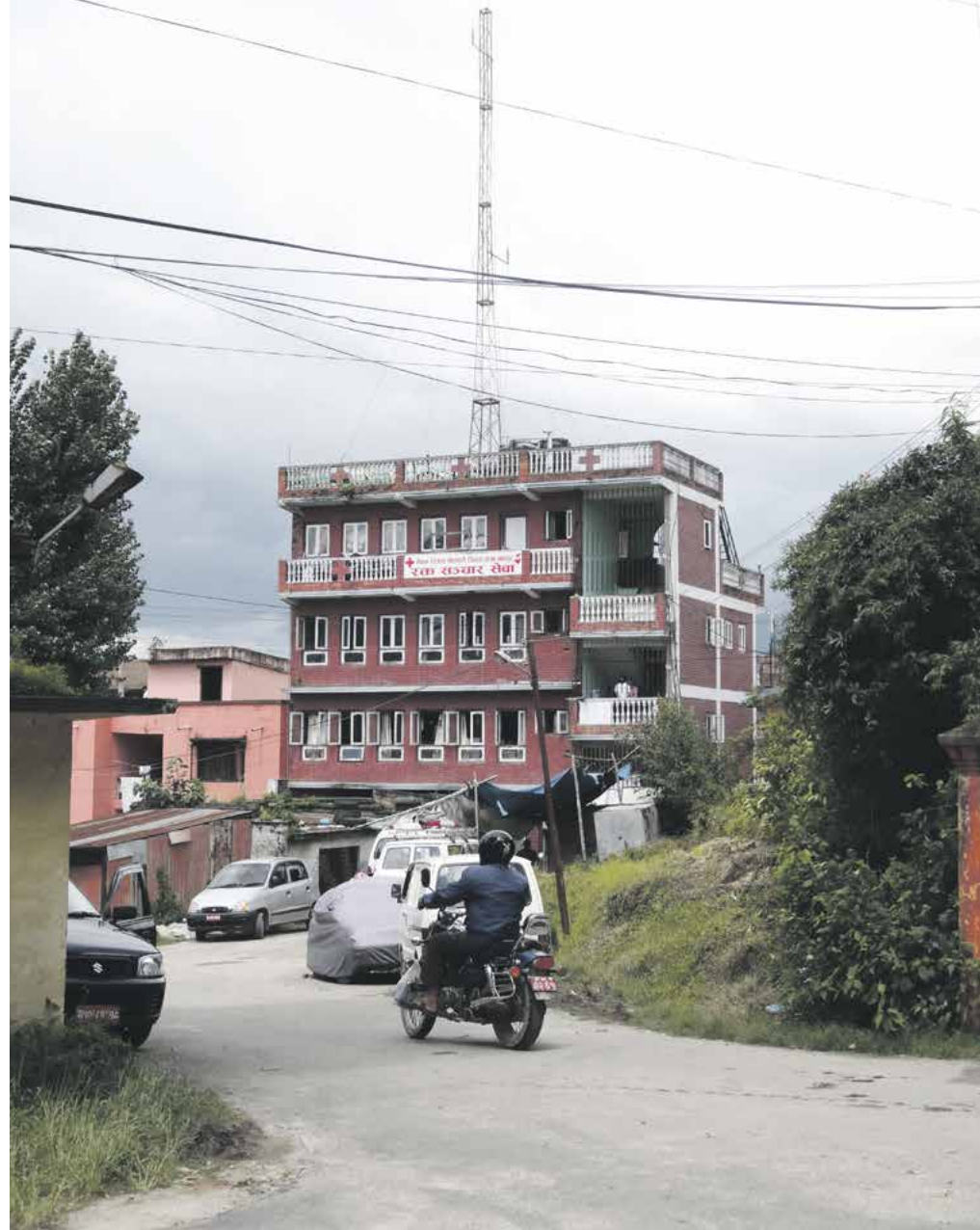
The message is, however, taking longer to trickle down to lower levels – the chapters and sub-chapters which have to co-ordinate with the wards, sub-wards, CDMCs and a range of other actors.

A renewed focus on connectedness in the complex urban disaster management system is vital for the NRCS and all other agencies. In such a system, co-ordination is at times best defined in relation to geographic areas rather than technical assistance delivery sectors (Kyazze et al. 2012). Geographically, the EPS programme is located at the centre of Kathmandu Valley's three districts (and covers most wards), therefore there is an expectation that communication channels for many other initiatives will flow through the NRCS and the

CDMCs. The extensive institutional analysis required to support such a complex arrangement necessitates a strongly outward-looking organisational culture and well-developed relationship management and partnership development skills. These factors are central to the sustainability of the programme, and are all the more important given the overlapping spheres of influence of agencies operating in urban areas.

A particular strength of the NRCS in this area is its auxiliary role to the GoN in disaster management, and the potential to use its presence across a number of networks to enhance strategic co-ordination on

DRM. Encouragingly, NRCS chapter offices visited in the preparation of this study noted recent engagement in simulations and drills by key national response actors, including emergency and security services.

The NRRC flagships are also important for promoting such engagement, for example better linking DRM and response actors with the health and education sectors and the national emergency services. Examples of essential work in building connectedness include initiatives undertaken by the WHO-co-ordinated Enhancing Emergency Health and Rehabilitation Response Readiness Capacity consortium;[15] work by World Bank GFDRR, NSET, DFID and others on school risk mapping; and the work of Flagship Two with national emergency and security services and international humanitarian actors.

But engagement should not be limited to government and aid actors. Inter-agency work on pandemic preparedness in sub-Saharan Africa has shown that engaging with the private sector, critical service providers and the military to understand how contingency planning and business continuity planning intersect can be an important first step in developing a 'whole of society' approach to preparedness.[16]

The initiatives listed above are of upmost importance to the connectedness of the NRCS into the urban disaster management system, and they highlight the necessity of breaking out of silos to work across humanitarian-development divides, sectors and specialisms to ensure a highly-networked approach. This is true not only between but within agencies; the NRCS should continue to actively involve its Disaster Management Department and Health Department in all disaster preparedness and risk management initiatives.

Co-ordination, however, requires time and resources, and no single partner can be expected to co-ordinate with all initiatives at once. Rather, a more gradual approach taking priority sectors and thematic issues in turn may be more appropriate and efficient. As such, co-ordination can be addressed in relation to specific issues arising out of an assessment of risk and vulnerability, rather than as an end in itself. Attention must also be paid to co-ordination with CDMCs. It was noted by some respondents that CDMC co-ordination with higher levels of the disaster management system can be problematic, as the secretary and members are often very busy, yet it is difficult to get them to delegate responsibilities to others.

Leadership

Crisis management requires people with training in team leadership, organisational matters and relief operations. Leaders must be sensitised to the needs of their staff (ensuring the safety and security of staff and their families is confirmed before they respond) and the population at large (who need to feel there are individuals taking charge of the response at multiple levels). NRCS leaders at all levels have to be a 'candle in the dark', by following the practical preparation steps they recommend to others and giving directions that build a vital sense of hope to people affected by the disaster. All chapter offices should ensure they have emergency 'go bags', generators and a few days of fuel so they can stay open and provide a place for people to go and seek advice.

While there are clear lines of authority in leadership, interviews and group discussions highlighted that the NRCS must deal with an

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Learning point 4
Nepal's urban disaster management system is crowded, complex and continually evolving. Knowing in advance where to go to seek guidance, instructions and to coordinate (both for individuals and the NRCS at all levels) is critical. Partners may not be the usual go-to actors; urban disaster management requires engagement with diverse actors such as the NEOC, militaries, Nepal Police and Armed Police Force, fire brigade, utility providers and the private sector. This requires investment of time and resources in institutional analysis and co-ordination, which should be undertaken in a gradual manner, addressing priority sectors and thematic issues in turn.

Learning point 5
Urban disaster management requires trained leaders who are sensitised to the likely needs of their staff and the population at large. Lines of authority and chains of communication must be clear given the complex and evolving nature of the disaster management system in the Kathmandu Valley. Leaders also require the physical means to operate and remain credible in a large-scale urban disaster.

over-centralisation of decision-making capabilities, which creates a lack of redundancy in respect of senior leadership. This is problematic when preparedness, response and risk reduction require multi-level and multi-sector co-ordination. Yet, interviews with NRCS chapter presidents and EPS programme staff showed that the leaders are clear on the first contacts they should make in the event of a disaster. These are, in order:

> Chief District Officer (who will escalate within GoN)

> Police

> NRCS headquarters

> District Disaster Response Committee/District Development Committee, to start operations under the instructions received during previous calls.

Leadership training is critical, but it is also vital to ensure that those trained leaders at all levels have the means to operate and remain credible in the event of a large-scale disaster. This can often mean ensuring that the basic equipment (communication, energy provision, urban search and rescue equipment, first aid kits etc.) is accessible and functioning.

The role of technology

Increasingly, the availability of technology and private sector development in the Kathmandu Valley is presenting exciting new opportunities for risk awareness raising (mobile/smart phones, Facebook etc.) and disaster impact and response mapping (geospatial and open street mapping, crowdsourcing, crowdseeding etc.) (OCHA 2013; Harvard Humanitarian Initiative 2011).[17] Yet, given the dynamism of urban areas, relating to human and economic flows and physical construction and evolving uses of space, risk maps can go out of date quickly, and may be rendered largely redundant in the aftermath of a disaster.

Partnerships with technology companies provide an important opportunity to address complex risk management challenges that individual actors are unable to manage alone. Research by the Humanitarian Futures Programme, King's College London and Deloitte has shown that platforms for private sector-humanitarian collaboration can help to facilitate this process (Oglesby and Burke 2012). One example of private sector partnerships are the 'hackathons' the World Bank has been promoting in Kathmandu, working with a local company called Young Innovations. Participants work together to use existing data sources to create mobile phone applications – or 'apps' – to address specific urban problems, for example developing taxi meters on mobile phones to support competitive price structures. A session on disaster risk is also being planned.

But it is important not to evangelise about the transformative potential of technology without robust evidence of the impact of specific innovations. It is necessary both to develop a scientific understanding of risk and vulnerability now (for example through the use of KAP surveys) and to be ready to harness the transformative potential of technological devices and applications (including Facebook, SMS etc.). At the time of the disaster, organisations must have full control of the technology or else should revert to simple methods.

New information technologies of course provide interesting possibilities, but the lack of electricity and fall-back telecommunications systems in event of a large-scale disaster is likely to undermine their utility. Therefore use of information boards, whistles, flags, high frequency (HF)

and very high frequency (VHF) radio still remains critical and is part of the redundancy approach to managing operations in degraded mode explored in the next sub-section. This is particularly important for the NRCS as chapter offices remain only very basically equipped.

Ensuring 'redundancy': Preparing to manage operations in a 'degraded mode'

Engineers know that a system can perform to its maximum capability when all functions are present, but it may also continue to function when only some key functions are preserved: this is called the 'degraded mode'. The existence of 'redundancy' to preserve these key functions in the system and the capacity to pre-set fall-back positions as part of systemic resilience are two crucial elements of a degraded mode.

Shifting from non-functional cellular communication or from rapidly saturated satellite networks to HF and VHF radio communication can become mission critical in the event of a large-scale disaster. But it is not just technological considerations that need to be addressed. As in the 2010 Haiti earthquake, the GoN and national and international actors will be both victims of the disaster and actors in the response (Grünewald et al. 2010). This poses challenging questions for preparedness. For example, how does an organisation respond when up to 50 per cent of staff and volunteers have been killed or are incapacitated, or when roads and lanes are blocked by fallen rubble?

Providing the necessary flexibility has training and financial implications. The Danish Red Cross has an important project supporting the NRCS on fall-back communications across the Kathmandu Valley (four standby mobile telephone masts outside the valley and wireless internet service provision). Similarly NCELL, the mobile network provider with the largest market share of users in Nepal, has designated a disaster planning focal point and has begun major investments to make the current network more seismic-resistant, as well as to establish a back-up network. BBC Media Action's communications preparedness project addresses another vital element of fall-back, a radio station that can be set-up within 24 hours of a disaster using a 'suitcase radio' model. The project also provides emergency back-up support to Kathmandu's existing broadcasters.

Other agencies within NRRC Flagship 2 are working on the readiness of the airport to cope with a large-scale disaster, disaster-proofing critical infrastructure and supporting warehouse construction. Remaining operational when cut off from higher management levels is a key challenge in societies used to working through hierarchical administrative systems. Developing a sense of responsibility and initiative is thus very important.

This can be acquired through scenario-based training sessions, drills and rehearsals, for example those regularly conducted by NRCS, GoN and other NRRC partners. However, it should also be noted that more work is need to ensure that such communications, human resource, transportation, logistics and media systems function effectively in non-crisis situations. As such, redundancy should be addressed within wider support to overall urban system capacity and development.

Managing the response

Local leadership in the first phase response

Kathmandu's Tribhuvan International Airport is likely to be damaged by a seismic event, and much of the road network is likely to be idle as a

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Learning point 6
Urban areas present exciting opportunities for risk awareness raising and disaster impact and response mapping. It is important both to develop a scientific understanding of risk and vulnerability now and to be ready to harness the transformative potential of technological devices and applications. Crucially, however, at the time of disaster, technology must either be fully mastered or more traditional methods used. This is critical in the event that information networks and communications systems are 'down'.

Learning point 7
Preparedness and readiness for response to a large-scale urban disaster involves the ability to operate in a degraded mode. Redundancy must be built into the system through fall-back positions in communications, human resources, transportation, logistics and media. This requires a combination of technical investments and training.

result of the debris. Rubble removal will be slow due to the demands of search and rescue and dead body management, as well as the lack of heavy duty equipment in the Kathmandu Valley. Local capacity to lead the initial response will, therefore, be critical. This requires the development of clear linkages between local Red Cross chapters and the rest of the national and international response system.

There are, of course, limitations on what trained first responders can realistically be expected to do in the first phase response. Equipment available to CDMCs under the EPS programme is likely to pale in comparison to the level of need. Collapsed structure USAR interventions are potentially dangerous and are beyond the capacity of volunteers. However, light search and rescue and organising the evacuation of

wounded who are not deeply buried will be vital.

Other critical functions will include light first aid interventions, warning people of the risk of aftershocks, directing people to relief and moving the wounded to health facilities. The capacity to deliver first aid treatment (control of external bleeding, securing airways, splinting of fractures, proper handling of the injured and dealing with those suffocating from the dust) will be essential. More efforts should be invested in these areas.

In the first few days after the response, local level efforts will be the core of the overall response as the NRCS volunteers and staff are likely to be on their own in many areas of the valley. In the area covered by one of the sub-chapters visited for this study, for example, there is no fire station and the

⌃ Overloaded electric cables increase risk of secondary disasters such as fire. © Nepal Risk Reduction Consortium.

nearest military barracks are 7km away (and this is only the Army Sports Academy). Empowering local leadership will therefore be essential to the first phase of the urban response.

Because of their activities before any disaster, the presence of NRCS volunteers and staff will be vital to creating a sense of order in affected communities. This is a heavy responsibility and the local head of operations must demonstrate their leadership capabilities to the population and whatever remains of the local administration. They should also show they care for the safety and wellbeing of NRCS teams and their families – otherwise staff and volunteers will not be able to perform properly.

'Domino effects': dealing with sequential crises

Experience shows that disasters never come alone. This is particularly true in urban areas, as witnessed with Japan's 2010 'triple crisis' (earthquake, tsunami and nuclear contamination), for example. As Kent notes (2013: 7), while such "domino dynamics" have been discussed as plausible in consultations with UN country teams, few people in national authorities or international agencies have given them much credence to date.

In Kathmandu, an earthquake might generate fires, chemical contamination and/or social unrest. The risk of fires spreading is increased by the high housing density in some areas of the city, where increased use of cooking gas heightens the risk of ignition and explosions (Perks et al. 2011). Depending on the time of day, an earthquake may bring about massive and uncontrolled population movement. Capacity to rapidly identify these domino effects, report them to higher levels and to try to mitigate them is crucial. The threat of these effects highlights the need for effective co-ordination and information and communications management detailed in the subsequent sub-sections.

Co-ordination and co-operation in a complex multi-actor response

As in the preparedness phase, effective co-ordination and co-operation is key to providing an efficient response that draws on the diverse capacities of all actors in such a complex urban disaster management system. What may be required is a shared leadership arrangement, rather than relying on the exceptional-individual approach that predominates within the humanitarian system (Knox Clarke 2013).

For the Red Cross, co-ordination and co-operation are of utmost importance in four priority areas: first aid and triage, blood banks, dead body management and delivery of relief items. Overall, in coordinating the response, the Red Cross must be ready to work with diverse actors from national and international militaries to the Nepali diaspora.

With the large number of first responders trained in first aid under the EPS programme, basic triage will be essential to ensuring effective linkages to the health sector response and referral system. The WHO-led DiPECHO consortium is currently finalising practical tools to support the mass casualty management strategy of the Ministry of Health and Population (MoHP) (2012). It will be important for NRCS to engage with this consortium and build knowledge of resources being developed into on-going first aid training and preparedness and readiness planning. These resources include emergency referral mechanism and forms (red, yellow, green, black triage) (Merlin Nepal 2012) and an early deployment mechanism for human resources for health (Kendra and Handicap International 2012).[18] The focus here should be on strengthening the critical link between first aid and basic life-saving care and assessment, diagnosis, treatment and referral at primary health care facilities.

The NRCS is a central actor in the supply of fresh blood packs to health institutions where injuries will be treated. Many of these people will need significant quantities of blood (including victims of crush syndrome, visceral injuries and open wounds with broken bones). The current working hypothesis is that the central blood bank may be idle and that blood supply will therefore rely significantly on an NRCS mobile blood bank, operating with the aid of a fully self-sufficient mobile trailer. The plan is that the 1,000 blood units kept for normal daily use will be complemented by another 1,000 units for the first critical 48 hours.

In the case of an earthquake, a number of hospitals will be out of action. There will also be much higher needs arising from trauma sustained. To support this, a

Learning point 8
In the face of limited national response capacities and major logistical challenges likely to delay international humanitarian assistance, local capacity to lead the first phase response will be critical. The focus here should be on limited light search and rescue interventions, first aid, evacuation and linkages to remaining functioning health structures.

Learning point 9
Urban areas present a heightened risk of an earthquake triggering other secondary disasters. The potential for an earthquake to trigger fires, chemical contamination, social unrest and mass displacement should be at the heart of all preparedness and response planning.

message asking people to give blood in times of disaster will feature in the pre-disaster mass-awareness-raising campaign. US PACOM is supporting the development of an earthquake-resistant blood bank which should help to address the challenge of emergency blood supply.

Body evacuations to mortuaries or body gathering sites will be an important part of the NRCS volunteers' role in the response. It will be very important to manage this issue sensitively, particularly given its symbolic significance and public health connotations. Recording information and taking identification photos before cremation, for instance, will be vital. There is no evidence that corpses cause disease or epidemics per se. Victims of an earthquake are likely to die of trauma and not diseases such as cholera, typhoid, malaria or plague. According to the latest international guidelines, infectious diseases that do last in a dead body for up to two days, such as tuberculosis, hepatitis B and C and diarrhoeal diseases, only present a slight risk of contamination (IRIN 2009). However, lack of preparedness planning for mass fatality management can lead to major problems in already overcrowded urban areas. In the aftermath of Haiti's 2010 earthquake, which killed more than 200,000 people, lack of co-ordination resulted in bodies being piled up outside morgues and hospitals. Thousands were buried in unidentified in mass graves (IRIN 2012).

How corpses are dealt with can have a profound and long-lasting impact on the mental health of survivors. An extensive field manual for first responders has been prepared by health and forensic experts and should be used in the

development of training curricula and preparedness plans (PAHO, WHO, ICRC and the International Federation 2009).

The prepositioning of relief items is always a difficult exercise. Decisions must be made about what should be stored and in what quantity, as well as how stock rotation will be organised and who will pay for it. In the Kathmandu Valley, it is currently planned that non-food item stocks will be held in a warehouse on the site of the NRCS headquarters, as well as containers in one open space in each of the three districts.

As with other resources to be delivered at the open spaces such as water supply, engagement of CDMCs in the management of these resources will be essential. Reasons for this include minimising aid-supported mobility, and related secondary public health crises in camps, after the disaster. Negotiations with landowners (specifically different public authorities) are also important, as they may feel the pre-positioning of non-food items does not provide them with a clear, on-going benefit. Whereas water supply, for instance, would. The Movement should have a strong voice in influencing what open spaces are used for. Sites should be centres of safe assistance and protection for the affected population, and not dominated by the logistical machinery of military and other responders. The two key levels of co-ordination that are essential to the NRCS response are detailed in Table 2 overleaf.

The scale of the disaster and its urban nature are likely to facilitate significant military and diaspora involvement in the response. Other organised bodies with the capacity to intervene rapidly are the Nepal Fire Brigade, the Nepal Army, the

Nepal Police and the Armed Police, potentially with the support of the Indian and Chinese militaries, and later the US armed forces. The 2009 Sichuan earthquake, for example, showed the significant response capacity of the People's Liberation Army – with over 100,000 soldiers and armed police mobilised within days, according to officials – as well as the reach of the US military through its Pacific Command (Mulvenon 2008).

As with other recent large-scale disasters in the region, therefore, the issue of civil-military co-ordination is likely to emerge after the first few days, with the scale of disaster (and the associated humanitarian imperative) and geopolitical pressures placing additional stresses on civil-military co-ordination (Madiwale and Virk 2011). This means that guidelines for civil-military co-ordination in the event of a large-scale earthquake in the Kathmandu Valley should be developed as a preparedness measure, with efforts invested in ensuring 'ownership' from both the GoN – as the affected state – and national and international humanitarian actors.[21]

For the NRCS and the other components of the Movement which are currently working in Nepal, it will be essential that there is a common Red Cross response to the issue of civil-military co-ordination. A common position that ensures adherence to the Fundamental Principles will be essential.[22]

Similarly, changes in flows of remittances and human resources[23] from the diaspora should be sensitively incorporated into the management of the response. Nepal is one of the leading recipients of remittances (as a percentage of GDP) in the world, and remittances received between 1995/6

Table 2: Strategic and operational co-ordination of the response

	Strategic co-ordination	Operational co-ordination
Key partners	> NEOC/MOHA Kathmandu Metropolitan City, UN resident and humanitarian coordinators, Humanitarian Country Team and key donors (all issues and sectors below)	> Nepal Police, Armed Police, Fire Brigade, national and international militaries, donors and UNDAC (USAR) > MOHP, WHO and NGO partners (health) > MoHA, IOM, UN Office for the Co-ordination of Humanitarian Affairs (OCHA) and NGO partners (population movement and open spaces) > GoN ministries and agencies, private sector and regional and international actors (logistics) > MoHA, IOM and other international actors (non-food items and other assistance) > ICRC, national and international security services and militaries and other international actors (protection)
Thematic issues/ sectors and key partners	> Needs and response capacity assessment (and later early recovery) > Constraints identification (logistics, law and order, security and political/ administrative)[19] > Legal dimension (including international disaster response law[20] and land law and rights)	> USAR > Health – full referral system from first aid and triage to surgery and medical evacuation > Management of population movements and open spaces > Logistics, including infrastructure, communications and transportation > Non-food items and other assistance > Protection

and 2003/4 contributed to between a third and half the reduction in poverty throughout the country during that period (Sapkota 2013). Therefore the likely disruption of remittance flows by death, displacement and damage to communications and transport infrastructure will have a significant impact on the coping capacity of the affected population (see Harvey and Savage 2007). However, once the necessary infrastructure is restored, flows from the Gulf States and the UK may increase, while those abroad may return to search for missing family. These changes in monetary and human flows need to be considered in the response, for example in the livelihoods and cash transfer sector and in restoring family links.

Information and communications management

The NRCS is a key node in the network connecting communities and the multi-sector, multi-agency disaster management system. This is particularly true in the areas of search and rescue, first aid and giving instructions for behaviour in times of disaster (including access to open spaces/relief distribution locations and the health system). However, the aftermath of the disaster will be a tense situation, with people trapped in a dense, collapsed urban environment. Even the simplest information can prompt rumours that create panic and expectations, which will in turn have to be managed. Information and communication

management must be at the heart of urban disaster response.

A clear and well understood communication strategy and media surveillance systems must, therefore, be in place in event of disaster. This will help to facilitate expectation management and to mitigate panic in an environment of rapid and uncontrolled information flows. The CDMCs and local Red Cross branches must effectively co-ordinate communication flows up to NRCS headquarters, down to affected communities and across to

municipalities, district authorities and agencies. Effective communications and information management will also require a robust two-way communication system to reach and hear from the affected population, only a segment of which will become direct beneficiaries. Therefore communicating and engaging with complex disaster-affected, urban communities must go beyond the limited concept of 'beneficiary communications'. It will be important to ascertain from the affected population information about:

> needs

> lost lives, lost relatives, separated families etc.[24]

> targeting

> additional incidents and domino effects

> programme implementation challenges and suggestions on how to improve them.

It is interesting to note that despite the positive feedback from Port-au-Prince, Haiti and other disaster-affected areas, little has been done to engage in a pre-emptive way with tools of the open source community such as Ushaidi, Savana or Crisis Camp. The EPS plans to operate through a relatively sophisticated scheme involving many intermediaries, thus introducing

the risk of message manipulation or modification of meaning. This will require high vigilance and the rapid deployment of information verification teams.

As seen in the 2010 Haiti earthquake, the presence of mobile phones and social media can significantly increase the volume of information coming in from affected communities (Harvard Humanitarian Initiative 2011). In this situation verification becomes all the more important in ensuring adherence to the fundamental principle of impartiality, and guaranteeing that assistance is given to those that need it most. The present plan is to use a multi-channel communication approach, using both low-tech traditional methods and the modern tools that are becoming more

widespread in Nepal, such as mobile phones and social media.

Local and national media will also be key partners in ensuring effective information and communications management. At present, the media in Nepal tends to focus much more on reporting disaster impacts than what to do in the event of recurrent hazards and secondary impacts. Triage, triangulation and repackaging of information are critical to the media's role in disaster management and additional support is needed both before and during the disaster. BBC Media Action has developed a plan for post-earthquake communications. Messages to be delivered cover medical issues, search and rescue, managing expectations, psycho-social issues and social rehabilitation.

However, past experience has shown that it is very difficult to synchronise messaging after a disaster. Within a week of the disaster numerous radio and TV stations may be back on air that will need to be co-ordinated with, not to mention international media sources. Co-ordination with media actors will be essential to minimise panic. At the community-level, BBC Media Action and NRCS are exploring the development of a memorandum of understanding that could help to ensure consistent and strategically managed two-way communications at the community level after a disaster. Overall, the NRCS must get in the right information to assess needs and plan the response and get out material to the affected populations informing them what to do.

Being alert and agile

Uncertainty is an unavoidable feature of urban preparedness planning: Nobody knows what a post-earthquake Kathmandu Valley will look like. Nevertheless, all assumptions point to a very complicated, highly-sensitive situation with immense operational constraints. NSET and Geo Hazards International (2007), for example, have a well-developed earthquake scenario for the Kathmandu Valley which looks at impacts one hour, one day, one week, one month and one year after the shaking in order to support planning and preparedness exercises.

Without certainty about the magnitude of the earthquake, its epicentre, timing and the attendant implications for disaster impact and constraints on the response, no preparedness plan or process can ensure complete readiness. Figure 4 opposite illustrates just how complex and messy the response may be.

Learning point 10
Effective co-ordination and co-operation is core to an efficient response that draws on the capacities of all actors involved in the urban disaster management system. For the NRCS, co-ordination and co-operation in the following areas should be prioritised: first aid and triage, blood banks, dead body management and delivery of relief items. In coordinating the response, the Red Cross must be ready to work with diverse actors from national and international militaries to the Nepali diaspora.

Learning point 11
The NRCS is a key node between communities and the multi-sector, multi-agency urban disaster management system. Effective information and communications management will be vital in getting in the information required to assess needs and plan the response and get out key messages on search and rescue, first aid and behaviour in the aftermath of the disaster.

Learning point 12
Nobody knows what the exact impact of, and operational constraints imposed by, a large-scale earthquake will be. Therefore the focus of DRM and preparedness efforts should not be on prediction, but on building a state of alertness and agility, in order to respond effectively to a range of scenarios.

Instead, a state of alertness and agility should be built, with attention focussed on their respective capacities of readiness for immediate response and rapid adaptability to the demands of the particular situation. These two capacities should be the outcome of consolidated DRM and preparedness for response efforts.

Ultimately, the emergency response must analyse not only the needs and operational constraints presented, but also the institutional dynamics and political economy of the disaster situation; response programming should be according to context rather than predetermined solutions (Levine et al. 2012).

Figure 4: A complex and messy urban response
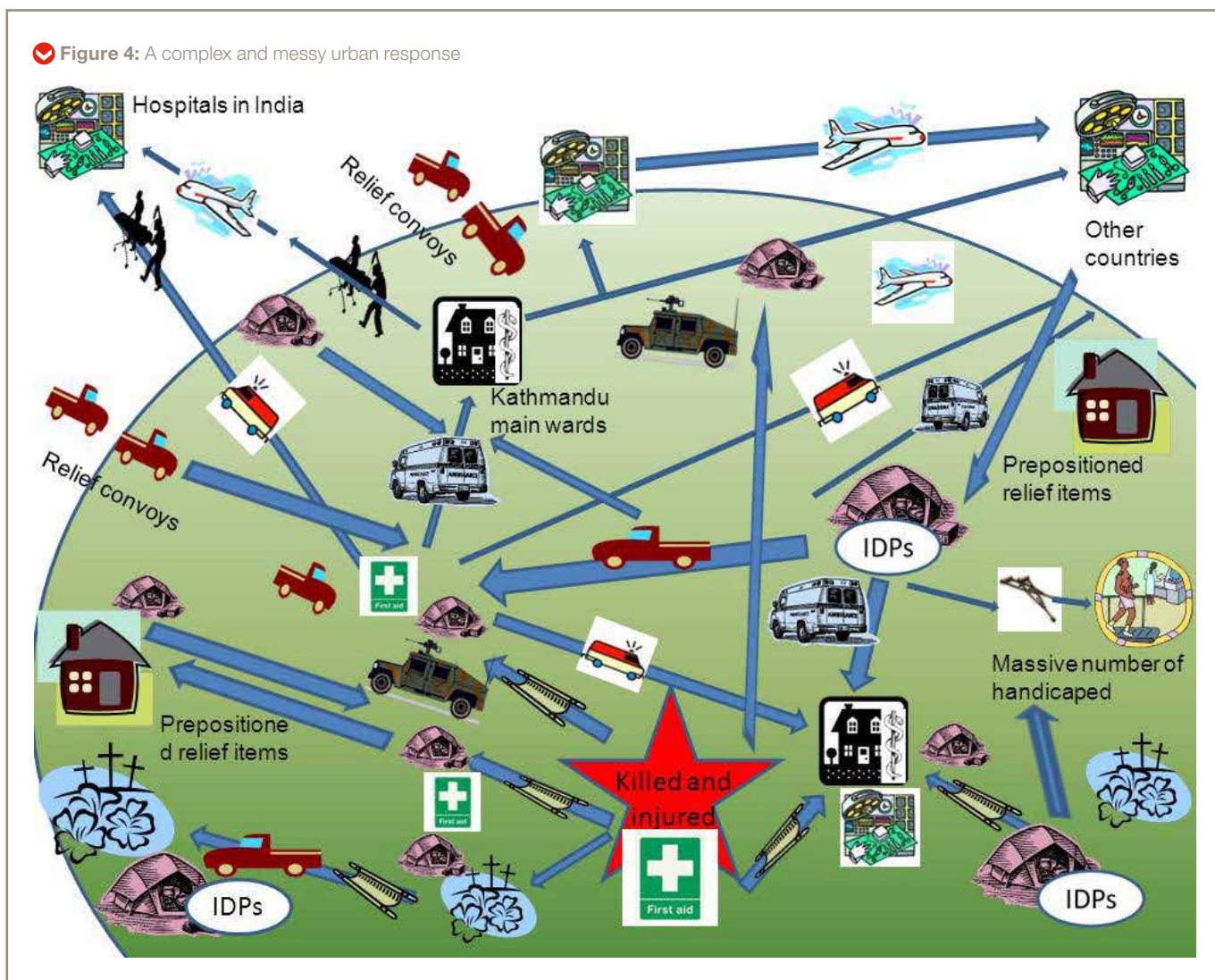
5. Lessons for the British Red Cross and its partners

Building on the key learning points identified in the previous section, which are specifically framed in relation to the Kathmandu Valley, this section outlines nine key learning points for urban DRM and preparedness more broadly. The points detailed in this section are intended to guide learning, training and embedding of good and innovative practices within the Movement, and the wider humanitarian sector, as part of the British Red Cross Urban Learning Project. As with the previous section, the learning points are divided into three sub-sections relating to different phases of the disaster management cycle:
1) understanding diversity,
2) preparing for the unknown and
3) being ready.

Understanding diversity

Urban space and mobility: Implications for assessment, preparedness and response

Urban space is often very heterogeneous. Rich and poor areas, new and old neighbourhoods, highly populated centres and peri-urban peripheries administrative districts and industrial zones often sit side-by-side. Urban spaces are the result of a historical process and so are made up of areas with different symbolic significance. These might include national monuments, sacred buildings, locations negatively marked by historical events etc. An urban space is also a collection of units: interconnected flows of goods, services, people and energy. The composition of these units changes over time, such as during the course of a day or seasonally (through seasonal labour, tourism flows etc.).

Understanding the special features of individual urban areas, and how they change over time, is essential to appreciating the potential impact of a disaster and how people will behave in its aftermath. Four key variables that must be considered are the risks, vulnerabilities, likely community responses to a disaster and opportunities for preparedness and response in each area.

Mobility and rural-urban linkages will also affect the human impact of the disaster, as well as where people are likely to go in its aftermath. The time of the disaster will be critical to its effect, as the location of urban populations changes throughout the day and night. Factors affecting its impact will include people's movement to and from workplaces (and thus the availability of first responders), the presence of schoolchildren in classrooms, and whether people are in their homes or in the street. These factors can make a significant difference to the number of casualties, amount of panic created and options for managing the situation. Which season the disaster occurs in can lead to additional considerations, determining whether concerns including winterization, the risk of secondary disasters such as landslides, and thirst management are priorities or not.

The risks, vulnerabilities and capacities of communities can therefore only be understood through high-quality assessments that take account of change over time (which can be very rapid in urban areas). Information gathered through participatory approaches such as VCA or the Participatory Approach to Safe Shelter Awareness should be triangulated with secondary data from government

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Learning point 1
Risk management, preparedness planning and response management must be developed to take account of the physical and social differences between and within urban areas. Plans should also address peoples' movements to, from and within urban areas. These factors create different risks, vulnerabilities and opportunities with implications for assessment, preparedness and response planning. The risks to and vulnerabilities and capacities of communities can only be effectively understood through high-quality assessments that use secondary and technological sources to supplement participatory methodologies, while also taking account of change over time.

Learning point 2
Understanding the political, socio-economic and cultural characteristics of the urban community you are working with is essential to effective programming. This will have important implications for how preparedness, awareness raising and training activities are organised. Similarly, a detailed and nuanced understanding of the power dynamics, leadership and decision-making processes in the community is vital to maximising the reach and impact of risk management and preparedness activities.

sources and GIS mapping in order to ensure a robust approach to urban assessment, preparedness planning and management of the response.

Understanding the urban population

Understanding the socio-economic, political and cultural characteristics of a population is important to avoid key planning, operational and communication difficulties. Approaches to the planning of participatory preparedness activities in urban areas will likely have to be adapted to take account of people's time commitments, with the organisation needing to take a more flexible approach than in rural settings. This may involve planning activities during holidays or in offices, businesses, hospitals or schools. Extra care must be taken not to leave anyone behind, for example tenants who may be given less attention by community-led groups than permanent residents. Significant gains can be made by highlighting the utility of first aid in managing 'everyday risks', as well as the potential contribution of volunteering to peoples' studies, professional development and recognition from the community. Refresher training, simulations and drills are other ways to help retain volunteers, but these need to be regularly organised in order to ensure sustainability.

The socio-economic characteristics of the populations and their level of political consciousness often determine the way communities or neighbourhoods are organised and how they interact with the state and local institutions. This is an area where mistakes are often made due to a simplified notion of urban communities, which are often looked at through rural lenses. Urban communities are unique due

to their lack of internal cohesion, recent creation and heterogeneity. They function less due to traditional linkages between the population and a site, and more because of a time-bound identification of common interest. Understanding power dynamics, leadership and decision-making processes, as well as how interfaces between civil society, business and state mechanisms function, can help tremendously in delivering urban risk management programmes. This is especially important for Movement actors which must both ensure adherence to the Fundamental Principles and support the specific auxiliary role of the National Society. As outlined in Box 2, applied political economy analysis can be a powerful tool to use here, although it needs to be conducted in a sensitive and discretionary manner. Approaches to preparedness activities must also be fine-tuned to the specific needs of different members of the community, for example taking account of varying levels of education, an issue which itself is related to social status.

Identifying and mapping critical infrastructure and services

In an urban disaster situation, critical infrastructure and services play an essential role. It is important to map them and mark their proximity to Red Cross or Red Crescent branches. Keeping this map up-to-date is very important. Particular infrastructure and services of concern include:

> hospitals and health facilities

> NDMA facilities

> emergency and security services (including fire brigade, ambulance, police and military)

> parks and open spaces

> public buildings (for example schools) that can be transformed into evacuation centres

> electricity supply

> water supply.

The question of identifying and mapping critical infrastructure and services is closely linked to institutional analysis within the urban disaster management system, which is addressed in the following sub-section.

Preparing for the unknown

Institutional analysis in complex urban systems

Understanding roles and responsibilities within each country's unique national urban disaster management set-up, and the system's linkages to international actors, is essential. The prominent role of national and municipal institutions in urban disaster management, as well as those at the neighbourhood level, must be fully recognised. The National Society is the critical link between communities and the wider disaster management system, particularly national institutions given the auxiliary role of National Societies to their governments in disaster management.

Institutional analysis should be a strategic and operational priority, particular when working in complex urban systems. Knowing where to go to seek instruction and to co-ordinate is essential and requires investment of time and resources in institutional analysis. In urban areas this requires engagement with diverse actors such as NDMAs,

militaries, emergency services and the private sector. However, given the plethora of actors involved in urban disaster management, no single implementing partner can be expected to co-ordinate with all initiatives at once. Rather, a more gradual approach taking priority sectors and thematic issues in turn may be more appropriate and efficient.

Multi-scenario planning

Appropriate, effective and efficient disaster response requires a high level of preparedness and a critical level of opportunism. A contingency plan based on only one scenario is extremely limited. Further, scenarios should take account of potential domino effects in urban areas, or sequential crises driven by an initial hazard. Many different variables have to be taken into account, not just the scale of the disaster but the exact location, time of the day, season, political context etc. These variables are particularly important in urban areas, where movement of the population relating to time of day and season will have a major influence on the impact of the disaster, the behaviour of the affected population and options for management of the response. The plan should also take account of the institutional and politico-economic dynamics that are likely to provide different constraints and opportunities for the response.

Multi-scenario planning capacity should be built into organisational capacity development. The best way to implement it is through a collective, cross-institution and hierarchical process where identification of the variables, their margin of fluctuation and when they may occur is fed into the development of a scenario tree. In the final analysis, what really matters is the process, level of alertness and adaptability a plan creates – not the production of a document that sits 'ready' on the shelf.

Utilising new technologies

New technologies for pre-disaster risk assessment (using satellites imageries), post-disaster needs identification (crowdsourcing/crowdseeding), coordination (GIS mapping), monitoring and impact evaluation (PDA data collection and transmission and crowdsourcing) and relief activities (cash transfers through SMS and branchless banking) have emerged in recent years and have fascinating potential. Urban areas often provide greater opportunities for the use of such new technologies in managing the response. Furthermore, partnerships with technology companies located in urban areas provide significant potential to address complex risk management challenges that individual actors are unable to manage alone.

It is important to optimise these new technologies for use in urban response, particularly given their increasing usage (especially among young people), but not become a slave to them. Lack of electricity and fall-back telecommunications systems could entirely undermine their utility. Redundancy should

Learning point 3
One of the features of urban areas with a high level of exposure to disasters is that part or all of their critical infrastructures can be destroyed if a disaster takes place. As part of urban preparedness it is important to keep an up-to-date map of infrastructure and their distances to Red Cross or Red Crescent branches. Strategic development of the area should therefore incorporate the need for redundancy, for example in health, water and communications systems, within core urban planning objectives.

Learning point 4
A clear understanding of roles and responsibilities is particularly important given the complexity of urban disaster management systems. Urban disaster management requires engagement with diverse actors such as NDMAs, militaries, emergency services and the private sector. This requires investment of time and resources in institutional analysis.

Learning point 5
A number of variables, including location, time, season and political and institutional context, will significantly affect the impact of a large-scale urban disaster and the challenges and opportunities presented by the response. Multi-scenario planning is, therefore, essential. This should involve a collective, participatory and cross-organisational process, which aims to build a state of alertness and adaptability in order for the National Society to respond to whatever the disaster may throw at them.

be seen as critical here: traditional HF and VHF radio handsets must remain available, with people trained to use them. Similarly, information boards, whistles and flags may still be appropriate and complementary tools.

Being ready

Leadership

A large-scale disaster in an urban centre can lead to chaotic situations. In this environment the rapid provision of emergency leadership at all levels is essential. For the Movement, the national and local (chapter or branch) levels are particularly important:

The national level should be clearly entrusted with strategy development, global coordination and interaction with external actors. This means that the senior management of the National Society should be ready, trained and kept informed of the latest developments. Engagement should be first and foremost with its branches and volunteers in the field, and then Movement partners and the NDMA.

The local level. Because of their presence and activities prior to the disaster, National Society staff and volunteers will be vital in helping to create a sense among the population that there is someone in charge. This is a heavy responsibility, which requires the local head of operations to demonstrate their leadership capabilities to the population and

Nepalese Red Cross volunteers discuss progress outside the warehouse at the central office in Kathmandu where 50,000 emergency kits are stored as part of an earthquake preparedness programme.
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whatever remains of the local administration. They should also show that they care for the safety and wellbeing of the local Red Cross or Red Crescent teams and their families – otherwise these people will not be able to perform properly.

Leadership training is important here, but so is ensuring that those trained leaders have the means to operate and remain credible following a disaster. This often means ensuring that the basic equipment (for communication, energy provision, urban search and

rescue, first aid etc.) is in place and can be optimally used.

Building readiness for coordination

Co-ordination in urban response involves working with a continually growing range of actors. As in the preparedness phase, effective co-ordination and co-operation is core to an efficient response, especially one that draws on the diverse capacities of all actors involved in the disaster management system. A clear understanding of strategic and operational co-ordination and how they relate to different levels of leadership in the National Society is vital.

Co-ordination will not only be with Movement actors, but will involve more challenging co-operation with government agencies, national and international militaries and the diaspora. Effective engagement with such actors requires relationships to be built-up in the pre-disaster phase, with clear responsibilities for relationship management allocated.

Getting the communication right

Disaster situations are often messy and scary. It is a situation where the most simple information can get transformed into a dreadful rumour and create panic and expectations that will have to be managed. The simple fact of a high number of people concentrated in an urban area, the rapidity of information flows in cities and the frequent high political consciousness of urban populations necessarily place information and communication management at the heart of urban disaster response. Having a clear and well-understood communications strategy (covering media, public and donors) must be an essential risk management measure, in light of the potential for rapid and uncontrolled information flows in an interconnected urban environment.

Gathering the right information to plan and operate and giving the right information to the affected populations – keeping them informed, as well as telling them where to go and how to get relief – is vital. In a situation of increased information flows, verification becomes all the more important in ensuring adherence to the fundamental principle of impartiality and guaranteeing that assistance is provided to those that need it most.

Learning point 6
The proliferation of new technologies and the potential for private sector partnerships in urban areas is leading to new opportunities for DRM, needs assessment, coordination, monitoring and evaluation and relief assistance. It is important to remain both fully connected to the emerging possibilities of new technologies, but also to build a capacity to maintain operations without them.

Learning point 7
Large-scale urban disasters lead to tense, complex and uncertain situations where the rapid insertion of strong leadership is essential, both at the national and local (chapter or branch) levels. Training is not the only requirement to fulfil the responsibility of leadership. Equally important are the basic equipment necessary to remain operational and credible, and the resources to ensure that staff and volunteers and properly cared for.

Learning point 8
Building readiness for coordination and cooperation is essential to an effective response that draws on the capacities of all actors involved in the urban disaster management system. This requires clear responsibilities for relationship management within the National Society, including co-ordination with actors such as the military and the diaspora.

Learning point 9
Learning point 9: Getting the communication right is essential to urban response given the rapidity of information flows and the potential for rumour and panic to create secondary disasters. A clear communication strategy should be in place as a preparedness measure, whilst measures should be in place to ensure effective information gathering, verification and communication on the situation, where to go and how to get assistance.

6. Conclusion

This study has explored the challenges and opportunities of DRM and preparedness for humanitarian response in a complex, dynamic and continually evolving urban system – the Kathmandu Valley. Complexity is a defining feature of urban disaster management, both in terms of urban areas and systems themselves and the rapidly evolving preparedness and response plans that serve them. These lessons from the Kathmandu Valley illustrate the scale and complexity of DRM and preparedness for response in a fast-growing urban centre exposed to a range of natural hazards and socio-economic vulnerabilities. As this study shows, context and local understanding are essential.

But to meet the challenges of preparing for a large-scale disaster amidst urban complexity, it is clear that understanding the complex realities underlying urban systems, leadership, partnership, information and communication is also essential. Furthermore, the opportunities presented by the city should not be ignored. These includes the sensitive exploration and adoption of new approaches, partnerships and technologies.

This study is part of an ongoing process of operational and organisational learning on humanitarian action in urban areas by the British Red Cross, NRCS and their partners in the Movement. It contributes to an evidence base being developed by the British Red Cross documenting operational learning through in-depth, field-based case studies. The study also develops the link between operational learning and current and future programmes in urban areas, particularly through a focus on embedding good practice and innovative approaches through
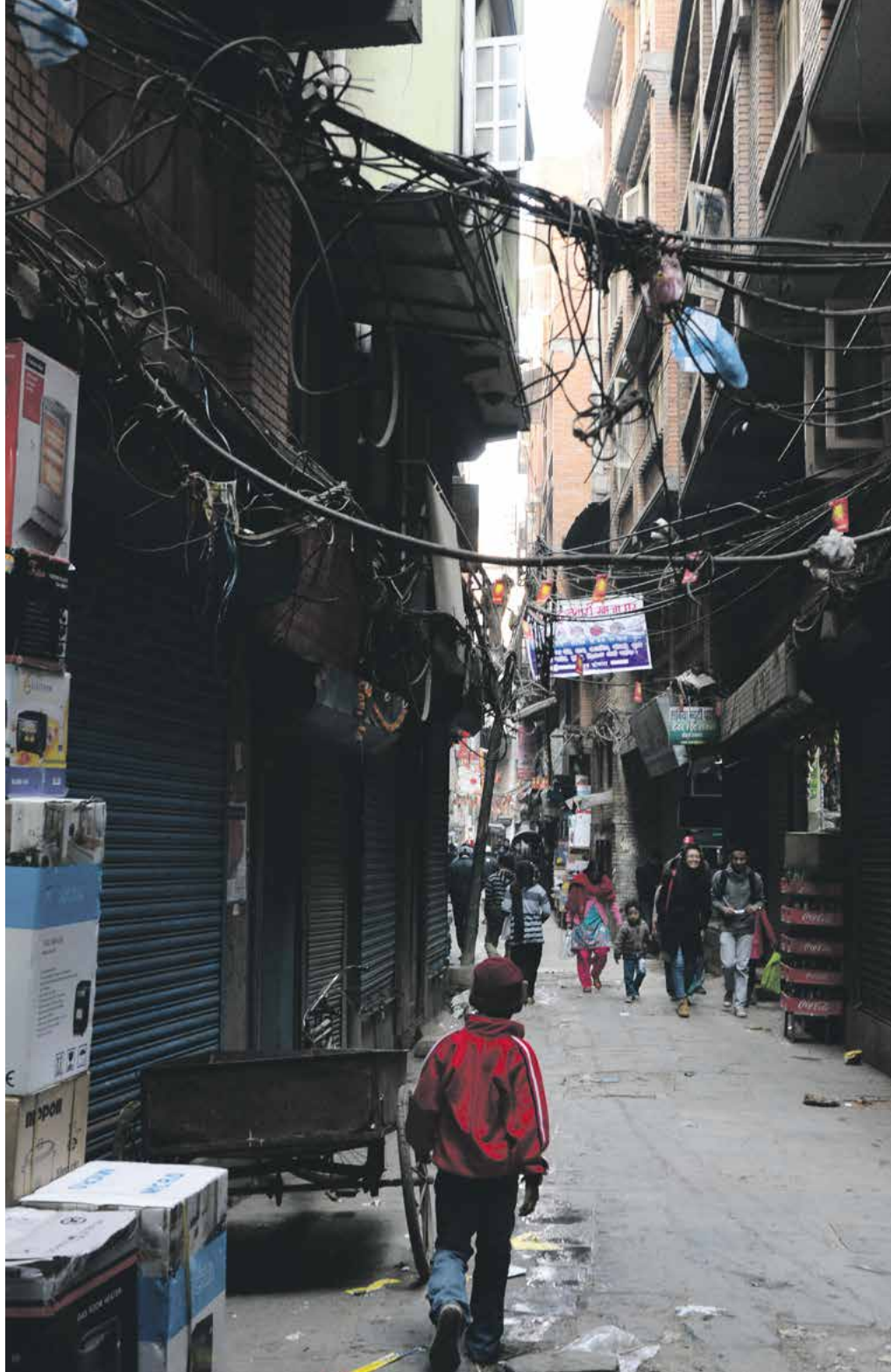
training, learning, guidelines and standards.

The evidence and wider lessons from this study will not only inform policy and operational practice within the Kathmandu Valley, but will also help to inform pilot programmes, technical guidelines, impact frameworks, monitoring and evaluation tools and roster and delegate training across the Movement in the coming years. This is essential if the Movement

The cramped, maze-like streets of central Kathmandu, District 27 are full of 'kissing houses' – a local name for buildings that lean into each other.
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and wider humanitarian sector is to meet the challenge of improving humanitarian action in urban areas through organisational change, and programme development is to be truly evidence-based and rooted in operational experience and learning.

Appendix 1: List of individuals and groups interviewed

Table 3: Individuals interviewed

Name	Strategic co-ordination	Operational co-ordination
Government of Nepal		
Bamshi Acharya	-	MoHA
Mr. Gopi Khanal	Joint Secretary	Ministry of Federal Affairs and Local Development
Chakra Pani Sharma	Under Secretary	Ministry of Federal Affairs and Local Development
Janka Nath Dhakal	Under Secretary and Head of National Emergency Operations Centre	MoHA
Suresh Prakash Acharya	Joint Secretary	Department of Urban Development and Building Code, Ministry of Urban Development
International Red Cross and Red Crescent Movement		
Becky-Jay Harrington	Coordinator, Flagship 4, NRRC	International Federation
Devendra Bahadur Pradhan	President, Lalitpur District Chapter	NRCS
Umesh Dhakal	Executive Director	NRCS
Mr. Dhakhwa	Secretary General	NRCS
Dinesh Thapa	Programme Officer, EPS, Bhaktapur District Chapter	NRCS
Ephrem Emru	Country Representative, Nepal	BRC
Mukunda B. Pradhan	President of Kathmandu District Chapter	NRCS
Pitambar Aryal	Director, Disaster Management Department	NRCS
Prajwal Acharya	Programme Manager, EPS	NRCS
Kalpana Aryal	Disaster Risk Reduction Officer	NRCS
Rajendra Rokaha	Monitoring and Evaluation Officer	NRCS

Table 3: Individuals interviewed – continued:

-	Programme Officer, EPS, Kathmandu District Chapter	NRCS
-	Secretary of EPS Project Steering Committee, Bhaktapur District Chapter	NRCS
-	Member of EPS Project Steering Committee, Bhaktapur District Chapter	NRCS
Donors and international financial institutions		
Anil Pokhrel	Disaster Risk Management Specialist	World Bank Global Facility for Disaster Reduction and Recovery (GFDRR)
Piush Kayastha	Programme Officer	ECHO
Sam Rose	Disaster Resilience Adviser	DFID
United Nations agencies		
Avani Dixit	Programme Analyst	United Nations Development Programme (UNDP)
Man B. Thapa	Project Manager, Comprehensive Disaster Risk Management Programme	UNDP
Damodar Adhikari	National Professional Officer	World Health Organisation (WHO)
Giovanni Congi	Public Information Coordinator	NRRC Secretariat
Moira Reddick	Coordinator, NRRC	Resident Coordinators Office, United Nations
Non-governmental organisations		
Scott Faiia	Country Director	International Federation
Surya Narayan Shrestha	Deputy Executive Director	Oxfam
Bhuwan Timilsina	Humanitarian and Climate Project Officer	NSET
	Humanitarian and Climate Project Officer	BBC Media Action

Table 4: Groups interviewed

Group	Participants	Gender	Organisation
CDMC, Bhaktapur District	Chair, Bakhtapur District CDMC (and Secretary of Municipality) and two members of CDMC	One woman, three men	Various
CDMC, Lalitpur District	Chair Lalitpur District CDMC and three members of CDMC	One woman, three men	Various
CDMC, Kathmandu District	-	-	Various
Bhaktapur District project staff	Participants included EPS Programme Officer, social mobilisers, community trainers, Accountant and Technical Supervisor	Four women, nine men	NRCS
Lalitpur District project staff	Participants included EPS Programme Officer, community trainers, social mobilisers and Technical Supervisor	-	NRCS
Kathmandu District project staff	16 staff	Eight women, eight men	NRCS

Appendix 2: History of seismic activity, deaths and damages in Nepal

Year (A.D.)	Deaths	Damages
1255	Estimated magnitude around 7.7. One third of population of Kathmandu killed	A lot of damage to residential buildings and temples
1260	Many people died, famine followed the earthquake	A lot of damage to residential buildings and temples
1408	Many people died	A lot of damage to residential buildings and temples, fissures developed in the ground

1681	Many people died	A lot of damage to residential buildings
1767	No record available on deaths	No record available on damage
1810	Many people died, particularly in Bhaktapur	A lot of damage to buildings, including temples
1823	No record available on deaths	Some damage to houses
1833	Estimated magnitude 7.7, 414 people died in the vicinity of the Kathmandu Valley	Nearly 4,040 houses destroyed in Kathmandu, Bhaktapur and Patan in the Valley and adjoining Banep, and a total of 18,000 buildings destroyed across Nepal
1834	No good record available	Many buildings collapsed
1837	No good record available	No damage recorded in Nepal, but greatly affected Patna and other parts of Bihar, India
1869	No good record available	No good record available
1897	No good record available	No good record available
1917 (1917?)	No record available on deaths	No record of damage available
1934	Estimated magnitude 8.3 (epicentre eastern Nepal). 8,519 people died in total, 4,296 in the Kathmandu Valley	Over 200,000 buildings and temples damaged out of which nearly 81,000 completely destroyed. 55,000 buildings affected in Kathmandu, 12,397 of which were completely destroyed
1936	No good record available	No good record available
1954	No good record available	No good record available
1966	24 people died	1,300 houses collapsed
1980	Magnitude 6.5 (epicentre far western Nepal). 103 people died	12,817 buildings completely destroyed, 2,500 houses collapsed
1988	Magnitude 6.5 (epicentre south-eastern Nepal). 721 people died	66,382 buildings collapsed or seriously damaged

Source: Upreti and Moshida (2009).

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Endnotes

[1] This process will build on Groupe URD's expertise in linking research, evaluation, learning and training through its 'Collective Learning Cycle'. For more information see http://www.urd.org/Our-mission

[2] 'The Richter scale or the local magnitude scale assigns a single number to quantify the amount of seismic energy released by an earthquake. The Richter magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs (adjustments are included to compensate for the variation in the distance between the various seismographs and the epicentre). Because of the logarithmic basis of the scale, an increase by a whole number in magnitude represents a 10-fold increase in amplitude; in terms of energy an increase by a whole number, corresponds to an increase of about 32 times the amount of energy released' (GoN 2011: 5).

[3] 'The 1998 Udayapur earthquake in eastern Nepal, illustrated the high vulnerability of these types of structures; approximately 6,000 schools were destroyed, fortunately during non-school hours.' (PDC and EMI 2005: 15). Presently, more than 60 per cent of existing school buildings are not strong enough to withstand and earthquake, risking the lives of 29,000 school children and potential injury of 43,000 (NSET 2013).

[4] Five year development plans are required of all local bodies in Nepal, but due to inadequate funding the plans are rarely put into action (Muzzini and Aparicio 2013).

[5] This built on the First National Action Plan on Disaster Management, prepared in 1996

[6] Reference to the HFA was made not only because it recommends what every country should do on disaster reduction, but also because the GoN had taken part in developing this framework and has made commitments to implement it.

[7] It should also be mentioned that Nepal's military, the Nepal Army, has been given two field hospitals to be deployed in case of disaster as a complement to its USAR capacity.

[8] Efforts to establish a central USAR training institution have stalled due to unanswered questions over its governance (i.e. whether the institution should be housed within the Nepal Army, Armed Police Force or Nepal Police). In an effort to move this agenda forward UNDP commissioned an assessment of USAR capacity in August 2012, but the resulting report has yet to gain traction.

[9] DFID is supporting the ICRC to deliver critical first aid and major incident management training to 30 hospitals in 19 districts.

[10] See NRRC Secretariat (2012a) and (2012b).

[11] The NRCS was recognised by the ICRC and affiliated to the International Federation in 1964.

[12] Kathmandu's residents generally work Monday-Friday and a half day Sunday, with many people visiting the temples on Saturday.

[13] Flagship 4 is, however, seeking to expand its learning activities in urban areas. For example, it hosted an urban symposium in Kathmandu on 3 December 2013.

[14] For an example of a Public Service Announcement on earthquake preparedness in Nepal prepared by USAID in collaboration with MoHA see http://www.youtube.com/watch?v=40nkffRC2Jw

15 The other consortium partners are Merlin, Handicap International and Oxfam. The consortium is funded under DiPECHO.

16 See 'WFP Pandemic Simulation Prepares Governments For Whole Of Society Response', available at http://www.wfp.org/news/news-release/wfp-pandemic-simultaion-prepare-governments-public-health-outbreaks

17 In relation to humanitarian action, 'crowdsourcing' refers to both directly seeking information from affected communities and the outsourcing of information management tasks to a 'crowd' of volunteers that can live anywhere, whilst 'crowdseeding' involves working with targeted people who are trained in gathering and sharing information (see OCHA 2013).

18 The triage system being used by NRCS-trained first aiders only involves two tag colours, red and green.

19 Previous urban emergencies have also shown that contingency planning processes need to take better account of the institutional and political challenges that are likely to arise in a crisis. Such questions are essential to effective institutional and actor analysis in the preparedness phase (Levine et al. 2012).

20 Legal preparedness for international disaster response is a crucial element of institutional preparedness. The NRCS in cooperation with the International Federation have published a detailed study of existing legal frameworks in Nepal for receiving international humanitarian assistance (NRCS and International Federation 2011).

21 While, to our best knowledge, a formal guideline has not been developed on civil-military co-ordination, there have been a series of discussions and workshops throughout 2010 to 2013 between major international humanitarian and military responders and national partners.

22 The Fundamental Principles of the Red Cross and Red Crescent Movement are: humanity, impartiality, neutrality, independence, voluntary service, unity and universality. For more information see http://www.icrc.org/eng/resources/documents/misc/fundamental-principles-commentary-010179.htm

23 In Haiti, there was an outflow of skilled human resources to the US and Canada within a few days of the disaster. This was not made up for by the arrival of diaspora seeking to find family members or assist the response (Grünewald et al. 2010).

24 This is important in the fulfilment of the one of the Movement's key roles in crisis situations, namely restoring family links, including through tracing and messaging services.

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