Relocalising disaster risk reduction in Boulder, Colorado

Ilan Kelman and Eric Karnes discuss the lessons learned in a disaster risk reduction relocalisation program in Boulder, Colorado, USA

Abstract

Relocalisation aims to return communities to a more local basis from their current, relatively centralised and transport-dependent systems, in sectors such as food, energy, and manufacturing. Disaster risk reduction can also be relocalised, in line with practices which involve local residents in disaster-related activities, pre-disaster such as mitigation and prevention and post-disaster such as response and recovery, rather than relying on post-event external assistance. Boulder Valley, Colorado, USA is one example of a community forming a non-profit, non-governmental organisation to prepare a Master Plan for relocalisation. This paper details the process undertaken and the phase 1 results from the Crisis Preparedness Group contributing to the Boulder Valley Relocalisation Master Plan. Lessons for disaster risk reduction within the context of relocalisation are discussed.

Background to Relocalisation

Disaster risk reduction, including pre-disaster activities such as preparedness and mitigation and post-disaster activities such as response and recovery, is best achieved at the local level with community involvement (e.g. Lewis, 1999; Twigg, 1999-2000; Wisner *et al*., 2004). Top-down guidance is frequently helpful, such as in a codified form (e.g. Australia's *Workplace Relations Amendment (Protection for Emergency Management Volunteers) Act 2003*), as guidelines and a plan (e.g. UNISDR, 2005), for standardising vocabulary (e.g. Thywissen, 2006; UNISDR, 2006), or for providing resources. Nonetheless, the most successful outcomes are seen with broad support and action from local residents, rather than relying on only external specialists or post-disaster assistance.

Examples of strong community involvement in and leadership for disaster risk reduction are Townwatch (Ogawa et al., 2005), Community Fireguard (Boura, 1998), Future Search (Mitchell, 2006), and the Safe Living Program (Hennessy, 1998). Even for post-disaster activities, many manuals suggest that people should take care of themselves for at least 72 hours without outside assistance (e.g. EMA, 2003; FEMA, 2004) although recent discussions have considered 1–2 weeks. Community teams are increasingly being trained for such purposes, such as the Community Disaster Volunteer Training Program in Turkey (http://www.ahep.org/ev/egitim5_0e.htm) and Community Emergency Response Teams in the USA (Simpson, 2001 and https://www.citizencorps.gov/cert).

To add to this portfolio of options, another approach has been developed for engaging local residents in disaster risk reduction: relocalisation. Relocalisation aims to return communities to a more local basis from their current, relatively centralised and transport-dependent systems, so that sectors such as food, energy, manufacturing, and disaster risk reduction would be minimally affected during events or conditions which reduce external links.

As with other forms of community-based disaster risk reduction, relocalisation accepts the premise that communities must be directly involved in disaster risk reduction, not relying on external assistance. Yet community-based disaster risk reduction including relocalisation does not imply excluding all external interventions. The focus, as noted above, is strong community involvement in and leadership for disaster risk reduction, not cutting off anyone and everything outside the community.

Relocalisation originated in concerns about "peak oil" and the ensuing crises from limited oil-based energy supplies. Peak oil refers to the time when the extraction rate of oil reaches its maximum and starts declining, leading to an increasingly restricted supply of oil-based energy products including petrol (e.g. Campbell and Laherrère, 1998 and Hubbert, 1956, but see Aleklett and Campbell, 2003 and Cavallo, 2004 for more recent analyses).

Consequences envisioned include reduced food supplies because lorries have limited petrol to transport supplies to supermarkets; blackouts during hot and cold temperature extremes because electricity generating plants fired by oil-based products must shut down; and emergency services being unable to respond promptly due to petrol restrictions. Social disruption is likely, as witnessed in the UK to some extent during September 2000 when fuel depots were blockaded leading to

a nationwide petrol shortage (Noland et al., 2003; Robinson, 2003). Because peak oil refers to a steadily more restricted supply, it will appear less dramatically than the fuel blockades, manifesting as a creeping change which might provide some time to adjust if warning signs are heeded.

In addition to peak oil and fuel blockades, similar energy and electricity restrictions could occur for other reasons. Examples are the four major blackouts in Europe and North America in August-September 2003, Auckland's blackout in February-March 1998, the ice storm across eastern North America in January 1998, and Hurricane Rita reducing oil supplies from the Gulf of Mexico in September 2005.

A technological breakthrough which overcomes dependence on oil-based energy products is feasible, although it would be naïve to assume that this breakthrough must happen – or that it must happen before the limitations cause crises. Relocalisation started with peak oil, but applies beyond that, to any energy-restricted society as well as to non-energy-related events and conditions.

Some commentators have criticised relocalisation as being anti-globalisation within the context of increasingly global disaster impacts and responses. This criticism contradicts the proven effectiveness of community-based disaster risk reduction efforts as referenced above. As well, the argument of increasing global disaster impacts and responses is somewhat circular in that an international disaster response and relief culture exists because comparative resources have not been invested in community-based disaster risk reduction. As one example, an Indian Ocean tsunami warning system, which would have to involved local communities to be effective, was deemed to be too expensive and of lower priority compared to addressing other threats until after the 26 December 2004 disaster (Kelman, 2006).

Relocalisation does not deny advantages of global input, such as the top-down guidance mentioned above or a perspective based on universal human rights (e.g. Kent, 2001). Relocalisation does assert, and support other complementary work, that the trend towards dependence on international response mechanisms ought to be reversed without losing the global sharing of ideas, information, and approaches for community-based endeavours.

To implement these ideas, a Relocalisation Network has started (http://www.relocalize.net) and some local groups are pursuing relocalisation plans. For example, in Kinsale, Ireland, a college project produced an "Energy Descent Action Plan" (Hopkins, 2005) while in Tompkins County, New York (Bosak, 2006) residents are developing a relocalisation plan. Neither report addresses the emergency services or disaster risk reduction in detail, suggesting a gap remaining to be filled for relocalisation.

Relocalising in Boulder Valley, USA

In August 2005, in Colorado, USA, Boulder Valley Relocalization[1] (BVR) [sic] was founded as a local residents' non-profit group to relocalise the Boulder Valley community (http://www.boulderrelocalization.org). Boulder Valley is a loosely-defined area northwest of Denver with approximately 300,000 people scattered over approximately 2,000 km^2 of the Rocky Mountains and plains of Colorado. The largest settlement is the university city of Boulder (Figure 1) with a resident population of 95,000 (U.S. Census Bureau, 2000).

Figure 1: Boulder, Colorado.

To tackle relocalisation in Boulder Valley, BVR has undertaken five sequential tasks, which were mandated at BVR's formation:

1. Define the current reality by listing the challenges faced and by inventorying resources available for tackling those challenges.
2. Consider potential scenarios and solutions for addressing those scenarios.
3. Define an achievable vision with goals to achieve that vision.
4. Develop recommendations and pathways for pursuing those recommendations.
5. Write an open source Master Plan for independent review.

The timeframe remains flexible, but the Master Plan is expected to be completed during 2008.

BVR subgroups were formed to tackle different aspects of relocalisation, including food, energy and transport, manufacturing and employment, and crisis preparedness. Each BVR subgroup is undertaking the five tasks autonomously, but regularly reporting back to each other to enable coordination and idea sharing.

1 Being based in the USA, the group's official name uses American spelling.

The work of the Crisis Preparedness Group (CPG) to relocalise disaster risk reduction is reported here. CPG defined its mandate as "providing information on and recommending actions for preparing for crises which could result from peak oil as illustrative of relocalising general disaster risk reduction". This mandate has three advantages. First, it defines a manageable task by focusing on peak oil. Second, it highlights the dependence of many disaster risk reduction activities on oil-based energy products. Third, by using peak oil as an illustrative example of wider concerns, connections with other disaster risk reduction efforts are highlighted, indicating similarities amongst solutions.

CPG thus embraces wider disaster risk reduction (see UNISDR, 2005) and adopts UNISDR's (2006) broad definition of "disaster" as "A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources". This definition is appropriate for longer time scales—for disaster conditions such as desertification and poverty—alongside traditional shorter time scales applying to disaster events such as from earthquakes and tornadoes (see Glantz, 1999; Lewis, 1999; Pelling, 2001; Wisner et al., 2004).

For CPG, Boulder Valley is defined as Boulder County because the existing disaster risk reduction structures are delineated by that boundary. This definition must be accepted loosely since other BVR subgroups have different definitions based on existing structures relevant to their subgroup; yet the Master Plan must integrate all aspects of relocalisation. For example, the official Boulder Valley School District encompasses a small part of neighbouring Gilpin County which could be included for school-related information campaigns. This loose definition is unsatisfactory, but must be accepted as the reality of Boulder Valley.

Crisis Preparedness Group: Phase 1 Results

Task 1: Understanding the Current Reality

The first of BVR CPG's five tasks was to understand the current reality, achieved for Boulder Valley through three actions: 1. inventorying disaster risk reduction resources, 2. identifying possible disaster events and conditions, and 3. describing disaster events and conditions which would be particularly affected by peak oil as illustrative of wider contexts and considerations. This section summarises the work completed.

For the first part of task 1, disaster risk reduction resources were inventoried. The City of Boulder and Boulder County Office of Emergency Management's primary responsibility is disaster response and recovery. Its pre-disaster activities are focused on training and preparing for disasters, although some overlap with mitigation and prevention is seen, such as an annual public symposium on disaster awareness. Other pre-disaster activities are scattered amongst mainly government agencies. Illustrative examples from the inventory are:

- For floods, the City of Boulder's flood management program conducts flood mitigation through activities such as awareness programmes and planning regulations.
- Municipal public health departments try to prevent disease outbreaks, for example through education programmes and disease surveillance.
- Local and regional offices of the USA's National Weather Service run awareness workshops, involve local residents in weather watching, and issue weather-related warnings across Boulder Valley.

For emergency services, law enforcement is a local responsibility, although state police patrol state and federal roads plus state and federal law enforcement services can be requested for major crises. In addition to municipal police services, university land and parkland are each patrolled by its own police. Fire services are provided municipally by paid staff for city services and by volunteers or a volunteer-staff mix for rural services. State and federal forest services are involved in tackling wildfires on land which they own. Most fire services teach fire prevention as a contribution to pre-disaster activities.

Figure 2: The Boulder Fire-Rescue Dive Team is an example of the combination of volunteer and paid groups that provide search, rescue and recovery services.

For emergency medical services, Boulder Valley is served principally by a private ambulance company and government medical centres, but other services such as private medical centres also exist. Search, rescue, and recovery services are provided by a combination of volunteer and paid groups covering technical rescue specialties. The Boulder Fire-Rescue Dive Team (Figure 2), Rocky Mountain Rescue Group, and Front Range Rescue Dogs are examples. Other non-governmental organisations involved in disaster-related activities include the local chapter of the American Red Cross and the Amateur Radio Relay League.

Information on the salaries of emergency services personnel was collected. Most salaries would make it difficult to own property in Boulder Valley's relatively affluent areas, especially the City of Boulder. A challenge exists in relocalising emergency management activities, and using those resources for relocalising all disaster risk reduction, when skilled personnel cannot afford to live in the community which they serve.

In most cases, personnel rely on private vehicles to commute to work and other vehicles for work. Exceptions to vehicle dependence occur only when essential, such as parkland police and forest firefighters operating on foot because vehicles cannot reach the locations. Bicycle-based paramedics, such as in Ohio and at London's Heathrow Airport, or bicycle-based police officers, as exemplified by the Law Enforcement Bicycle Association (http://www.leba.org), are not considered to be routine[2]; however, the City of Boulder does use a few bicycle-based law enforcement officers. As well, the back-up power system for Boulder's emergency operations centre currently uses a diesel generator rather than considering non-oil-based energy supplies.

For the second part of task 1, possible disaster events and conditions which could affect Boulder Valley were listed followed by a judgment of each disaster's estimated probability (low, medium, high) and estimated consequences (low, medium, or high). This comprehensive list proved useful for extracting the disasters which would be most affected by peak oil as illustrative of wider contexts, the third part of task 1.

In the short-term, peak oil would substantially increase the cost of using motorised vehicles while in the long-term, lack of petrol and oil would limit their use. Examples are snow ploughs, ambulances, police cars, fire trucks, and aircraft. Driver and pilot training time, along with other training such as deploying rescuers from aircraft, will also have increased expense and then become infeasible. Diesel generators for hospitals, emergency operations centres, and residences could be impacted along with lack of electricity inhibiting water supplies, indoor temperature control in hot and cold weather, and communications.

Disaster events which would be particularly exacerbated by peak oil consequences were identified as blackouts/brownouts, disease outbreaks because response relies on energy-intensive health care infrastructure, drought because that would reduce the capacity of hydroelectric systems, temperature extremes, and wildfires. Disaster conditions which would be particularly exacerbated by peak oil consequences were focused on civil disorder, economic decline, and increasing poverty.

Task 2: Considering the Options

The second of BVR CPG's five tasks was to consider scenarios and solutions to the possible disasters identified. Specific scenarios based on the inventory from task 1 were summarised (Box 1). The list is illustrative, not comprehensive.

Box 1: Illustrative scenarios to consider for relocalising disaster risk reduction

- All Events Scenario 1: Fuel and oil become increasingly rationed. How should the government prioritise who gets it?
- All Events Scenario 2: No fuel or oil is available, including for snow ploughs, ambulances, fire trucks, and diesel generators.
- Event Scenario 1: Continued, lengthy blackouts or brownouts, most likely occurring during heat and cold waves.
- Event Scenario 2: An infectious disease outbreak incapacitates or quarantines more than 20% of Boulder Valley's population for more than three days.
- Condition Scenario 1: Due to reduced precipitation, water resources in Boulder Valley are half their current amount by 2050.
- Condition Scenario 2: An energy crisis is used as a basis for eroding civil liberties, especially trying to undermine Boulder Valley's referendum-mandated "home rule" status which gives some Colorado state powers to the municipality.

The illustrative scenarios helped to identify solutions. Solutions (Table 1) were more generic than the scenarios, as they need to provide a portfolio from which possibilities could be selected, rather than implying that every solution would work for everyone all the time. Different sectors were considered for applying solutions as shown in Table 1's framework.

2 Bicycle-based firefighting could be done, but would be less realistic due to the equipment required for firefighting and fire-related rescue operations.

Table 1: Illustrative solutions to consider for relocalising disaster risk reduction

#	Category	Solutions
1A	Households	- Each family could be prepared to be on their own following an emergency for at least one week, plus considering contingencies such as their cache being put out of use or family members being separated at the time of the emergency. - Each family could be involved in prevention activities, such as making homes safer and relocalising their own food, water, and energy. - Community volunteerism which contributes to relocalisation could be increased, both by individuals making that choice to spend their time and by society including workplace support for that choice of increased volunteerism. - Local businesses and industries could be supported rather than, for example, multinational companies.
1B 1C	Neighbourhoods Local NGOs	- All neighbourhoods could have an effective Neighbourhood Association which is actively involved in relocalisation. - Community teams could be created and maintained which are modelled on Community Emergency Response Teams and Neighbourhood Watch, but which address relocalisation. - Neighbourhood communication networks could be developed and tested, for example a knock-on-door tree and designated amateur radio and satphone operators in each neighbourhood with appropriate spare equipment including spare batteries. - Emergency shelters could be established, stocked with supplies, maintained, and promoted in case housing is ruined. Examples are government buildings, businesses, schools, libraries, religious buildings, host programs to take in families, and temporary structures, such as tents and mobile homes (see also Corsellis and Vitale, 2005). - Neighbourhood caches of emergency kits could be established and maintained in locations such as government buildings, schools, libraries, and religious buildings. Contingencies would be needed in case those caches are put out of use.
2A	Local industries and businesses.	- Local industries and businesses could be better integrated into the community. Examples are providing volunteer resources in terms of staff time, goods, and services and/or donating a percentage of profits to relocalisation initiatives.
3A 3B	City County	- Building, land use, and planning regulations relevant to relocalisation could be promulgated, monitored, enforced, and evaluated. Examples are more stringent energy efficiency rules for buildings, denying access to many roads for private motor vehicles, and increased use of green space for growing food. - Disaster-related systems, such as emergency services, which address relocalisation could be maintained. Issues to tackle include ensuring that skilled personnel can live locally and considering alternative transportation modes such as bicycle- and foot-based emergency services in neighbourhoods. - School programmes could introduce students to relocalisation. - "Home rule" could be reinforced and strengthened.
All	All	- Public awareness messages could be increased, both in the media and in public areas such as parks, libraries, and recreation centres. - An annual Relocalisation Day could be enacted in offices, schools, and public places to reinforce messages and to provide a focus for newcomers to become involved. - Product and service dependency on the non-local energy and transport sectors could be reduced. - Supporting locally-based independent media could provide opportunities for engaging the community in relocalisation. - Off-grid energy supplies for buildings could be implemented, in particular active and passive solar and small-scale wind turbines. - Other communities around Boulder Valley and beyond could be encouraged to implement these solutions too so that they would not try to depend on Boulder Valley during a crisis.

Categories 3A and 3B are officially separate, but act together for all the disaster risk reduction activities undertaken by the City of Boulder and Boulder County Office of Emergency Management. As well, since BVR's scope is Boulder Valley, encompassing the city and county, public sector tasks should be completed at both levels in a coordinated manner. Therefore, although these categories are legally separate, they are combined for Table 1. Similarly, 1B and 1C could be separated, but neighbourhoods have limited options for acting without some form of organisation which has led to Neighbourhood Associations acting as local NGOs.

Scope exists for non-local levels to be added to Table 1, namely non-local NGOs, non-local industries and businesses, and state, federal, and international organisations. Since the tenet of relocalisation is that solutions should be implemented at the local level, non-local contributions should be implemented by Boulder Valley without fostering reliance on non-local groups, especially reliance during and after a disaster. To encourage and emphasise local solutions, appropriate non-local support should be channelled through a local category from Table 1.

Many of the solutions in Table 1 have a well-established basis to draw upon if that solution were selected. As one example, if volunteerism were chosen as a focus, then Fahey et al. (2002), Millican (1997), Howard (1999), and Reinholtd (1999-2000) provide helpful background along with special volunteer-related issues of the *Australian Journal of Emergency Management* (vol. 18, no. 4 and vol. 20, no. 4).

Task 3: Vision and Goals

The third of BVR CPG's five tasks was to articulate visions and goals for which to strive, completed by describing what should ideally be reached along with parallel, realistic statements which have a good possibility of being reached. Reaching even the achievable visions and goals will not be simple and will require detailed plans.

The ideal visions are:

- No external help is needed in a crisis.
- No reliance is placed on top-down approaches for disaster risk reduction. Instead, it starts with individuals and households and moves up, requesting top-level support when needed.
- All disaster risk reduction actions are initiated and completed within Boulder Valley, requesting external support when needed.

The achievable visions are:

- No external assistance is needed in a crisis for at least one week.
- An adequately staffed and resourced mixture of volunteers and professionals exists for disaster risk reduction including emergency response.
- All Neighbourhood Associations, including Neighbourhood Watch groups, are connected and are addressing disaster risk reduction.
- A Boulder Valley Relocalization Team Program is created, including identifying all skills and skill gaps within each neighbourhood along with a plan to fulfil needs.

The ideal goals are:

- 100% of households have an adequate emergency cache and emergency training.
- 100% of the population is trained in relocalising disaster risk reduction and implements those skills for pre-disaster activities.
- 100% of newcomers are ready for a crisis within two months of arrival.

The achievable goals are:

- 75% of households have an adequate emergency cache and emergency training.
- 75% of the population is trained in relocalising disaster risk reduction and implements those skills for pre-disaster activities.
- 75% of newcomers are ready for a crisis within two months of arrival.
- People with disaster risk reduction skills can afford to live in Boulder Valley where those skills are needed.
- Normal installation and maintenance activities factor in disaster risk reduction.

Lessons and Conclusions

Three main lessons are evident from this work. First, in Boulder Valley, disaster risk reduction activities appear to assume the availability of unlimited oil-based energy products, especially petrol and oil for vehicles but including oil-based fossil fuels used for electricity generation. This assumption should be revisited and disaster risk reduction should explicitly tackle peak oil related events.

An example is from the Boulder Valley emergency services who, in informal interviews, indicated that their operational plans include the ability to adjust their response depending on resource availability. The interviewees stated that if personnel or equipment are unable to reach a site, for any reason which could include oil restrictions, then the incident commander should reassess the resources available and adapt operations based on that assessment.

From a wider disaster risk reduction perspective, such plans are a commendable start, but it would be equally important to anticipate reasons why resources might not be available and, if possible, to counter those reasons before the emergency strikes. As illustrated by CPG's task 2 results, solutions exist to contribute towards reducing the impacts of expected disasters. Task 3 demonstrates that visions and goals can be developed to implement those solutions. These results are useful for removing the assumption of unlimited oil-based energy products from disaster risk reduction activities without losing focus on wider disaster risk reduction.

The second lesson is that implementing more generic solutions, rather than focusing on specific perils or single scenarios, can be advantageous for relocalising disaster risk reduction. Examining scenarios related to or exacerbated by peak oil led to solutions which would be helpful for, and which have been promoted for, scenarios not related to peak oil. Yet peak oil should not be abandoned. Starting from that basis, BVR has prompted more Boulder Valley residents to contribute to disaster risk reduction efforts. These contributions apply to disaster risk reduction beyond peak oil. Relocalisation is one more approach to be added to already-successful techniques of community-based disaster risk reduction.

Third, principal advantages and disadvantages of relocalisation are evident. The main advantage of relocalising disaster risk reduction is noted in the second lesson, that it reinforces the already-established approach of developing local skills and capabilities for disaster risk reduction. Relocalisation should complement, not supplant, other approaches. As also noted for the second lesson, relocalisation engages residents concerned about an energy-restricted society, placing those concerns in the context of all disaster risk reduction activities—a useful technique for motivating support for community-based approaches.

The initial focus on peak oil, though, could become a disadvantage. Disaster risk reduction and community-based disaster risk reduction are not just fossil fuel issues. A danger exists that temporarily falling oil prices, or a technological discovery overcoming some energy concerns, could cause interest to wane in relocalising disaster risk reduction if it were based on only peak oil. While peak oil is useful for initially engaging some residents, it should not be relied on to retain that interest. Instead, a wider perspective of relocalising disaster risk reduction irrespective of peak oil should be promoted.

Another potential disadvantage of relocalisation is becoming too caught up in the local community and neglecting positive external influences. As noted from experience with other community-based disaster risk reduction efforts, relying on only post-event external assistance is unhelpful, but top-down external guidance can be useful for pre-disaster activities. As well, it would be difficult for all communities to provide all forms of highly specialised medical services, so collaboration with key centralised medical centres would need to be maintained if a high standard of these specialised medical services were deemed to be important. Relocalisation must be careful not to become isolationist, exclusionist, or survivalist.

Nonetheless, an advantage to consider from relocalisation is the longer-term results of increased orientation towards one's community. Community-based tasks apply not only to disaster risk reduction, but also to other sustainability aspects. Any links forged through relocalising disaster risk reduction, even if focused on peak oil, help to lay the foundation for increased relocalisation in other sectors and thus to contribute over the long-term to more sustainable communities.

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