The Built Environment Professions in Disaster Risk Reduction and Response: Supplement

Ripin Kalra

TEN NOTES ON GOOD PRACTICE FOR BUILT ENVIRONMENT PROFESSIONALS
on
DISASTER RISK MANAGEMENT AND RESPONSE
May 2009 Draft

INTRODUCTION

These notes have been produced by the Development from Disasters Network (DFDN) as a supplement to the *Built Environment Professions in Disaster Risk Reduction and Response: A guide for Humanitarian Agencies,* referred to below as the Guide. They provide additional guidance for good practice for the built environment professions and should be read in conjunction with the Guide.

The notes are intended to outline principles of good practice in the application of built environment professionals' skills in disaster risk management, whether in pre-disaster planning and risk mitigation, in damage assessment in the period immediately following a disaster, or in planning and executing the longer term recovery and reconstruction to achieve broader development goals.

The name, Development from Disasters Network, reflects a belief that reconstruction in the period following disasters offers an opportunity, often missed in practice, to improve the conditions of affected communities – not only to reduce their vulnerability to future disasters, but to improve their basic lives and livelihoods. Reconstruction should be about development.

Note 1

PRINCIPLES

While the focus of built environment professionals is with the reconstruction of buildings and settlements following disasters, in line with the international humanitarian community as a whole, the linking of humanitarian and development concerns must be mainstreamed across the whole range of disaster management issues. In particular, it must be integrated into the international efforts at disaster risk reduction as set out in the UN Framework for Action 2005-2015: *Building the Resilience of Nations and Communities to Disasters*, adopted at the Hyogo Conference in 2005.[1]

Three key principles to guide built environment professionals in overall disaster risk reduction and management, as well as in post disaster response[2]:

1. Development or intervention before, during and following recovery should be driven by the wishes and needs of local communities affected by the disaster, including the right to return.
2. The development process should be transparent and ensure financial accountability, with funds distributed to the lowest practical level. It is vital that external funding is allocated in ways that reach local communities and organisations.
3. Development should be comprehensive and long-term and rebuild lives, not just houses and infrastructure. Support is needed for income generation, rebuilding

[1] See the Guide, p9

[2] Adapted from the basic principles of the Development from Disasters Network <www.developmentfromdisasters.net/content/view/15/49/>

social support networks, activities essential for maintaining cultural identities, and reviving, restoring and conserving the often protective but vulnerable ecosystems where communities live and work.

These principles require approaches to professional engagement based on partnership, teamwork and flexibility

Partnership

Central to the effectiveness of any such assistance in both the mitigation of natural disasters and recovery after a disaster is the establishment of partnerships between households, communities and local government, and the agencies, organisations and professionals assisting them. Experience has shown that effective disaster preparedness and lasting recovery and development following natural disasters can only be achieved and sustained with the full participation of *all* the actors and stakeholders over a prolonged period of time. Effective partnerships depend on understanding the skills, assets, ambitions and roles of each partner by each partner. The development of two-way communication and trust between all of them maintaining transparency and mitigating wasteful spending to ensure resources are spent where required.

Understanding and teamwork

Whilst these principles underpin any development process, including the introduction and implementation of disaster mitigation measures, they are made more acute in the aftermath of a disaster, which brings together a wide range of new actors in a very short space of time to respond to the recovery and response in the unfamiliar conditions of emergency. There is no time for the traditional trial, error and testing processes of partnership formation. There is a need for immediate decisions and action led by informed leadership that will have long-lasting consequences for those most affected. ‘External’ advisors should understand the social and economic context within which they are working. They must also be familiar with the skills, assets and resources of their partners and be able to work in a team, which, on the local side, may be sadly depleted by damaged physical and administrative infrastructure as well as injury, death or trauma affecting its personnel. Even so, in the aftermath of a major disaster, communities and individuals can show extraordinary resilience.

Resourcefulness and flexibility

In addition to the principles of community participation and partnership and the importance of multi-disciplinary teamwork and inter-disciplinary cooperation by the different built environment professionals, outlined below, it is recognised that in many post-disaster situations it is not possible to assemble the ‘ideal’ team of technical and professional advisors. This requires a degree of ‘professional resourcefulness and flexibility’ that may go beyond the tenets of conventional practice.

The role of practitioners engaged in disaster-related work goes well beyond that of their technical competence. Partnership and teamwork are at the heart of their task. They have to engage in the ‘politics of development’ in support of their partners and clients and take on institutional and organisational capacity building activities in addition to skill training and human resource development.

Definition of a disaster

In humanitarian practice and in this document, the term 'disaster' is used to refer to the impact of different physical, social, economic, political and complex hazards on vulnerable communities. It includes, therefore, not only disasters associated with extreme natural events such as earthquakes, hurricanes or volcanic eruptions, but also disasters due to war and civil conflict, displacement due to political violence and development projects such as large dams, and disasters due to the collapse of existing social welfare systems as a result of wider economic and political changes. As such, the term disaster is used here in a much wider sense than the conventional definition of 'natural disaster' used by natural scientists and engineers and is broadened to encompass other types of disaster such as complex emergencies and economic crisis.

A significant part of development assistance is spent on the construction of infrastructure in developing countries. However, these investments and associated development gains can be lost in seconds in the event of a hazard event. The majority of human and direct economic losses from a hazard event occur as a direct result of damage to the built environment and/or ineffective early warning and evacuation systems. The negative impact of hazards on communities can be limited by taking such hazards into consideration when selecting sites, designing new infrastructure and strengthening existing infrastructure.

UNISDR website[3]

Note 2

POVERTY AND VULNERABILITY

Disasters are a result of an inability to cope with the magnitude of a natural or human-made phenomenon, often out of poor regard for well-established principles of safety such as safe buildings and appropriate location of settlements. Disasters are only symptomatic of a deeper social, economic and cultural malaise. Some populations, particularly those who are economically poor and socially weak, may not have an alternative but to settle in risk-prone sites and build without knowledge or access to adequate technical advice. People often ignore technical advice and regulatory guidance out of sheer lack of awareness or if they appear time consuming or expensive to obtain. On the other hand people may also resign to living with risks if they perceive no other choices are open to them.

To add to economic vulnerability, climate change is increasing exposure to environmental hazards. The destruction of fragile houses and economies following cyclones, earthquakes and other disasters, adds yet another barrier to the ability of the poor and vulnerable to improve their lives and their contribution to development. A growing understanding of climate change impact has identified natural disasters particularly extreme flooding as an increasing risk for developed as well as emerging countries. Carbon emissions in the more affluent parts of the world are likely to impact most seriously on communities in other parts of the world.

[3] UNISDR website. <www.unisdr.org> (See also *UNISDR Terminology on Disaster Risk Reduction (2009)* in Folder 5 on the Resource CD)

Disasters tend to hit the poorest hardest, as they are often made vulnerable by their social and economic circumstance, lack of access to education and other basic services and resources. Any approach to planning and disaster preparation has to tale this into account.

Natural disasters focus local and international attention in ways that might otherwise be ignored or regarded as a low priority. They bring in human, financial and material resources which otherwise may not be available and in doing so provide opportunities to 'build back better'. This requires a co-ordinated effort to identify and address locally perceived and expressed needs in as efficient and sensitive a way as possible.

Experience has shown that the public of affluent countries are extremely generous in responding to humanitarian crises. This places an enormous responsibility on all professionals working in disaster-related programmes to work together in ways which can respond to and maintain such positive responses. The 'Hyogo Framework' outlines how the different stakeholders: international agencies and NGOs, national and local civil society organisations, national, sub national and local government can play a role in creating development from disaster.

Note 3

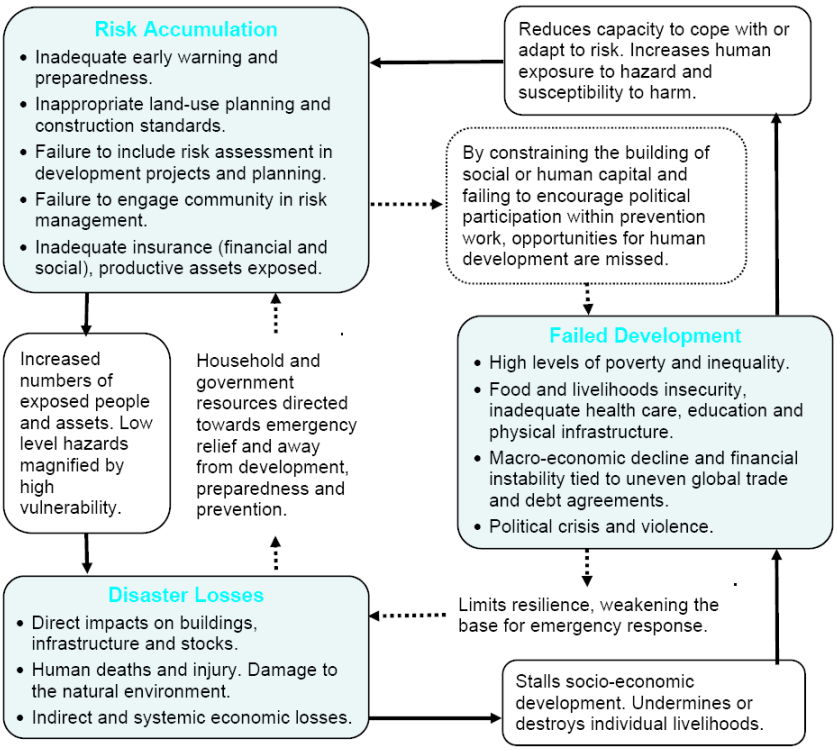
DISASTER RISK MANAGEMENT AND DISASTER RISK REDUCTION

Disasters cause losses and disruption to vulnerable communities generating a need for humanitarian assistance. At the same time, however, disasters are also unique opportunities for physical improvement and for introducing technological innovations, which can enable reconstruction of communities and livelihoods on an improved and sustainable basis and the reduction of future risks.

Unfortunately, the relationships between disasters and development still tend to be overlooked by development and humanitarian agencies alike. Many development agencies fail to build risk reduction strategies into their projects, inadvertently increasing risks. For their part, humanitarian agencies often fail to use emergency relief and assistance in a way that transforms disaster into development and facilitates the reconstruction of sustainable communities and livelihoods.

The two-way links between disasters and development can take the form of 'vicious spirals', such as the two shown in Figure 1. The anticlockwise spiral shows development failures undermining capacity to cope and increasing exposure to hazard. Without effective risk reduction measures, dangers to people and assets are magnified, in turn increasing the likelihood and severity of disaster. Failure to mitigate avoidable disaster risk leads to direct disaster impacts such as damage to housing or infrastructure, in turn holding back development and undermining livelihoods.

Figure 1 – Vicious spirals of disaster risk and development failure

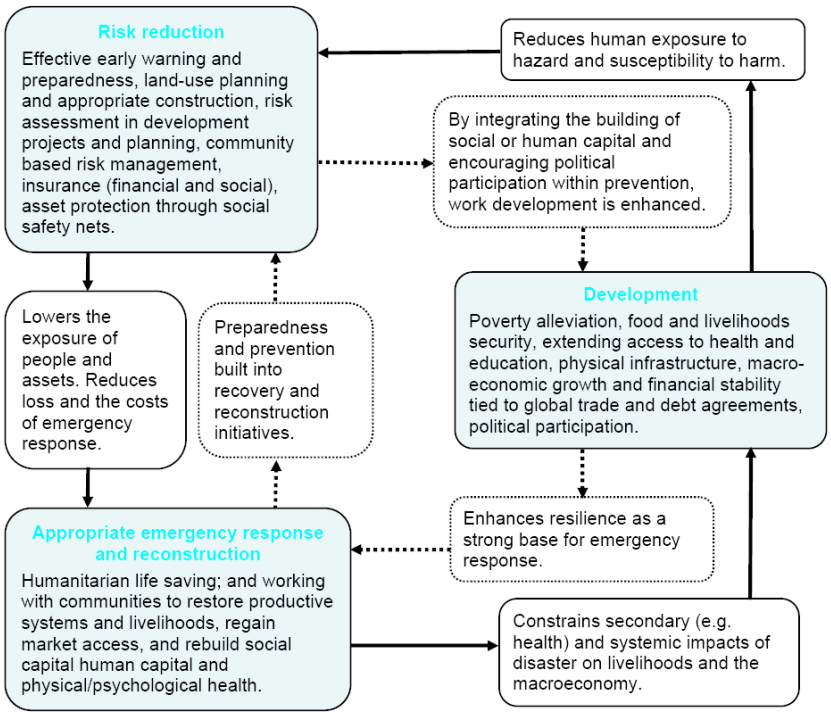


Source: Adapted from Disaster risk reduction: a development concern, DFID 2005, P4 [4].

Figure 2 is a response to Figure 1. It outlines the possibility for 'virtuous spirals' of development and disaster risk reduction backed up by timely and appropriate disaster response. In the anti-clockwise circuit development mainstreams disaster risk reduction so that exposure and susceptibility to harm are minimised, and this is matched by the integration of development into disaster response so that losses are contained. In the clockwise loop, development provides a basis for strong emergency response, and a unique opportunity to reinforce disaster risk reduction in the process of reconstruction, in turn providing a more secure environment to enable and protect development gains.

[4] DFID, (2005). *Disaster risk reduction: a development concern*. London: Department for International Development. Downloadable from: <www.dfid.gov.uk/Documents/pdf_misc/disaster-risk-reduction.pdf>

Figure 2 – Virtuous spirals of disaster risk reduction



Source: Adapted from Disaster risk reduction: a development concern, DFID 2005, p5 [5].

Note 4

WHERE TO FOCUS: PREPAREDNESS, MITIGATION or RECONSTRUCTION

Factors such as global climate change and urbanisation are occasioning a dramatic increase in the risk of loss of life, livelihoods and property when natural disasters strike. The Intergovernmental Panel for Climate Change (IPCC) estimates that world-wide the losses from natural disasters particularly flooding, cyclones and earthquakes will exceed $300 billion a year by 2050. Currently, world-wide losses in infrastructure are nearly $10 billion annually with loss of houses, roads, bridges, hospitals, schools, power grid components, airports, ports and public facilities and damage in poorer countries much more difficult to recuperate as funds are diverted from regular economic development into recovery.[6]

Those hardest hit are poor households and communities with the least resources with which to prepare and protect themselves against disaster or to rebuild their lives afterwards. They can benefit from professional, technical, managerial, financial and institutional assistance from a wide range of government, non-governmental and international organisations and agencies.

---

[5] Ibid

[6] Freeman, P. et al. (2003). 'Being prepared', in *Finance and Development*, September. Downloadable from: <www.imf.org/external/pubs/ft/fandd/2003/09/pdf/freeman.pdf>

The recent 'Mind the Gap' study[7] found that reconstruction after major natural disasters often takes far longer to progress and is less effective than might be anticipated because of major gaps in the institutional framework. Furthermore, development opportunities to reduce risk and improve lives are being lost. Empirical evidence shows that reconstruction funding has to be raised in a relatively short span of time and the window of opportunity can be fairly limited and inadequate. This puts severe limitations on understanding the full magnitude of funding and expertise required and often too little is obtained. Moreover, the funding has to be spent in a short span of time leaving little for the capacity building, operational and longer-term development. In large disasters, budgets worth several decades of spending in normal times are spent over a short span of time overwhelming the people, the supply of resources, the administration and impeding a proper understanding of the full impact of the reconstruction investment. These factors are another reason for international institutions, governments and humanitarian organisations to focus their attention on more cost-effective disaster prevention and risk reduction measures.

Note 5

FRAMEWORK FOR INTERNATIONAL STANDARDS

Since the 1990s, natural disasters, poverty and climate change have been understood to be inter-related and common issues. As a result, global momentum to share knowledge and expertise has increased, resulting in common approaches to policy and ways to act upon the problems of vulnerability and mitigation.

In terms of accepted international policy 'The World Conference on Disaster Reduction' held in January 2005 in Kobe, Hyogo, Japan, adopted the present '*Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*'. The Conference provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks to hazards. It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters.

The conference adopted the following five priorities for action by national governments and international humanitarian agencies:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels

[7] Max Lock Centre, (2006). *Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief*. London: RICS. Downloadable from: <www.developmentfromdisasters.net/content/view/1283/80/> (See Folder 3 on the Resource CD)

These priorities set the strategic framework for all the disaster-related activities of humanitarian and development agencies. The Guide (Box 1, p9) shows how built environment professional can contribute to meeting these priorities. Professionals also need to be guided by the *'Sphere Humanitarian Charter and Minimum Standards in Disaster Response'* collated by a number of international charities sets out for the first time what people affected by disasters have a 'right' to expect from humanitarian assistance.[8]

Note 6

FRAMEWORK FOR COLLABORATION

Managing development after disasters or planning and regulating any large-scale development makes special demands for collaboration between the built environment professionals involved. The key professions of architecture, civil engineering, surveying and urban planning, together with municipal engineering, transport planning, urban design all provide essentially complementary expertise. Project management and co-ordination roles are critical, although the context of disaster management, particularly in developing countries, there is a limited opportunity for traditional, technocratic and top-down management methods.

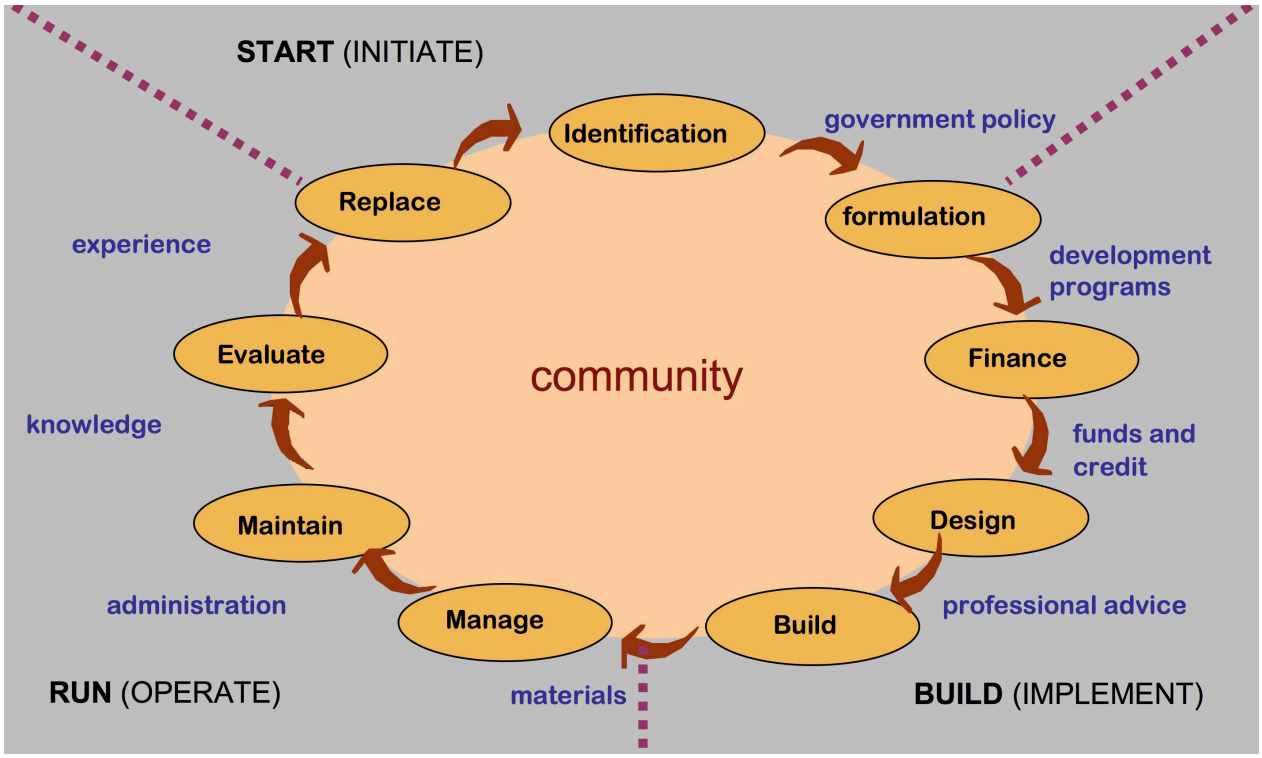
The planning, design, operation and replacement or renewal of elements of the built environment after a disaster is often a long-term and fluid process that requires a variety of skilled professionals within and outside the built-environment disciplines to be engaged according to need or the requirement of 'sustainability' and 'design quality' packages.

Particularly in countries where sophisticated project management tools and standards are limited, it is all the more important to ensure that building, infrastructure and land development projects are addressed within a project management cycle that is centred on the needs of affected communities (see figure 3). This in turn should be related to consideration of the broader sustainable development concerns in disaster-prone regions – the disaster risk management and response spiral – highlighted in the Guide.[9] It is also critical that such planning is informed by a 'whole life' or 'life cycle costing' approach to ensuring environmental sustainability.

[8] Sphere project website <www.sphereproject.org>

[9] See the Guide p16-17

Figure 3 – Project management cycle (source: Max Lock Centre 2005)



Note 7

SUSTAINABLE RELIEF AND RECONSTRUCTION

The built environment professions are facing a fundamental paradigm shift requiring them to deliver measures that ensure sustainability, reduce vulnerability to natural disasters and identify ways of reducing the causes of climate change. There are five pillars to this new paradigm are referred to here under the acronym SCORE:

- ***S*ustainable development standards:** Measurable standards ensure that the built environment will enhance and sustain social, economic and environmental benefits and minimise exploitation of natural resources. As, in general, the built environment contributes between 40 and 50% to carbon emissions, such standards are rapidly being introduced across the developed world. In developing countries, professionals need to familiarise themselves with cost-effective ways of reducing resource use in building construction and management.
- ***C*ollaboration:** Built environment professionals need to collaborate with other disciplines to ensure that the social, economic and ecological principles and practices are carefully implemented.
- ***O*wnership and consultation:** The scale of adaptation and mitigation necessary for natural disaster preparedness is vast and without the active participation of the people in general it cannot be achieved and the process of building with safety will not get embedded in day-to-day practice.
- ***R*educing resource use and carbon emissions:** There are increasing commitments across the world to minimise the emissions of greenhouse

gases. Providing renewable energy and producing designs that consume less energy and resources and produce less waste are vital to achieving a low carbon future.

- ***E*nvironmental assessment and simulation:** Making best possible use of computer-based tools in Environmental Impact Assessment to measure impacts and inform design solutions (e.g. BREEAM in the UK, LEED in the USA[10] – explain in a footnote) and to simulate the impact of existing and new developments particularly in response to natural forces such as cyclones, earthquakes and flooding.

UN-HABITAT has recently agreed a new *'*Strategic Policy of Human Settlements in Crisis and Sustainable Relief and Reconstruction Framework*'*.[11] The Framework is partly a response to the gap between disaster relief efforts and longer-term reconstruction and recovery identified in the *'Mind the Gap'* report.[12] It emphasises the point that well-executed, planned and financed reconstruction can contribute to the larger goal of sustainable development in several key ways:

- It can reduce the risk of future hazards becoming disasters and strengthen the resilience of affected communities;
- It can reduce the overall vulnerability and improve on the general conditions and quality of life of affected communities that existed before the disaster struck ('building back better');
- It can address the ever more pressing issues of environmental sustainability, through incorporating greater efficiencies in resource use, reducing carbon emissions and adapting to climate change.

UN-HABITAT's Sustainable Relief and Reconstruction (SSR) Framework suggests that 'sustainable recovery in human settlements is a process combining the following key elements[13]:

- Bridging the gap between emergency relief and sustainable development.
- Integration of mitigation and vulnerability reduction into sustainable development and recovery.
- Creating appropriate human settlement conditions for facilitating the transition from emergency to sustainable development.
- Building and engaging capacities at all levels; in all sectors and of all actors to be a priority from the earliest stages and throughout the process.

It identifies the key thematic areas of Sustainable Relief and Reconstruction as:[14]

- Disaster mitigation and vulnerability reduction

[10] BREEAM: The BRE Environmental Assessment Method <www.breeam.org/>; LEED: Leadership in Energy and Environmental Design Green Building Rating System developed by the US Green Building Council <www.usgbc.org/>

[11] UN-HABITAT, (2008). *Humanitarian Affairs, and the role of UN-HABITAT.* Nairobi: UN-HABITAT (See Folder 5 on the Resources CD)

[12] Max Lock Centre, op. cit.

[13] UN-HABITAT, op. cit. p21 (See Folder 5 on the Resource CD)

[14] Ibid. p22

- Land and property administration
- Longer-term shelter strategies
- Economic recovery
- Participation and good governance
- Partnerships
- Capacity building.

Note 8

USE OF LOCAL SKILLS AND RESOURCES

In low income developing countries, and in the poorer regions and districts of middle income developing countries, low income households and communities are rarely able to afford the services of professionals. In addition, the availability of built environment professional expertise in remote locations is invariably limited and, in the poorest regions such expertise is non-existent.

In these cases, international humanitarian and development agencies need to strategically mobilise, leverage and make the best use of the scarce human skills and resources that do exist. Built environment professionals need to be aware of the requirements for 'knowledge transfer' for, including actively engaged in training the builders, artisans and householders who will keep the buildings and infrastructure well managed and maintained and cost-effective and reduce risk from future natural hazards. Experience shows that reconstruction can sometimes increase vulnerability rather than resilience, as assets are built in the context of a lack of knowledge of local appropriateness, a limited time frame, poor skills and not enough investment in maintenance.

The available resources may take the form of local builders and skilled tradesmen or it may simply be self-build by the disaster survivors themselves. In either case, or in combination, it is important that best use is made of established modes of construction, locally sourced materials and local knowledge of these. Where technological innovation is required, for example to increase the resilience of reconstructed buildings and infrastructure to the natural hazards, it is better to adapt existing methods and extend existing skills through training programmes than to ‘import’ new and unfamiliar technologies. It must be borne in mind that training and maintenance are long-term strategies as ‘trained’ personnel and users of buildings can move to new locations taking their knowledge with them. A high mobility of the construction workforce can be an important factor in increasing vulnerability, but also an asset in rapid response.

Introducing wholly unfamiliar forms of construction as a 'quick fix' (particularly those dependent on imported material and components) are often culturally inappropriate or difficult to assimilate. As a result, they may be subject to neglect and lack of maintenance and prove unsustainable in the long term.[15] The strategic use of limited

[15] Max Lock Centre, (2005). *Rough Guide to Community Asset Management*. London: MLC Press, University of Westminster

professional expertise in this situation should be directed towards co-ordinating the local skills and non-professional human resources that are available, and leveraging and enhancing this through the design and delivery of appropriate training programmes.

Note 9

RECONSTRUCTION AND RESILIENCE – THE LONG TERM CHALLENGE

As discussed previously, ‘prevention’ and mitigation are invariably more desirable and cost-effective than reconstruction. They have the added advantage that ‘prevention’ can help to alleviate poverty and some of the impacts of climate change through appropriate planning, construction and skills development. Prevention, by definition, is community-based, with funding and enhanced skills retained within the community, while reconstruction can often draw funds away from poverty reduction programmes and other social and economic priorities. However, considering the scale of recent natural disasters, although mitigation remains the goal, reconstruction is likely to remain high up on the humanitarian agenda.

A variety of tasks need to take place in succession in the immediate aftermath of any disaster. The scale of the reconstruction often requires assistance to be provided in difficult conditions, on a large scale and in a timely manner over an extended period of time, sometimes extending for more than 10 years. In recent experience of assessing and delivering reconstruction assistance, procurement and co-ordination have been singled out as major problems in managing this process.

During the reconstruction process, the quality and nature of assistance can be very difficult to control as international agencies, government agencies, local government organisations, NGOs, self-help groups and individuals all provide development assistance of varying magnitudes and at various times over the course of the reconstruction process. It has been observed that the presence of external agencies is at its peak up to 4-5 years after a disaster, after which it declines sharply. Beyond this term usually only a handful of agencies are still operating at grassroots level although issues with construction and maintenance continue to arise.

Where a suitable administration is present, special agencies with the specific mandate for reconstruction are commonly created to plan and deliver the 'formal' reconstruction assistance provided by international and government sources. Their role is to project manage the planning and delivery of the reconstruction effort until it is completed. The role of NGOs and self help groups and individuals is more difficult to manage and the objectives and quality of professional input can vary enormously in accordance with the mandate and resources of the agency employing them.

Though extremely important, consultative planning and design in the immediate aftermath of a disaster can be very difficult because the will of communities and individuals to rebuild their lives co-exists with a sense of loss, trauma and disbelief. Anecdotal evidence from professionals working in reconstruction often shows that traditional building technology is commonly blamed for the loss of life and property

and becomes out of favour for reconstruction, often with some justification. New technologies are preferred and often demanded for reconstruction as they are considered 'safer', despite evidence such as the tragic collapse of schools built using concrete slab structures in the recent earthquakes in Kashmir, Pakistan and China .

Professionals ultimately need to ensure that during the technology selection and design process the designs of new built assets are tested for their resilience over a 10-20 year time-scale.

The preparedness and recovery strategy of communities has to be focussed on people who have a long-term involvement in development and prevention of further disasters. Cost-effective operation and management of the built environment strongly relies on the participation and co-ordination of its users, communities and local administration.

As pointed out above, experience shows that the physical presence of external agencies with a direct interest in the economic, social and environmental reconstruction drops off considerably 3-4 years after a disaster and particularly when the physical assets such as housing are completed and inhabited. There is a defined need for technical assistance beyond the handover period to monitor and assist in the maintenance and management of the assets created in many cases using a wide palette of technologies. Although there are a few instances of agencies with a deliberate mandate to be engaged in a disaster zone 4-5 years after the disaster to fill in the gaps left by other agencies, this is still an area that needs to be established within current reconstruction practice with better professional input.

Note 10

REGULATORY FRAMEWORKS AND LONG TERM MONITORING

Planning and building standards and regulations, together with administrative procedures, such as processing development applications and transfers, exert an enormous influence on the ability of people to access legally sanctioned land, shelter and services. This regulatory framework is the result of individual and collective efforts of professionals involved in the built environment over many years. In many developing countries, such norms were introduced or revised under colonial rule and many such norms remain on the statute books decades after independence.

In many cases, the regulatory frameworks were designed to meet the needs of a small urban elite and not those of the local population. Even countries not subject to colonialism often adopted standards; regulations and procedures from more urbanised or developed countries. However, such norms impose costs in terms of finance and time as well as uncertainty and this may make it virtually impossible for many people to comply. The result is a massive incentive to develop land in ways that bypass official statutory requirements.

Research in several countries[16] has demonstrated that regulatory audits can provide

[16] See Payne, G. and Majale, M., (2004). *The Urban Housing Manual: Making regulatory frameworks work for the poor*. London: Earthscan.

a useful basis for assessing the extent to which planning or building standards, regulations or administrative procedures need to change in order to facilitate planned and secure development. In most cases, it has also shown that administrative procedures constitute the greatest single barrier to affordable legal development. This is often because the number of departments and steps involved in processing applications, together with the time involved and the uncertainty over the eventual outcome, is counter-productive and actually encourages non-conformity.

Post-disaster situations do, however, provide an opportunity to remove unnecessary regulatory barriers to equitable and acceptable development based on locally expressed needs and priorities. It is vital that all professionals engaged on development from disaster programmes therefore assess options for revising the regulatory framework in ways that can influence development under less onerous conditions.

Longer-term impacts of the adaptation, reconstruction and regulatory process must be undertaken to weed out problems and maintain a focus on building preparedness. It is estimated that less than 5% of agencies and professionals return to the site of a natural disaster after the initial building work is over. Maintaining a long-term view and recurring presence in the area will build confidence and ensure people can continue to generate a safe and sustainable built environment.