Disaster Management Lifecycle

Disaster Resilience in the Built Environment

Learning Package 3: Disaster management lifecycle

Working in collaboration with ORBEE

Disaster management lifecycle

In this section you will:

- *Work to define the key stages of pre-disaster planning and post-disaster recovery*
- *Learn more about the role of built environment professionals in the different phases of disaster management*
- *Read about post-disaster reconstruction as a window of opportunity to address disaster risk*
- *Check what you have learned so far with reflective exercises*

Introduction

The process of disaster management is commonly visualised as a two-phase cycle, with post-disaster recovery informing pre-disaster risk reduction, and vice versa. The disaster management cycle illustrates the on-going process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. The significance of this concept is its ability to promote the holistic approach to disaster management as well as to demonstrate the relationship between disasters and development.

Recovery and reconstruction are commonly identified within the post-disaster phase, the period that immediately follows after the occurrence of the disaster. Once a disaster has taken place, the first concern is effective recovery; helping all those affected to recover from the immediate effects of the disaster. Reconstruction involves helping to restore the basic infrastructure and services which the people need so that they can return to the pattern of life which they had before the disaster (Davis, 2005). The importance of the 'transitional phase', linking immediate recovery and long-term reconstruction, is also stressed by a number of publications (de Guzman, 2002; Max Lock Centre, 2006). With the recovery of social institutions, the economy and major infrastructure, efforts may shift to longer-term recovery and reconstruction.

Although the construction industry is traditionally associated with the long-term reconstruction phase of the management cycle, there is growing recognition that built environment professionals have a much broader role to anticipate, assess, prevent, prepare, respond, and recover from disruptive challenges. This learning package introduces the concept of a disaster management cycle and considers the role of the construction industry at different stages of the process, from pre-disaster planning and mitigation, through to longer term, sustainable reconstruction after the event.

Disaster management cycle

Disaster management aims to reduce, or avoid, the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery (Warfield, 2004). The Disaster management cycle illustrates the on-going process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.

The mitigation and preparedness phases occur as disaster management improvements are made in anticipation of a disaster event. Developmental considerations play a key role in contributing to the mitigation and preparation of a community to effectively confront a disaster. As a disaster occurs, disaster management actors, in particular humanitarian organisations become involved in the immediate response and long-term recovery phases. The four disaster management phases illustrated in Figure 1 do not always, or even generally, occur in isolation or in this precise order. Often phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster.

Figure 1: Four phases of the disaster management cycle

Mitigation - Minimizing the effects of disaster.
Examples: building codes and zoning; vulnerability analyses; public education.

Preparedness - Planning how to respond.
Examples: preparedness plans; emergency exercises/training; warning systems.

Response - Efforts to minimize the hazards created by a disaster.
Examples: search and rescue; emergency relief.

Recovery - Returning the community to normal.
Examples: temporary housing; grants; medical care.

Mitigation

Mitigation activities actually eliminate or reduce the probability of disaster occurrence, or reduce the effects of unavoidable disasters. Mitigation measures include building codes; vulnerability analyses updates; zoning and land use management; building use regulations and safety codes; preventive health care; and public education.

Mitigation will depend on the incorporation of appropriate measures in national and regional development planning. Its effectiveness will also depend on the availability of information on hazards, emergency risks, and the countermeasures to be taken. The mitigation phase, and indeed the whole disaster management cycle, includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.

Preparedness

The goal of emergency preparedness programs is to achieve a satisfactory level of readiness to respond to any emergency situation through programs that strengthen the technical and managerial capacity of governments, organisations, and communities. These measures can be described as logistical readiness to deal with disasters and can be enhanced by having response mechanisms and procedures, rehearsals, developing long-term and short-term strategies, public education and building early warning systems. Preparedness can also take the form of ensuring that strategic reserves of food, equipment, water, medicines and other essentials are maintained in cases of national or local catastrophes.

During the preparedness phase, governments, organisations, and individuals develop plans to save lives, minimise disaster damage, and enhance disaster response operations. Preparedness measures include preparedness plans; emergency exercises/training; warning systems; emergency communications systems; evacuations plans and training; resource inventories; emergency personnel/contact lists; mutual aid agreements; and public information/education. As with mitigations efforts, preparedness actions depend on the incorporation of appropriate measures in national and regional development plans. In addition, their effectiveness depends on the availability of information on hazards, emergency risks and the countermeasures to be taken, and on the degree to which government agencies, non-governmental organisations and the general public are able to make use of this information.

Response

The aim of emergency response is to provide immediate assistance to maintain life, improve health and support the morale of the affected population. Such assistance may range from providing specific but limited aid, such as assisting refugees with transport, temporary shelter, and food, to establishing semi-permanent settlement in camps and other locations. It also may involve initial repairs to damaged infrastructure. The focus in the response phase is on meeting the basic needs of the people until more permanent and sustainable solutions can be found. Humanitarian organisations are often strongly present in this phase of the disaster management cycle.

Recovery

As the emergency is brought under control, the affected population is capable of undertaking a growing number of activities aimed at restoring their lives and the infrastructure that supports them. There is no distinct point at which immediate relief changes into recovery and then into long-term sustainable development. There will be many opportunities during the recovery period to enhance prevention and increase preparedness, thus reducing vulnerability. Ideally, there should be a smooth transition from recovery to on-going development.

Recovery activities continue until all systems return to normal or better. Recovery measures, both short and long term, include returning vital life-support systems to minimum operating standards; temporary housing; public information; health and safety education; reconstruction; counselling programmes; and economic impact studies. Information resources and services include data collection related to rebuilding, and documentation of lessons learned.

Table 1 provides some examples of the type of activities or measures that might occur in each of the four disaster management phases, in respect of different types of disasters.

Table 1: Example of Measures in Each Disaster Risk Management Phase

<table>
<tr><th>Disaster

Phase</th><th>Earthquake</th><th>Storm (cyclone, typhoon, hurricane)</th><th>Landslide</th></tr>
<tr><td>Prevention / Mitigation</td><td>- Seismic design
- Retrofitting of vulnerable buildings
- Installation of seismic isolation/ seismic response control systems</td><td>- Construction of tide wall
- Establishment of forests to protect against storms</td><td>- Construction of erosion control dams
- Construction of retaining walls</td></tr>
<tr><td rowspan="2">Preparedness</td><td>- Construction and operation of earthquake observation systems</td><td>- Construction of shelter
- Construction and operation of meteorological observation systems</td><td>- Construction and operation of meteorological observation systems</td></tr>
<tr><td colspan="3">- Preparation of hazard maps
- Food & material stockpiling
- Emergency drills
- Construction of early warning systems
- Preparation of emergency kits</td></tr>
<tr><td>Response</td><td colspan="3">- Rescue efforts
- First aid treatment
- Fire fighting
- Monitoring of secondary disaster
- Construction of temporary housing
- Establishment of tent villages</td></tr>
<tr><td>Recovery</td><td colspan="3">- Disaster resistant reconstruction
- Appropriate land use planning
- Livelihood support
- Industrial rehabilitation planning</td></tr>
</table>

Activity

3.1 Expand Table 1by identifying examples of measures in each disaster risk management phase for:

(a) a flood

(b) a terrorist strike on a major retail centre

Humanitarian action

During a disaster, humanitarian agencies are often called upon to deal with immediate response and recovery. To be able to respond effectively, these agencies must have experienced leaders, trained personnel, adequate transport and logistic support, appropriate communications, and guidelines for working in emergencies. If the necessary preparations have not been made, the humanitarian agencies will not be able to meet the immediate needs of the people.

Sustainable development

Developmental considerations contribute to all aspects of the disaster management cycle. One of the main goals of disaster management, and one of its strongest links with development, is the promotion of sustainable livelihoods and their protection and recovery during disasters and emergencies. Where this goal is achieved, people have a greater capacity to deal with disasters and their recovery is more rapid and long lasting. In a development oriented disaster management approach, the objectives are to reduce hazards, prevent disasters, and prepare for emergencies. Therefore, developmental considerations are strongly represented in the mitigation and preparedness phases of the disaster management cycle. Inappropriate development processes can lead to increased vulnerability to disasters and loss of preparedness for emergency situations.

Post disaster reconstruction as a window of opportunity

Learning package 2 outlined the concept of a resilient built environment. If this concept is appealing, how can it be achieved? Despite the disaster management lifecycle's emphasis on pre-disaster planning, it frequently requires a major disaster to initiate a window of opportunity to address many of the vulnerabilities usually encountered in a community's built environment. There are several features of this post-disaster period that can be capitalised upon.

Firstly, the disaster has destroyed much of the built environment that was improperly designed and vulnerable, creating a fresh start from which to address disaster risk. Furthermore, the experience gained during the disaster typically generates new knowledge, which brings various stakeholders together around a shared awareness of the nature of risk. The mistakes of previous development policies and strategies are exposed and can be addressed. Next and perhaps even more significantly, the political will and desire to act is almost certainly stronger than usual. Any interest in disaster risk reduction that had been forgotten or side-lined before the disaster, will suddenly gain renewed prominence in the recovery period. In a similar vein, the lack of resourcing for risk reduction, any presence of corruption and otherwise weak institutional structures that allowed a vulnerable built environment to be constructed will have been highlighted. Finally, but perhaps most importantly, the post-disaster period often provides a level of resourcing, including considerable external funding, that would be otherwise unattainable. If properly utilised – something that is by no means certain – this additional resource does afford a major opportunity to reduce vulnerability.

The fact that this window of opportunity exists does not mean that the various actors involved in reconstruction will take advantage of it. Although many, if not all, of these features are usually present following a major disaster, even a cursory glance at the countless studies and evaluations of programming after disasters, provides evidence that it is frequently a missed opportunity.

There are a myriad of reasons as to why these failures occur. Humanitarian principles are primarily concerned with addressing acute human suffering. By necessity, a timely response is essential. Anything that slows this response is likely to be a problem. Unfortunately, the well-planned reconstruction of a more resilient built environment will take time. Likewise, humanitarian principles also tend to dictate maintaining independence, neutrality and

impartiality. This can dissuade actors from highlighting previous failings, which would otherwise create the necessary political will for change.

Effective reconstruction of the built environment is also competing with many other priorities. Poverty alleviation, improved health, and good governance are a few of the many goals usually mainstreamed in the post-disaster recovery period. A more resilient built environment can certainly contribute to these goals, but there will inevitably be a time-lag; other recovery programmes can sometimes appear more appealing due to their ability to deliver short term results. If the window of opportunity is to be taken advantage of, then advocates of a more resilient built environment will need to demonstrate the vital role it plays in helping society achieve much broader development goals.

A further complication is the natural tension between the need for timely reconstruction and a desire to utilise and where necessary develop local capacity. Institutions and local enterprise to plan and construct the built environment may matter, but they are often simply not there. Government, both national and local, is usually called upon to make critical long term planning decisions, and to develop and enforce appropriate building regulations. This expectation is made of institutions that have usually failed to achieve this in far less challenging periods. The reality is that large scale reconstruction may have to be undertaken during a period soon after a major part of the civil service has perished, or at least been severely disrupted. At a time when even greater demands are being made of the civil service, its employees are sometimes being laid off, with the damage to the local tax base reducing available funding. At the same time, the local construction industry is suddenly called upon to increase its output to meet the needs of an unprecedented programme of reconstruction activity, while simultaneously familiarising itself with less vulnerable methods and materials. Building human resources and local capacity to address these shortfalls and support reconstruction, may take years.

The alternative, to make use of international agencies and private enterprises, understandably raises other concerns. International actors are often accused of poaching the most talented local civil servants and encroaching on a country's independence, while the private sector is accused of disaster profiteering and leaves local industry unable to 'benefit' from the economic opportunities afforded by the disaster.

In summary, there is a window of opportunity, but it is beset with challenges. A pragmatic approach to the development of a resilient built environment needs to include an understanding of these difficulties and their implications for what can actually be done, at least in the short term. While the humanitarian efforts are frequently a rushed process, effective rebuilding for resilience will require reflection, discussion and consensus building. This

should not undermine the importance of starting this process early in the recovery phase; indeed, a failure to consider long term reconstruction goals early in the recovery can lead to wasted or misguided effort, as well as undermine efforts for future resilience. Instead, it recognises the importance of a judicious approach that addresses the complexity of creating resilience.

Activity

3.2 Summarise the related challenges associated with reducing vulnerability:

(a) before a disaster occurs

(b) in the aftermath of a major disaster

Role of built environment professionals in disaster management

The recovery role of construction from both natural and human disasters is well documented. In particular, post-disaster reconstruction has been the subject of a significant body of research, with particular emphasis on developing countries that are less able to deal with the causes and impacts of disasters. The importance of improving the construction industries of developing nations is widely recognised, highlighting a need to equip them to manage recovery. Construction is typically engaged in a range of critical activities: temporary shelter before and after the disaster; restoration of public services such as hospitals, schools, water supply, power, communications, and environmental infrastructure, and state administration; and, securing income earning opportunities for vulnerable people in the affected areas. Similarly, disaster planners have begun to realise the link between disaster and development – a large and well-established field relating to social, economic, and significantly from a construction perspective, physical aspects of society.

Although more robust construction in and of itself will not eliminate the consequences of disruptive events, there is widespread recognition that the engineering community has a valuable role to play in finding and promoting rational, balanced solutions to what remains an unbounded threat. There has been considerable research aimed at developing knowledge that will enable the construction of a generation of buildings that are more resilient and safer, for example, through reduction of injury inducing blast debris, the development of glazing materials that do not contribute to the explosion-induced projectiles and have enhanced security application, as well as the integration of site and structure in a manner that minimises the opportunity for attackers to approach or enter a building.

The pre-disaster phase of the disaster management cycle includes both mitigation and preparedness. Disaster mitigation refers to any structural and non-structural measure undertaken to limit the adverse impacts of natural hazards, environmental degradation, and technological hazards. Mitigation measures may eliminate or reduce the probability of disaster occurrence, or reduce the effects of unavoidable disasters. These measures may include building codes; vulnerability analyses updates; zoning and land use management; building use regulations and safety codes. Mitigation seeks to eliminate the risk of future disasters by effective sharing of lessons learned through preparedness planning.

Construction managers have a key role to play because they are involved in the construction of the infrastructure, and therefore should also be involved when an event destroys that infrastructure. Construction management skill in getting equipment, scheduling a set of activities to accomplish a task, and knowing how to manage those activities can be very valuable when an extreme event occurs. Moreover, construction engineers possess valuable information about their projects, and that information can be critical in disaster preparedness, as well as response and recovery. The information they possess may be the difference between life and death. In a similar vein, the Max Lock Centre (2006) concluded that chartered surveyors, with appropriate training, have key roles to play during all disaster phases, from preparedness to immediate relief, traditional recovery and long-term reconstruction (see scenario 1).

Further reading

The details of some related articles on the disaster management lifecycle are provided in ‘Reading Material’. Compare these authors’ understanding of the lifecycle and built environment professionals’ role within it, to those of the examples provided in the case study and scenario.

References

Davis, I. (2005) What Makes a Disaster, http://tilz.tearfund.org/Publications/Footsteps+11-20/Footsteps+18, accessed on 18th December 2006.

Guzman, M. de (2002) The total disaster risk management approach: an introduction, paper presented at the Regional Workshop on Networking and Collaboration among NGOs of Asian Countries in Disaster Reduction and Response, 20-22 February, Kobe, Japan.

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