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An approach to sustainable construction in post-disaster contexts: with specific reference to the Marmara region of Turkey

Hendy, Ashraf

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AN APPROACH TO SUSTAINABLE CONSTRUCTION IN POST-DISASTER CONTEXTS

WITH SPECIFIC REFERENCE TO THE MARMARA REGION OF TURKEY

ASHRAF O. A. HENDY

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Coventry University
Faculty of Engineering and Computing, Department of the Built Environment

Abstract

The objective of this thesis is to identify how to take advantage of opportunities – in the construction sector in specific – to contribute to sustainable development at an early stage of intervention in disaster-affected areas. To this aim, the thesis develops a "framework for sustainability", distilling the literature on sustainable, disaster recovery into a succinct set of criteria for the planning and/or evaluation of recovery programmes. What is unique about this framework is its intended suitability to the field of construction in particular.

The framework is tested in the thesis against two "case study projects" in construction in disaster areas. Data on these two projects, which took place in the Marmara Region of Turkey, was collected over a period of fieldwork. The findings, arranged in the chronological order of each project's planning/design, implementation, and maintenance, are presented in the latter part of the thesis. This is followed by an analysis chapter, which uses the proposed framework to evaluate the experiences of the two projects. The thesis concludes that sustainable recovery may indeed be supported from an early stage of construction initiatives, by concentrating not only on constructed products, but more importantly, on the construction process itself.

In remembrance of my martyr Brother Akram and …other martyr friends who lost their Lives for peace…

To my parents, sisters, brothers, Joyce, and Catherine ……..

And for Nadia …….

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In Coventry I am grateful to my friends, fellow students and the Centre for Disaster Management who have supported, shared their knowledge and provided me with invaluable friendship. Many thanks to my two examiners, Dr. Terry Thomas and Andrew Fox, for guiding this work to completion. Finally, I would like to express my sincere thanks to my parents and my wife Nadia for their continuous support and encouragement.

Ashraf O. A. Hendy

Author's declaration

I declare that this thesis is my own unaided work. It is being submitted for the degree of Doctor of Philosophy at Coventry University, Faculty of Engineering and Computing. It has not been submitted before for any other degree or examination in any other University.

Ashraf O. A. Hendy
Coventry, January 2007

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Chapter 1. Introduction

1.1. Rationale

> What does it mean for a city to recover?...For cities that have lost huge percentages of their populations, the restoration of the city as a place of habitation is itself a signal achievement. Others will judge recovery through different sorts of mindsets, conditioned by both professional training and by personal attachment to places and people. Economics will look toward restoration of economic activity; transportation planners will seek measures of local and regional traffic flows; designers will look for the healing of streetscapes and the advent of new buildings and memorials; psychologists, clergy, and schoolteachers will make assessments of emotional well-being. Those who can resist such professional frames will view recovery as an ongoing search for a "new normal." (Vale and Campanella, 2006: 12)

This thesis combines and addresses three issues of importance to today's world: recovery from disaster; sustainability; and construction. These are described in more detail in the three sections below. The objective behind the research was to identify how to take advantage of opportunities in the construction sector to contribute to sustainable development at an early stage of intervention. Toward this objective, the thesis proposes a "framework for sustainability": a set of suggested criteria for the planning and/or evaluation of construction activities in disaster-affected areas.

1.3.1. Redefining recovery

To this day, recovery from disaster continues to be classified according to a chronology defined in 1991 in UN General Assembly Resolution 46/182. The chronology, termed the "relief-development" continuum, is comprised of three phases: relief (or emergency), rehabilitation (or transition, or restoration), and reconstruction (or development) (see Figure 1.1). Relief activities (said to last one to eight weeks) include search and rescue, locating missing and homeless people, clearing rubble, and providing basic needs like food, water, medical care, and temporary shelter (Daley, Karpati, and Sheik, 2001: 67-68; West and Lenze, 1994: 132; UNDRO, 1982; OECD, 1997: 10; Azimi-Bolourian, 1986: 64). Rehabilitation activities (between eight weeks and nine months) include completion of clearing the rubble, rehabilitating housing, utilities, public services, and livelihoods, and conducting needs assessments for reconstruction (ibid). Yet rehabilitation only aims to return the situation to its pre-disaster state, hence potentially increasing original vulnerabilities; reconstruction is thus needed to move beyond this state (Sirleaf, 1993: 303). Reconstruction can be further subdivided between “replacement” and “developmental” reconstruction. Replacement reconstruction (up to three years) rebuilds lost capital stock, and replaces and repairs damaged structures – including housing (West and Lenze,

1994: 132). Lastly, developmental reconstruction (up to ten years) focuses on large-scale projects (ibid).

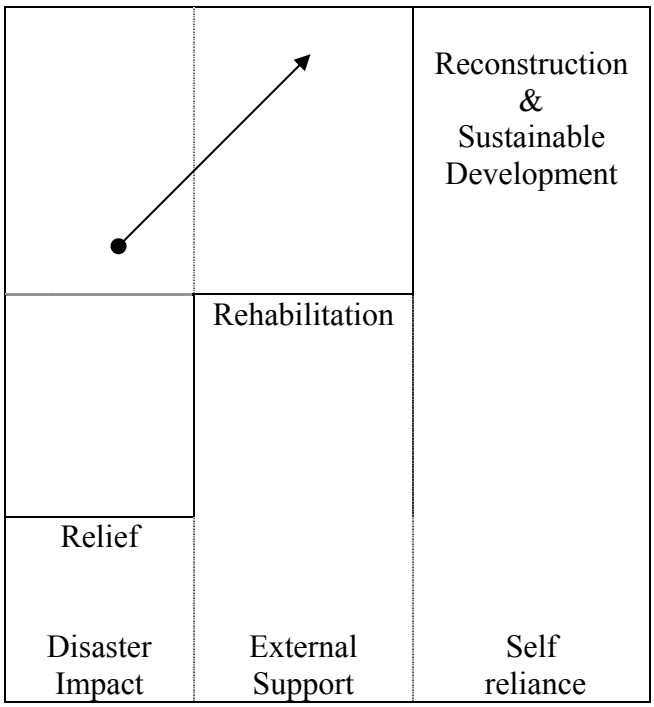

Figure 1.1: Three recovery phases.
Source: Adapted from Barakat and Hoffman (1995).

As shown above, sustainability and community development are usually fit into the third phase, reconstruction (e.g. World Bank, 2000: 1.6). For example, the World Health Organisations states that communities become most aware of what they wish to do, and how they wish to recover, when the relief phase ends (WHO, 2005: 71). "Post-disaster" is seen as too turbulent for development (UNDP, 1991: 1; UNDRO, 1992). In support, some argue that distinguishing between phases is important "to avoid recurrent relief" (World Bank, 1998: 3), and that the scale of damage and community coping capacity alters only the sequencing of the phases (World Bank, 2000: 1.6). As a mild criticism, many have argued for increased integration between phases (e.g. UNDRO, 1992: 98; Blaikie, 1994). They recommend, for instance, that relief not be withdrawn too early, when people are still dependent upon it (ODI, 1997: 10; Smillie, 1999: 5).

Yet a chronological model has deeper problems. It can lead to inflexibility and problems in coordination, such as those that occurred after the 1976 earthquake in Furili, Italy, where reconstruction programmes faced difficulties dealing with the scale of damage, aftershocks, bureaucratic delays, and uneven resource distribution among settlements (Alexander, 1989: 234). Furthermore, organisations are not necessarily specialised to a particular phase (Smillie, 1999: 13). Lastly, a chronological model presumes a particular, linear model of development (Stiefel,

1994: 17), such that "development" is presumed to precede and follow disaster (UNDP, 1991: 13). This was not the case in, for example, Bosnia, where – following emergency relief – development programmes typically used in developing countries were felt inappropriate (Pugh, 2000). Nor is it necessarily the case in many developing countries, where development programmes may not be in place in disaster-affected areas prior to the disaster. Factors that challenged the area prior to disaster are likely to continue after disaster, thus making the relief-development continuum appear to be a false promise. Perhaps for this reason, some have said the relief-development continuum "rings hollow" (Duffield, 1994: 2-4). Others say it is "not only unhelpful…[but] more importantly – [it] does not reflect the reality on the ground, where roles traditionally associated with development are possible in relief situations, and vice versa…" (Eade and Williams, 2000: 825-826). In conflict situations, they add, "local and international NGOs have undertaken innovative and creative reconstruction and development work even before peace has been achieved," (ibid). Thus, it appears that an increasing number of practitioners and academics are raising the possibility that environmental, sociocultural, economic, and political/institutional development needs *may* be addressed in the early stages of intervention. This thesis explores this possibility further, through the development, proposal, and testing of a framework for sustainable recovery, for potential application in the largest sector in disaster areas: construction.

1.3.2. Vulnerability vs. sustainability

Disaster has traditionally been divided between "natural" and "anthropogenic" (human-caused), with the latter usually referring to conflict situations. Some examples of human-caused disasters include Palestine and the former Yugoslavia:

> Between October 1 and 20, UNRWA recorded the destruction of 189 houses in Rafah camp in the south of the Gaza Strip. Not since the April 2002 Israeli offensive in Jenin camp has so many dwellings been demolished at such speed. As a result of these actions, an additional 330 families, comprising 1,780 family members, joined the thousands of Rafah refugees who have already become homeless as a result of previous home demolition. A total of 293 additional dwellings that house 384 families (2,022 individuals) suffered damage at the beginning of October, and are now in need of repairs. UNRWA faces a bill of $30.5 million for the cost of its re-housing efforts in the Gaza Strip alone. Nearly 14,000 refugees have been made homeless in the OPT since October 2000. (UNRWA, 2003)

> The partial destruction or total obliteration of dozens of civilian installations on Yugoslavian territory (power stations, television centres, medical establishments, pharmaceutical, chemical and tobacco works, mechanical engineering facilities, car factories, construction sites and many industrial sites, where some 600,000 people were previously employed), has resulted in some 2.5 million people being left virtually without any means of subsistence. (Egorov, 2000)

Many regions fail to recover before another strike (USAID, 2000). The United Nations Research Institute for Social Development (UNRISD, 2003) wrote that "the real experience" of disaster – and war in particular – is not the "moments…you see on TV," but rather, "what happens afterwards, the years of suffering…or struggling to rebuild when all your property has been destroyed".

Recent natural disasters include the 2004 tsunami, Hurricane Katrina in the US, the 2000 and 2001 floods in Mozambique, the 2001 volcanic eruption in Goma, Congo, and the 1989 and 1995 hurricanes in the Caribbean, to name but a few (Ofori, 2002). However, even "natural" disasters are beginning to be perceived as anthropogenic. This has been explained through the division of natural disaster into two components: natural hazard, and vulnerability, with vulnerability referring to a complex interaction of environmental, sociocultural, economic, and political/institutional aspects (Blaikie, 1994: 6; UN Social and Economic Council, 1994; Barakat, 1993: 12; Cuny, 1986) (see Figure 1.2). Without vulnerability – defined as a "product of the prevailing conditions" (Lewis, 1999: 5) – a hazard would not be a disaster (Davis, 1987: 7; Davis, 1978: 18). Consequently, it is vulnerability, rather than hazard, that recovery programmes aim to address (Anderson and Woodrow, 1989; Boutros-Ghali, 1995: 34).

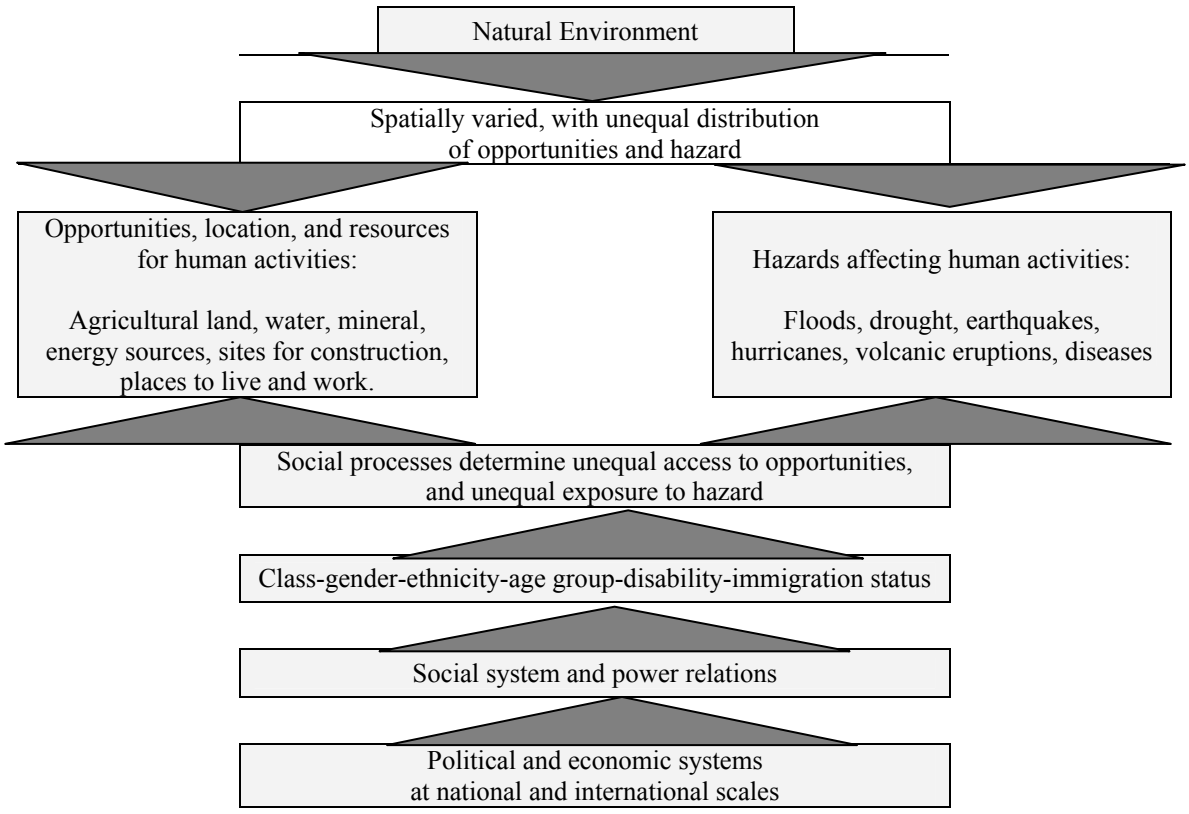

Figure 1.2: The social causation of disasters.
Source: Adapted from Wisner, Blaikie, Cannon and Davis (2004: 8).

A major issue in the debates on vulnerability has been the relationship between development and disaster (Barakat, 1996).

> Research into the field of disaster planning and in particular, post-disaster reconstruction often raises the issue of development and development planning. (Fox, 2004: 1)

On the one hand, "underdevelopment" is seen to increase vulnerability. As a percentage of GDP, losses from natural disaster are 20 times greater in developing countries than industrialised countries (Ofori, 2002: 4, citing the World Bank).

> …in most countries of Africa, the proportion of the population living under poor conditions of shelter, water supply and sanitation is rising… [Meanwhile] 51 percent of the total population of Colombo, the capital of Sri Lanka, live in slums and shanties, while only 42 percent of the national housing stock is permanent. (Ofori, 2002: 4)

According to Ofori (2002), "the occurrence and impact of disasters (both natural and human-caused) is greater in developing countries," and the same communities seem to suffer from a range of different kinds of disaster.

> …In the first half of 2001 alone, natural disasters caused over US$24 billion in damage worldwide…In 1998, natural disasters killed over 50,000 people and destroyed $65 billion worth of property and infrastructure. Some 95 percent of these disaster-related deaths occurred in developing countries, and affected the poorest people most severely. It would also appear that the same countries suffer from disasters repeatedly. For example, in Mexico, natural disasters claimed 10,000 lives and cost $6.5 billion in 1980-2000. (Ofori, 2002)

"Underdevelopment" is also said to impair recovery (Farah, 1993: 260). Ofori (2002) gives the example of Rwanda in 2001 where, seven years after being made refugees, two million people were still living in "makeshift structures such as plastic sheeting," (Ofori, 2002). The World Disasters Report writes:

> Catastrophe is no longer a brief dip on the curve of development but a danger to the process itself. The poorest of the poor are becoming more vulnerable, trapped in a vicious cycle of structural poverty and marginalization beyond their power to change. Worse still, some places prone to continual un/natural disaster are becoming lawless and a threat to security. (IFRC, 2001)

Developing countries are said to have less mitigation and recovery capacity, even if sometimes risks of hazard are lower than in, for example, the United States (Anderson and Woodrow, 1989). This broad statement, however, may overlook economic disparities within industrialised countries, as demonstrated, for instance, in 2006 in New Orleans.[1]

Given that internal inequality is as important as national development levels, therefore perhaps the "development" of a country is not the only measure of vulnerability. Some have commented, for example, that certain models of development can increase vulnerability (UN, 1994) (see Figure 1.3).

[1] Thanks to Terry Thomas for this observation.

Figure 1.3: The relationship between disaster and development.
Source: UNDP (1991: 2).

A key factor in increasing global vulnerability over recent years has been the steadily increasing dependence on the built environment, including commercial and residential sectors, water, power, gas, telecommunications, schools, food production, community networks, government organisations, and health services. Moor (2002: 1-4) cites in particular the events of September 2001 in the US, as illustrative of an increased reliance on infrastructure and thus an increased vulnerability to hazard. Although economic losses from disaster are difficult to estimate (ILO, 1995), Ofori (2002) uses such estimations to convincingly argue for increased disaster management in the construction sector in specific. He states, for example, that the 100 most expensive natural disasters of the 20th century have all occurred since 1970; 10 in the 1970s, 25 in the 1980s, and 65 in the 1990s. Housing, in particular, represents an investment of a person's (or family's) life-savings, making it perhaps irreplaceable (Ofori, 2002). This is especially the case, for example, if the government has a limited budget with which to aid its people, or if property and other insurance is unavailable, inaccessible, or unaffordable (ibid). The industrial sector also takes time to recover from disaster, largely because requisite infrastructure is costly (Azimi-Bolourian, 1986: 64).

> The built environment bears the impact of the damage from disasters of all kinds. For example, the earthquake in Gujarat state, India in January 2001 left 20,000 persons dead, 167,000 injured, and nearly a million families homeless. The earthquake ruined much of the area's social infrastructure – schools, health clinics, water supply systems, communications and power. In many villages and towns the destruction was nearly total. The total loss of assets was put at US$2.1 billion, of which US$1.1 was in the housing sector. (Ofori, 2002)

The statement that development can increase vulnerability has typically referred to infrastructure development during rapid urbanisation,[2] and to technical vulnerability, such as insufficient use of hazard-resistant materials (Habitat, 1992).

[2] Ofori (2002), for example, notes that in Bangladesh, the urbanisation rate is nearly 25%, and the capital (Dacca) is one of the world's 30 largest cities.

> In the past, infrastructure construction, covering the entire process of planning, design, construction, maintenance and operation required to deliver facilities, has adopted a conventional approach with little consideration for the possible need of future disaster management consequential to the failure of such facilities. (Broadbent and Broadbent, 2004: 2-3)

While such technical aspects are imperative to address, vulnerability also entails a number of other aspects (as illustrated in Figure 2.2 earlier).

> A focus on purely technical factors leads to the implementation of misguided redevelopment programmes following disasters. Altered levels of risk perception can even prevent valid rehabilitation programmes from proceeding if undertaken too soon after the event. (Fox, 2004: 6, citing Jigyasu in I-Rec, 2002)

By contrast, looking at coping strategies and sustainability could perhaps provide a new perspective, broader than just technical aspects. The United Nations (1994) has recommended that aid agencies explore and strengthen traditional and new ways of living with hazard. Acknowledging that communities inevitably bear the heaviest responsibilities of recovery, the UN suggested that external aid be compatible with communities' own coping strategies and responsibilities. Some pathbreaking literature has begun to work in this direction, looking at how communities cope. El Masri (1992: 32), for example, identified three stages of coping, which he termed, "absorption, acceptance, and reduction and change of use and livelihood". In this way, perspectives on vulnerabilty can be expanded, by seeking to understand and acknowledge existing methods of coping – and the requirements of communities in order to sustain these coping mechanisms. Therefore, the question that arises is: how can sustainable recovery be supported?

1.3.3. Toward sustainability: Construction as process

At the moment, the answer to this question is frequently seen in terms of final products. The expected cycle is that infrastructure boosts economic growth, which generates employment and income, which increases expenditure on construction, which then restarts the cycle (Habitat, 1997; Spence, 1993). Based on analysis of global data on construction, Crosthwaite (2000: 1) suggests that construction helps developing countries "transition" to become developed countries. While this may be premised on belief in a linear process of "development", nevertheless, what is certain is that sustainable development is supported by the reconstruction of the built environment (Bourdeau, 1999: 354). Rebuilding physical infrastructure is needed for resumption of the pre-disaster state, and political and social recovery (Habitat, 1994; UNDRO, 1984). This includes transport, communication, water and sanitation, energy, commercial and industrial facilities, and perhaps most importantly, housing (Sjostrom and Bakens, 1999: 348). Housing can be seen as protection (Moor, 2002: 1-4); as a residential and potentially also income-generating

facility (Ofori, 2002); and as a source of psychological comfort (ibid). It provides shelter from heat and cold, and other factors affecting health (MSF, 1996: 114; Babister and Kelman, 2002: 5), as well as dignity, orientation and identity – all of which are important to address when considering the widespread trauma caused by disaster (Babister and Kelman, 2002: 6). Housing affects relations between individuals, and between host communities and displaced or migrant communities (Babister and Kelman, 2002: 5). It comprises considerable personal expenditure, and can determine an individual's life chances (Balchin and Rhoden, 1998: xviii). Housing and construction can contribute to sociocultural wellbeing (Babister and Kelman, 2002: 4-5; Canadian Peacebuilding Coordinating Committee, 1998), and can meet psychological and spiritual needs also (Habitat, 1996). Construction programmes provide a physical support mechanism that other programmes cannot (Reilly, 2002). Construction can even carry meaning; "temporary" shelter is often interpreted as a signal – read by both migrant and host communities – that people displaced by disaster will return home (Babister, 2002).

Yet are finished products the only way for construction to support sustainable development? Could the process of construction be tailored to a given situation, and mindful of its future (as per the definition of sustainability by Trzyna, 1995: 15, citing Brundtland, 1987: 54)? Could sustainability be found in the "exploitation of resources, the direction of investments, the orientation of technological development, and institutional change" (Eade and William 1995: 20)?

1.2. Objectives

The goal of this thesis is to raise these questions and to seek their answers. Corresponding to the three key aspects described above – recovery, sustainability, and construction – the thesis has three theoretical objectives:

1. To examine whether activities shortly following a disaster can contribute to long-term development.
2. To better understand the dynamics of local and regional recovery, and how reconstruction activities can contribute to their sustainability (environmentally, socioculturally, economically, politically, and institutitionally).
3. To develop a framework that could guide construction processes (and not only products) toward supporting sustainable recovery.

In addition, the thesis has a more specific objective, related to its case study of the Marmara Region in Turkey:

4. To evaluate two case study construction projects in terms of their contribution to sustainable local recovery, following the earthquakes of 1999 in Turkey's Marmara Region.

This last objective is interlinked with the first three: the case study tests and situates the framework, while the framework contributes to understanding the case study. These four objectives guided the development of the research approach and methods, described briefly below, and in more detail within Chapter 3.

1.3. Methodology

Since literature on the subject of construction in disaster is limited, the methods chosen were "exploratory" (Rubin and Babbie, 2001: 123) and "flexible" (Robson, 2002: 89-90; Robson 1993: 169). Exploratory research has the potential to generate new ideas for change (Rubin and Babbie, 2001: 247). It involves observation and data collection, in order to first describe or understand phenomena, and then to improve upon ideas, redefine the initial research questions, and seek a defensible argument or "solution" (Zeisel, 2006, 33) (see Figure 1.4).

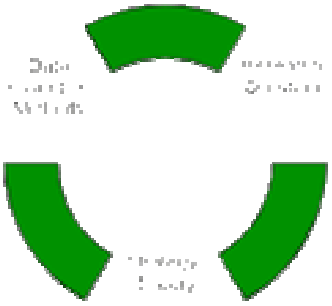

Figure 1.4: The research components.

Exploratory research typically requires qualitative data collection methods, which consider individual accounts of attitudes, motivations and behaviours (Hakim, 1987: 26). Such methods concentrate on finding and explaining trends, clusters, and other patterns in these attitudes and behaviours (ibid). To complement qualitative methods, two surveys were also conducted. Thus, different research methods and data sources were used to examine the same problem – what Hall and Hall (1996: 45) refer to as "methodological triangulation". Thus, the fieldwork was comprised of a variety of research methods, designed to support the development of a framework for sustainable construction. In chronological order (more or less), the research strategies were:

1. Literature review and preparation for fieldwork.
2. A survey of practitioners in the field of disaster management.
3. An internship with the International Federation of the Red Cross and Red Crescent Societies (IFRC).
4. Two case study projects:
    a. Düzce State Hospital, an IFRC reconstruction project; and
    b. Demetevlar Housing Project, a joint initiative by the World Bank and the Project Implementation Unit (PIU) of the Turkish Prime Minister's Office.
5. A survey in one of the case study projects (Demetevlar Housing Project).
6. Semi-structured interviews, direct observation, and unstructured interviewing in the IFRC, the World Bank, government organisations, the two case study projects, and academic institutions.

1.4. Chapter structure

Following this introduction, the second chapter reviews the literature on construction management in both disaster and conventional contexts. The chapter is comprised of four parts: (1) defining sustainable recovery; (2) searching for strategies for sustainable recovery; (3) international examples and views on recovery programmes; and (4) COAM: A framework for sustainability. The first part briefly considers how recovery programmes can address both present and future needs, in terms of the environment, society, culture, economy, and political and institutional representation. The purpose of this part is to introduce a working definition of sustainability, for use in the subsequent part of the literature review. One key theme of the thesis is introduced in this part, which is that public participation is a tool toward sustainability, and not only an end in itself.

The second part of the literature review also begins with a series of definitions: of construction, construction processes, and recovery programmes in general. It proposes a conceptualisation of the "recovery programme life cycle" as comprised of eleven stages. Each of these stages is then described in terms of its potential to contribute to sustainable recovery in disaster-affected areas. The third part of the literature review contextualises these reflections, using five international examples of recovery programmes in areas of conflict and/or natural disaster. To further situate the findings of the literature review in a contemporary context, the answers of international practitioners to a short survey are presented. These are structured in table form, based on the recovery programme life cycle, and thus linked to the earlier parts of the literature review.

The final part of the chapter summarises the major ideas presented, into a two-page table. The summarised ideas are then grouped together to form twelve criteria, to potentially guide future construction processes in supporting sustainable recovery. Lastly, these twelve criteria are further grouped into four categories, which form the basis of the framework proposed in this thesis, suggesting that construction processes be: compatible in the present, oriented to the future, achievable in the present, and maintainable in the future (abbreviated as COAM). Structured around the definition of sustainability (as serving both present and future), and around the recovery programme life cycle (from planning and design to implementation and maintenance), this four-part framework emerges from the literature review as both a summary and a proposal for future research and action.

Following on this, the third chapter describes how the proposed framework can be used not only as a planning tool for future construction initiatives, but also as an evaluation tool for past and/or ongoing initiatives. This chapter describes the research approach and methods. It begins with a discussion of how evaluation can be used as a research approach, and then describes the research process in (more or less) chronological order. The first section tells how literature was reviewed on the topic and case study, including secondary and primary sources, i.e. internal reports, planning documents, architectural designs, and so on. The second section explains how the survey of practitioners (described in the first chapter) was conducted prior to fieldwork. The following four sections provide a background to the fieldwork itself, about the internship, semi-structured interview process, case study survey, and periods of direct observation and unstructured interviews. The next sections speak of what was done after fieldwork: data analysis and verification, and sharing the findings. Finally, some of the challenges are listed, which were specific to this thesis and its fieldwork. These are then reflected upon in the final section, which concludes with eight lessons learned from the experiences described.

The fourth chapter introduces the situation in the Marmara Region prior to, during, and after the two earthquakes of 1999. This chapter rationalises the case study choice, explaining how the Marmara Region exemplifies the multi-faceted vulnerability that is the subject of this thesis. While the city in question – Düzce – was not the worst hit, the recovery there took longer than elsewhere, and was particularly affected by the centralisation of institutional arrangements. Therefore, although this chapter describes the natural hazards of the area, its focus is on the multiple aspects of vulnerability, including but not limited to technical vulnerability. A substantial chapter section on damages incurred (to homes, hospitals, schools, infrastructure, industry, economy, and environment) thus sets the stage for an overview of the subsequent

reconstruction. This overview highlights a common observation, that political and institutional arrangements were too awkard to adequately respond to the disaster, despite substantial investment. The chapter concludes that vulnerability is not only technical, but rather multi-faceted, and therefore a sustainable recovery requires aid programmes – and their construction processes especially – to address these many facets.

The fifth chapter temporarily narrows the scope of the thesis to two construction projects in the city of Düzce and its environs. Each project is described individually, running through the recovery programme life cycle, from planning and design, through to implementation, and finally, maintenance. This findings presented are based upon document analysis, interviews, a survey among the beneficiaries of one of the projects, and direct observation. The purpose of the chapter is to relate the experiences of each project, from start to finish (and after), from the multiple perspectives of the individuals, groups, and organisations involved.

The sixth chapter then subjects these findings to an evaluation, using the COAM framework developed in the second chapter. Specifically, this chapter questions whether the construction processes of the two projects were compatible, oriented, achievable, and maintainable. The chapter is structured according to the twelve criteria of the COAM framework, examining the extent to which construction processes are: reflexive, environmental, socioculturally responsive, participatory, socioculturally constructive, economic, accountable, coordinated, flexible, informed, institutionally developmental, or financially sustainable. While the body of the chapter represents an evaluation of the two projects, the conclusion of the chapter is an evaluation of the utility of the COAM framework. This chapter, therefore, presents two arguments on the basis of its analysis. First, it suggests that perhaps in each of the case study projects, construction activities could have taken place in alternative ways, so as to be more supportive of sustainable recovery. Second, it suggests that COAM could be a potential tool in bringing about the suggested changes to recovery programming, toward a more holistic and locally supportive approach.

The thesis concludes with some reflections on what remains to be done in this field, and what this thesis has sought to contribute. These reflections draw attention to the broader issues of equality and social justice, too often seen as peripheral in technical discussions of construction in disaster. What this thesis attempts to illustrate, therefore, is the interlinkages – best viewed at the microscale – between technical sustainability (hazard-resistant building design and such) and the factors on which it relies, and without which it remains an elusive goal.

Chapter 2. Literature review

This chapter is divided into four parts, the first of which begins with the generally accepted definition of sustainability – as encompassing environmental, sociocultural, economic, and political/institutional aspects. This is then used to consider the potential role of construction in disaster. This part of the literature review closes with a theme of the thesis, that public participation can be a means – and not only an end in itself – to achieving sustainable recovery, or at least to guiding construction efforts in that direction.

The second part of the chapter suggests that recovery activities may follow a "recovery programme life cycle", modeled on the now-popular concept of a project life cycle. It is thus divided between three sections (each of which have further sub-sections): planning and design; implementation; and maintenance. The purpose of this part of the literature review is to identify what experts have (or have not) said to date on the capacity of the construction process to support sustainable recovery in disaster areas.

The literature review then moves to a collection of five documented examples of construction projects in disaster areas, implemented in cross-cultural settings: Sri Lanka, Northern Ireland, Vietnam, Ecuador, and Algeria. As a summary, the five examples are compared in a table, arranged according to the recovery programme life cycle discussed earlier. The overall impression is that each project has its individual strengths and weaknesses, seen perhaps more clearly – and made more easily comparable – when examined through the lens of the recovery programme life cycle. The table is still insufficient, however, because sometimes projects have both strengths and weaknesses within a given activity in the life cycle. The next section, therefore, seeks to supplement them with the results of a brief survey, conducted as part of this research, to learn more about recovery programmes and programming internationally, at present. The survey gathered responses from 37 professionals, working in 16 development organisations, and operating in 13 countries affected by conflict and/or natural disaster. The fourth and final part of the literature review summarises the previous three parts into a series of tables, culminating in the proposed "framework for sustainability". This is then further discussed in the following chapter on research methodology.

Part I. Defining sustainable recovery

2.1. Aspects of sustainability

According to the UN Conference on Habitat (1996: 422-423), sustainable urban development includes three factors: environmental, social (or sociocultural), and economic sustainability. To these could be added a fourth factor: political and institutional sustainability (see Figure 2.1). These four factors are discussed in the following sections.

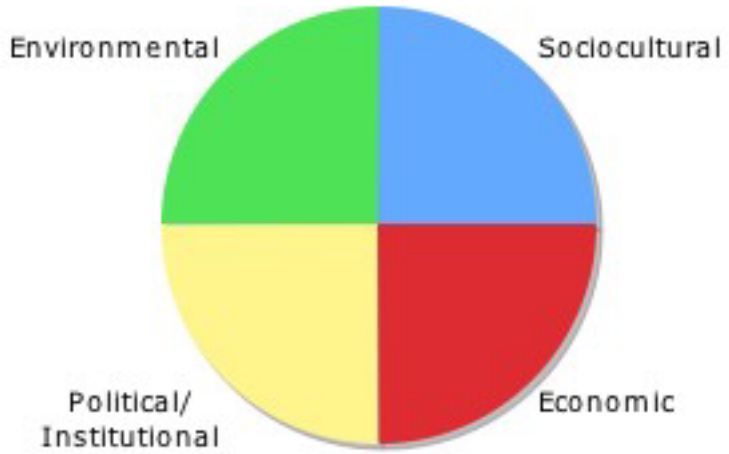

Figure 2.1: Aspects of sustainability.

2.1.1. Environmental

> Monitoring the impact of development on the environment lies at the heart of sustainability. All too often the response to a disaster overlooks this fact and, as a result, reconstruction programmes often lead in increased environmental degradation, increased vulnerability and a reduction in sustainable livelihoods. (Fox, 2004: 7-8)

Much debate has revolved around whether environment and economic development concerns can be reconciled (Ponting, 1994; Slim, 1993: 63). Former UN Secretary-General, Boutros Boutros-Ghali (1995: 69) stated that economic growth is not necessarily equal, anti-poverty, or environmental. Nevertheless, many feel that "improving the quality of human life" is possible "while living within the carrying capacity of the supporting system," (WWF, 1991: 211).

2.1.2. Sociocultural

Sociocultural losses may be more difficult to recover than other kinds of losses (Smillie, 1999: 25). People lose family members (often breadwinners), possessions, livelihoods, and even social structures (Anderson, 1996).

> Many unfortunate people will continue to be faced with social setback until the worst outcomes of disaster can be addressed. There are good reasons why these issues should be positively, rigorously and professionally addressed. (Broadbent and Broadbent, 2002: 3)

Some question whether physical, infrastructural recovery is even possible without incorporating sociocultural considerations into reconstruction (Leslie, 1995: 27). On the other hand, if recovery programmes can earn public respect and participation, they can then promote hope, healing and reconciliation (Barakat and Hoffman, 1995: 75-97). The Turkish and Greek earthquake responses, for instance, helped rapprochement through mutual exchange of search and rescue teams and mutual assistance, building on communication and peacemaking mechanisms already in place (Comfort, 2000: 21). Another example in Afghanistan shared similar success, when two communities in conflict (in Khas Orozgan[3]) approached a local NGO with a proposal to reconstruct a joint irrigation canal (Suleman, 1998: 18). Yet other programmes, however, represent missed opportunities. In the Iranian town of Abadan, following the Iran-Iraq war, opportunities for reconciliation were lost; Azizi (1997: 66) believes this was due to programme weaknesses: construction methods, uncoordinated implementation, inadequate skilled labour supply for specialised needs, unprioritised objectives and activities, and an overall lack of purpose during the different phases of reconstruction. Another example is the city of Berlin, which after over 15 years of unification, is still said to be united in the physical sense only, not socioculturally (Carr, 2004: 35). Learning from all these examples, perhaps international organisations can act as facilitators, in support of local efforts to rebuild society, culture, and community (Fisher, 1995: 55). In summary, construction can be not only responsive to local needs and situations, but also constructive in rebuilding community cultures and networks.

2.1.3. Economic

This focus on the process – and not only the products – of construction can be extended to the economic sphere also. The UN Conference on Habitat (1996: 422-423) defined sustainable shelter in terms of the product: "healthy, safe, affordable and secure, with provision of water, sanitation, transport, education and healthcare". While such a definition acknowledges the need

[3] Khas Orozgan is a district of Orozgan province in southwest Afghanistan, with a mixed population of Pushtoons (65%) and Hazaras (35%). The two ethnic groups have been in chronic dispute over land and other resources. (Suleman, 1998)

for appropriate products in terms of affordability, it says little about how the process of construction can support sustainable recovery. In general, construction is a major investment. Today in industrialised countries alone, half of fixed capital formation is in construction; if including civil works, this rises to two-thirds (Berghall, 1992: 2). In the EU, for instance, construction comprises over ten percent of the overall economy; and employs some 30 million people, making it the largest industrial sector in the EU (ibid). Since the precedent of post-WWII recovery – where construction helped boost the flagging economy – construction, and housing in particular, has been used as a tool to level off the ups and downs of the economic cycle (Berghall, 1992: 2). Most importantly for the purposes of disaster management, construction comprises most of a community's savings (Hillebrandt, 2000: 3); or in technical terms, 45-60% of worldwide "gross domestic fixed capital formation" is in construction (Ofori, 2002: 3). The built environment usually represents over half of "real capital" in a country, and construction is a major contributor to national income (Berghall, 1992: 2). Housing alone comprises 2-8% of GNP, 10-30% of gross capital formation, 20-50% of accumulated wealth, and 10-40% of household expenditure (Ofori, 2002: 3). In 1998, global investment in construction was over $3 trillion (Crosthwaite, 2000: 1), contributing significantly to employment and income generation (Rains and Stewart, 1999: 259).

Yet organisations undertaking construction in disaster areas, citing time pressure (Vaux, 2005: 43), tend to employ centralised methods with little local involvement. Although the broad objective of financial aid is to help bring about change, such aid is often limited to balance of payment support, and humanitarian assistance through international organisations (Dudley, 1993: 10-18). Recruiting from their own countries, international organisations spend much of the aid, which is in their trust, toward the expenses of their staff (Anderson, 1996). Today, officials and consultants are visible conduits of aid, through their "imported vehicles, salaries and fees," (ibid).

> It has taken time to recognise that growth and prosperity do not alone flow from the construction of national infrastructure and housing. For instance, foreign consultant and contractors were often used with little involvement of domestic resources. Few lessons have been learnt. The current situations in Afghanistan and Iraq clearly demonstrate the shortcoming in this approach if gauged against experience gained over many years of development initiatives. In all these cases, there is little local benefit from the construction process other than from the final built product. (Broadbent and Broadbent, 2004: 7)

The aim of recovery is not only to return to the pre-disaster state, but also to be economically stronger than before (APA, 2005: 55). This partly depends, however, on the way in which construction takes place. Some say that a beneficial construction process needs to be labour-intensive, and requires organisational capacity and quick investment (to control inflation) (Azimi-Bolourian, 1986: 64).

> …If building costs are spent within a country's national economy, the construction process could become the locomotive of that country's development. The multiplier effect is determined by the extent of self-reliance. When the designer, labour, materials and equipment are provided from within the local economy, there is an associated multiplier factor of three to four. (Soderberg, 1996: 644)

Others say that construction can provide a market for a number of parallel economic activities: supply or manufacture of essential building materials for sale through existing markets; establishment of workshops to produce components for infrastructure; and so on (e.g. Leslie, 1995: 28). The overall consensus – as expressed in UN initiatives like Habitat II and Agenda 21 – is that construction in disaster can and should provide employment to local people, attract investment, and support local industries – especially in construction (Zahlan, 1997: 147; Zahlan, 1984; Sjostrom, 2001; Harris and Lewis, 1999). Once again, therefore, the expectation of construction to support sustainable recovery results in two recommendations (based on the dual definition of sustainability as respecting both present and future): to be responsive to local economic capacities (or lack thereof) and livelihood requirements, on the one hand; and to be constructive in terms of rebuilding the local economy, on the other hand.

2.1.4. Political/Institutional

This dual definition – of addressing both present and future – is equally important for the issue of political and institutional sustainability.

> New development initiatives should therefore be designed to accommodate complex cultural, social, economic, technical and political dimension [sic] to ensure outcomes are sustainable. Every opportunity should also be taken to ensure good disaster management practices are included in future initiatives. This should set out to ensure the worst impact of any hazards do not unduly influence progress in achieving the objectives of sustainability. (Broadbent and Broadbent, 2004: 3)

Prerequisites for success include accountability, local empowerment, and capacity building (Lederach, 1997: 25). Such strategies are discussed in more detail in later sections of this chapter: *Assessing needs, Setting objectives, Reporting, Coordination and management, Logistics, Monitoring and evaluation, Training and institutional capacity building,* and *Future financing*. A key theme, throughout these and other sections, is the need for public participation, not only as an end in itself, but also as a means for construction to support sustainable recovery.

2.2. Participation

The subject of participation has proceeded through a number of stages in development literature. One of the first criticisms to emerge was in response to the lack of space given to local institutions within development programming (Madeley, 1991: 124; Todaro, 1989: 80-81). Top-

down, "expert" economic programmes were critiqued for promoting only one way to "develop" (Robert, 1984: 5), supposedly based on the recovery that followed World War II (Todaro, 1989: 64). Development, critics argued, depends on the interaction of different groups (Slim, 1996: 63, citing Anderson, 1993) and participation is thus needed. But participation is a broad term, and can be understood in different ways. The Overseas Development Institute identified five levels of participation: (1) to inform people; (2) to consult people; (3) to have people comply; (4) to have people design, implement, or assess; or (5) to have external actors facilitate. Pugh (1998: 22) found a divergence in participation levels between social programmes and infrastructure projects, with the latter being less participatory. Local people were more likely to be externalised to infrastructure projects, he argued, which were limited to the levels of information disclosure or consultation. In disaster, Pugh noted, participation may become inconsistent, but the need for it is greater.

Commenting on potential reasons for excluding people from infrastructure projects and construction, Cliffe (2003: 19) wrote:

> Central, provincial or district government officials may take for granted that they know the needs of the population and so may not accept the results of community council decision-making. They may also have little trust in the capacity of the people, and believe that decentralising authority in the aftermath of disaster undermines the authority of the state.

Thus, perceiving local people and institutions as incapable of participating can result in non-participatory programming. An example of this link between perceived capacity and participation levels can be found in the binary model proposed by Dynes (1993), whereby local capacity determines whether or not participation should be integral to programming. The first of the two models Dynes proposes is the "military model", which is premised on the notion that disaster creates chaos and so requires "command control". By contrast, the "problem solving model" assumes and promotes social continuity, coordination and cooperation (ibid). What these two models presume is that an external observer can judge local capacities and thus make an informed decision on whether or not to incorporate participation as the basis of programming.

While it is true that local communities may have lost much of their ability to contribute from human loss, socioeconomic damage, and changes in norms and values due to disaster (Pugh, 1998: 22), nevertheless, external actors may misperceive the "general and particular social potential," (ibid). Although learning about local initiatives and projects may not be easy, too often the importance of external actors (rather than internal ones) is overestimated (Stiefel, 1999: 16-17). Further discouragement of participation may complicate the situation, so that people appearing not to contribute may in fact have been excluded. For example, social exclusion can

arise if external organisations are selective, or if they place conditions upon participation, to which some people may not agree (Pugh, 1998: 22). Saunders (2004: 168) observes, "there is still a large distance between the flexible and "open" approach favoured by disaster-affected communities, including support for upgrading local solutions, and the "closed" approach often favoured by external donors and organisations," (Saunders, 2004: 168). Donor and aid agency preferences for inflexible planning, he explains, may be attributed to a desire for "rapid exit", a lack of management capacity, and limited vision. Unfortunately, such an approach fails to take into account the capabilities of the affected communities (Skotte, 2003).

On this note, participation is a valuable source of local input. It is not an end in itself. Mobilisation of resources is difficult (Mitchell and Bevan, 1992: 53-54), and local communities play a crucial role (UNDRO, 1982: 3). Inadequate mobilisation of human resources, for instance, could lead to delays in construction (ILO, 2006: 17). Beyond labour alone, however, true partnership with stakeholders may strengthen local institutions and promote a culture of public participation. It may also speed the recovery process, strengthen social solidarity, reduce the cost of construction programmes, and ensure cultural continuity in disaster-affected areas. Participation further encourages donors to fund construction projects; in addition, project success from such participation repeats this positive cycle. Last but not least, participation can help ensure transparency and accountability. All of these factors can determine the success or failure of construction initiatives, but more importantly, they can help such initiatives become more supportive of local communities, in their struggle to recover.

Part II. Searching for strategies for sustainable recovery

2.3. The recovery programme life cycle

The above sections of this literature review covered the issues of sustainability and sustainable recovery from disaster. Specifically, they suggested the possibility that construction processes could support sustainable recovery. The following sections, therefore, look more closely at these construction processes.

The term "construction" includes buildings, like residential and commercial facilities, as well as "immediate surroundings, community facilities, transportation and communication networks, and so on," (UNCHS, 1987: 5). Thus, construction also refers to related services and infrastructure, as well as the inputs (like land and finance) required to produce and maintain it (UNCHS, 1997: xiv). Processes of construction of course vary, depending on context, thus making generalisation difficult. Nevertheless, some analysts have sought to develop generic models, for adoption and adaption to various contexts. One such model is the "construction project life cycle" (Hendrickson, 2003) (see Figure 2.2).

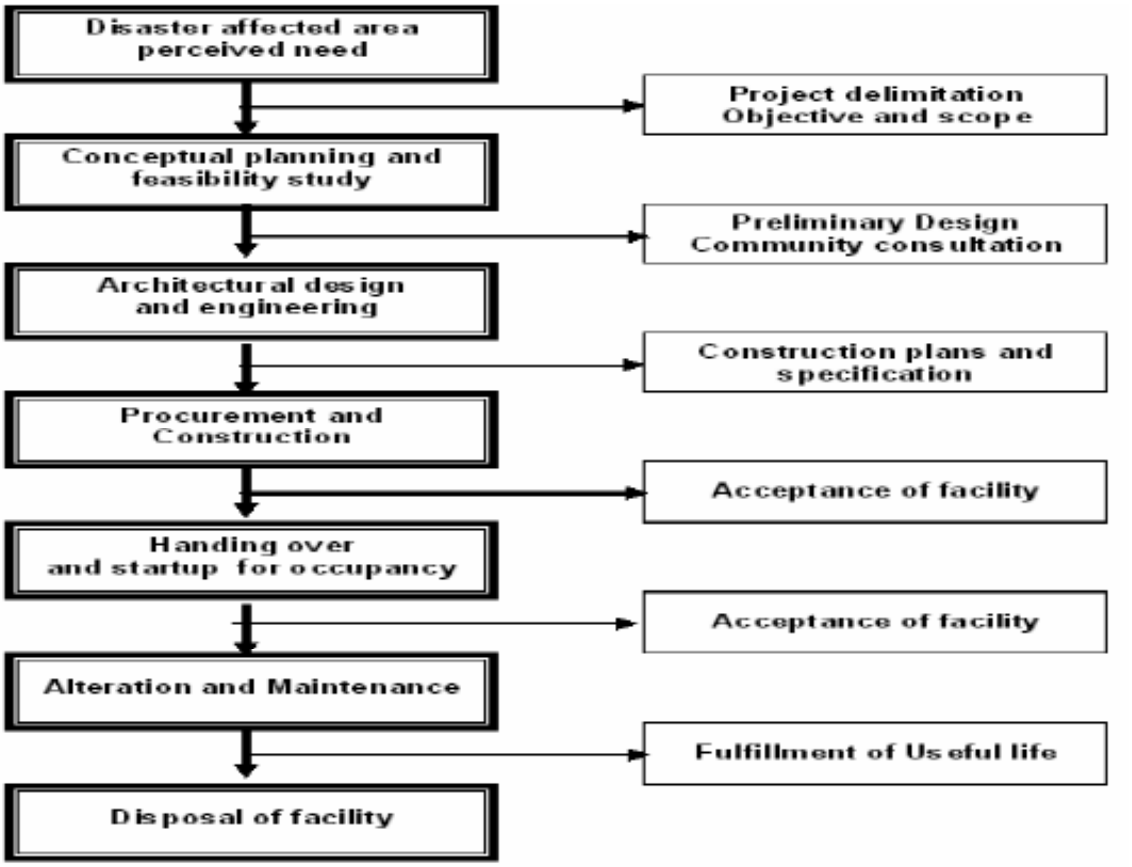

Figure 2.2: The project life cycle of a constructed facility.
Source: Adapted from Hendrickson (2003).

The stages illustrated may not be meticulously sequential: "some involve iteration, and others may be carried out in parallel or with overlapping time frames, depending on the nature, size and urgency of the project," (Hendrickson, 2003). The importance of this model is its inclusion of operation and maintenance, thus making it a "cradle to grave" model (with the "grave" being demolition or conversion) (ibid). This model is similar to that of Wenblad (2003), who identified four stages:

1. Planning, which includes technical, financial, legal and environmental risks and socio-political issues.
2. Design that specifies technical solutions and materials, building components and systems.
3. Construction, which converts the blueprints and drawings and specification into the final product: a harbour, hospital, a sewerage works, etc. This requires a complex process of assembling material, managing labour and equipment on site and transforming these inputs into the desired structure.
4. After handing over the project, it requires monitoring and maintenance.

Transferring such models to disaster contexts may require some modifications. Accurately assessing the time required for each stage, for example, is extremely difficult in disaster situations, where circumstances may be both challenging and unpredictable. Moreover, many projects may not begin from "cradle"; construction projects could instead cover retrofitting, repair, or even tangential activities such as manufacturing building materials. Nevertheless, the model is extremely useful. On the basis of this model, a "life cycle" can also be proposed at a slightly larger scale: the recovery programme. In disaster situations, communities and planners in construction are faced with an overwhelming number of questions: what are the needs, who are the beneficiaries, what are the objectives, what are the priorities, what is the timing, where should construction take place, what preparation does the site require, which technologies and materials should be used, who will be employed, how will activities be coordinated, what logistics are required to locate available resources, transport and store them, and finally, how will all of this be financed? To place these questions into some kind of framework could perhaps simplify the way the construction process is understood. This is the purpose of Table 2.1 below.

Planning and design
Assessing needs
Setting objectives
Siting/acquiring land
Technologies/materials/employment
Architectural design
Implementation
Reporting
Coordination and management
Logistics
Maintenance
Monitoring and evaluation
Training and institutional capacity building
Future financing

Table 2.1: The recovery programme life cycle.

The suggested programme recovery life cycle forms the basis for the following section of the literature review. The review is structured according to each phase and activity, and identifies some of the strengths, weaknesses and suggestions from past examples of construction in disaster.

2.4. Planning and design

2.4.1. Assessing needs

A typical needs assessment usually identifies two factors: the extent of damage and ongoing vulnerability, and the target population for aid. Identifying these factors is helpful not only in setting objectives, but also in providing baseline information that can later be used in measuring performance (Saebi, 1991: 1; APA, 2005: 54). Baden-Powell (1993: 10) is one of the earlier writers to think through the exact steps required in "building overseas" (the title of his book). Five of the six steps he identifies fall into the planning stage. First, he says, a project is *initiated* – or what Bennett (1991) refers to as "decision points": the decision that construction is required, and the nature of that construction. The agency then conducts further research and an initial appraisal, "of the chosen country's economy and politics, the opportunities for work, finance, local construction industry, materials, and likely staff conditions," (Baden-Powell, 1993). Not until Baden-Powell's fourth step does the agency conduct a needs assessment "to really find out what is, or is not, required," (ibid). A crucial point he makes is that partnerships are established as early as the needs assessment.

> Most importantly it enables contact to be made with relevant people. It is as a result of contacts that further steps may not be taken, partnerships established and so on. (Baden-Powell, 1993)

Baden-Powell's fifth step is a "full appraisal", to follow the initial appraisal, and to precede a project proposal to donors. As a postscript, Baden-Powell adds that this kind of appraisal can be ongoing – rather than once-only, or only at certain stages.

Awatona (1991: 19) argues that in developing countries, little to no attempt has been made to involve local communities in the programme stages of problem definition, decision-making, and implementation. The cost of such policies is that low-income individuals and families are at considerable disadvantage in reconstruction programmes, because they are given no opportunity to define and convey their interests. Lack of local involvement can cause different international organisations to define needs in different ways. When this occurs in a small geographic area, conflicting definitions of what is required can cause confusion and unfairness. In the case of post-genocide Rwanda, for example, the UNHCR reports:

> …Two neighbouring villages received different types of help creating jealousies (Kagabiro, Kibuye prefecture, where one village received the roofing kits and only a few doors and windows, while, on the other side of the bridge at some 300 meters, a new ECHO funded village received the full assistance). (UNHCR, 2000: x)

While some may attribute this example to poor inter-agency coordination, it also serves to strengthen the argument that greater participation is required in the assessment of needs.

This argument extends to the second factor of a typical needs assessment: identifying the target population for aid. Skotte (2003) notes this can be a very expensive process; one NGO active in the Knin area of Croatia, for example, spent 22% of its housing construction budget on identifying the target group. Furthermore, applying selection standards could be as difficult as setting them. Using income levels as a criterion for eligibility, for example, is very challenging. How can an external observer establish whether income meets needs – for every individual, household, or community surveyed? Certainly a key source of information in this endeavour is the individual, household, or community itself, together with others around it. A needs assessment that takes into consideration local knowledge could help to identify the most vulnerable, and ensure that programmes are correctly targeted. Most importantly, it may help to establish common conclusions, accepted by all (or at least more acceptable to communities than conclusions established in their absence).

In addition to identifying needs and target populations, a third way in which community participation can benefit a needs assessment is in verification of data. Field reports from various

organisations can sometimes be contradictory; for example, in Aceh after the 2004 tsunami, the government estimated that 120,000 houses were needed, while the UK Department for International Development (DfID) estimate was only 78,000. Variations in data can be due to a variety of reasons, such as a wish to augment or reduce funds (depending on perspective: recipient or donor). While involving communities in data collection and verification may lead to further difficulties, it could, alternatively, be an important means of gathering information that may otherwise remain unknown to programme implementers and other organisations.

In addition to being more inclusive, needs assessments could also be more comprehensive, covering more issues. Specifically, they could assess the capacities of local communities, and international organisations. Aysan (1995: 52) recommends assessing what is available among local communities for undertaking construction projects. Local communities may choose to contribute in a variety of ways: land, skilled and unskilled labour, building materials, technology, or financial and institutional resources. Communities often struggle on their own to return to normalcy, with signs of success including: early efforts to repair and re-open schools; commercial activities; investment in construction; efforts to restore infrastructure; and the restoration of institution and facilities of local authorities (IFRC, 1991: 68).

An issue often ignored in both theory and practice is the lack of human resources for construction in international organisations. To date, no aid organisation exists devoted to the issue of construction. International organisations lack expertise or even technical support in architecture, planning, and construction management (Vaux, 2005: 48). In Bosnia, for the reconstruction of a third of the 412,000 homes damaged or destroyed, aid organisations had no units dedicated to construction, nor did they have professional construction and/or management specialists at their headquarters (Saunders, 2004: 166). Elsewhere, organisations recruit short-term staff to fill this gap. These staff are usually unfamiliar with the institution, the context, and long-term development issues. Those who succeed, do so in spite of inadequate structural support from their organisations. Given its share of aid expenditure, construction is the least successful sector in the recovery process; USAID, for example, spends a quarter of all its investment on construction (ibid: 162). In the leading organisations involved in construction, the design and implementation of their construction initiatives is undertaken by generalists, specialists from other technical disciplines, or consultants (ibid: 166). Despite this generalised lack in international organisations' capacity, few needs assessments include an assessment of implementing organisations' own skills, time, resources, and so on.

2.4.2. Setting objectives

To be of value, objectives should work toward the good of the affected community, by being consistent with the overall programme aim, realistic given the budget and time period, measurable in terms of quality and quantity, and acceptable to those involved (Miles, 1979: 19). Since no organisation can achieve all their objectives at once – especially in disaster situations – researchers recommend establishing a priority list, with tasks defined in sequence, according to their importance (Davis, 1986:48). One option, for example, is to rebuild all damaged areas in a region in one phase; another option is to rebuild sequentially, in phases determined by local authorities (ibid).

Bennett (1991: 5-20) identified six management concepts – complexity, size, repetition, uncertainty, speed and economy, and quality assurance – suggesting that "these concepts may help in determining the appropriate form of organisational plan". He recommended that implementers, "clients", and designers collectively decide values for each of the six concepts (ibid: 15). **Complexity** refers to the number of project activities. It is determined by the time scale (e.g. if the project is in phases, or if logistics must be sequential), number of physical locations involved in the project, and the number of building components, type, and technologies. **Size** can either refer to cost, volume, or some other qualitative or quantitative measurement (Bennett gives the example of "number of beds in a hospital"). Defined from a construction management point of view, size refers to "the number of technologically distinct teams used to calculate the units activity…combined with timescale to make a basic measurement of one day's work for one team," (Bennett, 1991: 7). In disaster recovery programmes, project size is generally measured by budget, number of people assisted, or number of units completed. Measuring the number of beneficiaries is less frequent, as organisations seem to find this more difficult. What has proven successful, is measuring indicators of community-building, such as team development; Cabannes (1988: 30) gives the example of teams working together for the maintenance of buildings, grain production, sanitation, and waste collection. Such indicators are helpful, in that they measure *process*. They illustrate that objectives in construction should perhaps not only be product-oriented (with quantitative indicators such as "houses constructed", etc.), but also qualitative and process-oriented: capacity-building, employment, income generation, and so on.

Successful construction projects are often repeated. Alternatively, **repetition** can improve performance, lower costs, and thereby increase wages as the workers may share in the benefits.

The repetition is not simply in the form of the building, but in the organisation of the process. However, the repetition of ideas should be tested carefully from one location to another. For example the review of the UNHCR housing programme in Bosnia and Herzegovina shows that UNHCR spent about $1 million on a series of tents. These tents had proved very successful in hot climates but were totally unsatisfactory for the Bosnian winter and culturally not acceptable as the Bosnians regarded living in tents as degrading (Irvin, 1998: 8-10). Replication often happens in an ad hoc way, rather than being planned (Clark, 1991: 94). A series of questions regarding the replicability of some of organisation's construction programmes can be asked, including:

> Is there an adequate reservoir of the human resources required? Will the approach work as well elsewhere? Can a loss of flair in the original project be guarded against? Would it be better to multiply the number of like projects rather than increase the size of parent project? (Clark, 1991: 94)

Replication in housing does not always bring success, however. In 2005 in post-tsunami Aceh, the International Organisation for Migration (IOM) built a large number of prefabricated houses, which meant relative simplicity for supervision, deliveries, equipment and organisation. Oxfam, meanwhile, built houses on-site. While this was perhaps preferable to prefabrication, the number and remoteness of building sites made project management expensive and difficult. An alternative would have been to confine their role to providing and delivering materials, leaving the construction process to village groups under the guidance of technical local advisors. Had they chosen this alternative, Oxfam would not have been burdened with day-to-day management problems, freeing their staff to carry out more projects.

Information is key to management, with "planning being the basis for control, information as the guide, and action as a result," (Miles, 1979: 152).

> Good managers consider the possibilities, weigh up risks and practise contingency plans to deal with threat to their proposed action, and form their plans in ways to minimise the maximum threats to their project's success. (Bennett, 1991: 48)

Bennett (1991) defines two types of **uncertainty** in construction: variability and interference. While variability is "internal" within an organisation, comprised of "differences in the ability and working patterns of different teams", interference is "external" to an organisation. In disaster contexts, variability in the quality of construction teams is inevitable, due to shortages of skilled and semi-skilled labour, the harsh working conditions, and the psychological effects of disaster in terms of individual and collective trauma. Meanwhile, external uncertainty or "interference" often affects logistics. Prior to the tsunami in Aceh, for instance, sourcing timber took about two days. After the tsunami the process took at least two months. The only seaport capable of receiving commercial ships was outside Aceh, in a neighbouring provice. The road from this seaport into Aceh was in poor condition and unsafe. Following the tsunami, a special governmental authority,

the BRR, was established to coordinate reconstruction activities. Although the BRR permitted the import of timber, the Indonesian Custom Authorities followed an Indonesian law that prohibited timber imports. These factors cumulated in a two-month delay for each timber delivery.

In the conventional construction process, a large amount of data is published about **speed and economy**: how long a certain building may normally take to erect and how much it can cost. Reference to this data, combined with experience, can enable managers to establish a fairly accurate timetable and budget. However, in disaster situations, new methods are frequently being tried and tested; this is where the importance of using prototypes is evidenced (Mitchell and Bevan, 1992). Small-scale experiments provide a basis that will develop a project timescale and budget. Oxfam, for example, built one house as a pilot project during the first half of their year in Aceh. This test case revealed that the houses could be built at the cost of £1,500 and three weeks of work. On the basis of this information, Oxfam was able to develop a budget proposal to build 2,000 houses during the following phase of the housing programme. Lastly, Bennett (1991: 20) defines **quality assurance** as "making sure that project delivery meets your requirements, by employing management systems and processes, and setting project controls to meet project milestones".

2.4.3. Siting/acquiring land

> …[In post-tsunami reconstruction, implementing organisations] have accepted the need for seismic safety in building reconstruction but have been reluctant to engage in the debate about reconstruction in the immediate coastal areas. There is no commonly agreed definition of what is ‘safe’. The removal of people from ‘buffer zones’ is not clearly justified by scientific evidence… (Vaux, 2006: 43)

Whether to live in hazard areas and take strict mitigation measures, or move elsewhere, is one of the most difficult questions facing planners of construction programmes in disaster-affected areas. Reconstruction programmes require land and security of tenure (Aysan, 1995: 52). In certain disasters, survivors lose their land documentation, and in some areas, there is no institutionalised land record. After the 2004 tsunami, for example, individuals and communities had no documentation to certify land ownership, and the government land record had been washed away (Vaux, 2005: 17). Added to this was the submersion of large tracts of land along the coast. In this situation, construction planners were expected to provide shelter for the homeless survivors (as weather conditions were harsh), while land tenure issues were yet unresolved.

This example is but one among many, in which planners face the decision of whether or not to relocate infrastructure (and by extension, people). There may be sound psychological and physical reasons for moving away. It represents a fresh start, in an area untouched by trauma and loss; or it may remove an important factor in the community's physical vulnerability to disaster. This is not, however, a decision to be taken lightly; people may be attached to a particular site for an array of strong social, cultural, and economic reasons. The cultural, symbolic, and historical significance of the damaged area cannot easily be transferred to a new area; returning to a particular area, even if it is still unsafe, may be an act of defiance or an attempt toward psychological healing. Settlements do not spring up arbitrarily, and there are usually good reasons why a community settles in one place rather than another. These reasons may be positive: access to a trading route or important natural resources; or they may be negative: economic or political hardship could force people to settle in a particular location.

The site selection process may take a long time because of the numerous aspects to be considered: land use, exposure to hazards, infrastructure, environmental impact, property rights, and access to employment opportunities. When a disaster hits rural areas, survivors are likely to move closer to cities, and may often settle in slum areas near city centres (Barakat, 2003: 19). For construction programmers, one option is to build for these survivors on their self-settled location. But this option is problematic, as it may or may not imply legal ownership. In addition, differentiating between displaced persons and host communities is neither easy nor necessarily ethical. An alternative to building on-site is to carry out construction programmes in newly allocated areas, where consideration has been given to livelihoods, environmental impact, and access to local economic activities.

2.4.4. Technologies/materials/employment

New technologies can increase the resistance of constructed elements to disaster (ICE, 1995: 82-83). Yet mimicking construction practices of developed countries in developing countries has been criticised for creating dependency and wasting limited resources (Davis and Aysan). In response, the concept of appropriate or "intermediate" technology was proposed in the 1970s (Schumacher, 1973: 167). This emphasized using local resources, capital and assets, and focused on operations and maintenance (ITDG, 1980: 17). Appropriate technology, however, does not mean elementary or primitive technology (Parsa, 1989: 28). Sometimes industrialised building technologies – such as prefabricated houses – are presumed to be a quick solution. After the tsunami, for example, the International Organisation for Migration (IOM) carried out mass

housing using a prefabricated, semi-detached, 36 square metre, moulded concrete unit, which included water and electricity, and was designed to withstand earthquakes of up to 7 on the Richter scale. Although this mass production supplied people with a place to live, it was relatively inappropriate to the sociocultural and economic situation of the Acehnese.

Reconstruction can rapidly increase demand for materials, thus raising material prices, or even the taxes levied on those materials (ILO, 2006: 23). Price hikes can also be due to contractors inflating prices when bidding for projects. As construction takes place, the question of building materials usually becomes the most pressing environmental problem. Transporting materials can cause premature deterioration of roads, for example. Yet the larger environmental issue is usually that of resource extraction. Following the tsunami in Aceh, for instance, the demand for construction materials forced builders to obtain timber from the tropical forest – something that had been forbidden since 2001 (Montlake, 2005). Reconstruction in Aceh was expected to use four million cubic meters of raw and processed logs over five years (ibid). This rapid rise in demand raised local timber prices by 20%. While the government hinted the logging ban may be relaxed, some worried this could lead to landslides (ibid). Despite the ban, 70% of Indonesia's timber was estimated to be cut illegally, much of it for export. Many suggested that importing timber was no solution, as illegally logged timber could be exported, and then brought into Indonesia under "some other banner" (ibid). Donors worried that importing timber would prove impractical, or might fail to meet builders' needs and local expectations. Lastly, deciduous timber was different from Indonesia's tropical hardwoods, and would have needed treatment to withstand the humid climate. The example of timber in Aceh well illustrates the dilemmas faced when searching for materials in reconstruction.

"Contractor-based construction" seems to be viewed by some organisations and donors as being the easiest and quickest method to implement a construction programme and resume community normality. It is especially useful when the planned facilities are expensive or communal, such as schools, roads, and other infrastructure. This method relies on contractors who usually specialise in one type of construction such as residential or commercial building. They take full responsibility for the complete work, except for specified portions of the work that may be omitted from the general contract. Although "general" contractors may do a part of the work with their own teams, they often sub-contract most of the work to heavy construction or "specialty trade" contractors. In contractor-based construction, materials and expertise are often imported from outside the target community, despite some suggestions to pursue more labour-intensive practies:

> It is foolish for a contractor to surround himself with expensive, rarely used and inappropriate machinery as it would be refused even to buy a wheelbarrow on the grounds that the work could be done as well, but more expensively, with men with hand pans. A sense of balance has to be acquired quickly and adjusted with time and experience. (Miles, 1979: 106)

More labour, however, implies more management:

> Progressive construction units aim to maximise the use of simple labour intensive methods. This objective is not justified in social terms, but reduces fixed capital requirements and improves cash flow, as well as lowering the overall cost. Labour intensive methods are sometimes put forward as appropriate but more labour requires more management. (Miles, 1979: 16)

Understandably, not everyone wants to work on a building site, as implied by the above view of labour-intensive work as "not justified in social terms". After the 2004 tsunami, Habitat for Humanity (twinned with Christian Aid) found that people in Banda Aceh were unwilling to work on building sites: they said they had small shops in the city and were not familiar with building work (Vaux, 2005: 40). Yet this was an exception; many people across Aceh were keen to be involved, not only for income, but also to ensure quality and efficiency – two aspects felt lacking in the work of contractors.

Perhaps a more empowering alternative, "community-driven construction", has been proposed to mobilise and enable communities to undertake construction initiatives by themselves. A noted example took place after the second World War in the former Soviet Union, where approximately 15% of urban homes were said to have been built by their owners, using a handbook distributed by the government (Blumenfeld, 1991: 28). Community-driven construction is believed to be applicable in housing construction in rural areas, when the design is simple, labour is available, and there are no time limits. In the community-driven approach, external support may be in the form of building materials, expert advice, and financial facilitation; communities themselves may contribute financially.

> In post-disaster environment, urgent construction assistance by donors has generally been implemented by international NGOs with high overhead costs. Through involving the community in the construction process, where communities manage their own funds, they have a strong incentive to economise on available resources by increasing their contributions through community labour, using locally available materials, contracting local expertise, and applying appropriate technology. (Cliffe, 2003: 4)

Overall, it is seen as a way of ensuring that genuine needs are met and the benefits of construction initiatives are felt more immediately.

> [For example, in Indonesia] the Kecamatan Development Project – though not, strictly speaking a community-driven construction project – operates in several provinces with widespread and highly destructive conflict. Economic evaluations found that unit costs were substantially less than public agency costs, despite the disruptions caused by conflict. Farm-to-market roads, for example, cost an average of $4,000 per kilometer when built through community-driven construction techniques, but $11,000 when built by the public road agency, even controlling for the technology that was used. School repairs

> showed a similar cost difference, with CDR methods costing $2,000 versus $5,600 to make the same repairs using local contractors. (Cliffe, 2003: 4)

But the aim of employing community members is partly to provide a source of income. In many situations, income determines vulnerability.

> The issue on which there is more agreement is the need for long-term reduction of vulnerability. There is a need for wider assessment of risk […including] earthquakes, floods and cyclones as far more common events. These long-term plans need to be integrated into actions... Shelter design is an obvious area in which risk can be reduced, but there is also a danger that livelihood inputs are making people vulnerable. (Vaux, 2006: 43)

In addition to income, other advantages of community-driven construction may be a sense of ownership, psychological recovery, and improved community relations.

2.4.5. Architectural design

As stated above, standardised architectural design can be technically challenging, inappropriate to sociocultural needs and preferences, and economically costly to install, operate and maintain. One example of this was witnessed after the 1999 earthquakes in Turkey, in a hospital built by the German Red Cross in the town of Gölcük. The architectural design was done according to German standards, and was fully computerised. Once complete, the hospital was handed over to the Turkish authorities for operation and maintenance. Unfortunately, none of the people working in the hospital or the region were familiar with the design characteristics – especially the computer systems on which the hospital was run. The hospital fell into disrepair and disuse, and was eventually deserted.

Another example can be drawn from post-tsunami reconstruction in Aceh. Beneficiaries, in the end, were the ones to suffer from the range of problems related to architectural design, listed as: "[1] uncoordinated agency planning, leading to a large number of different and inappropriate designs; [2] different and often inappropriate approaches to construction; [3] poor coverage because of the uniquely "lumpy" nature of the resources; and [4] inadequate resettlement planning," (ALNAP, 2002: 95). The multiplicity of options (and especially the prioritisation of cost as a criterion for choosing among them) was viewed by some as a disadvantage:

> It would be unwise to assume that lower costs are always better: there is a trade-off between seismic safety (which favours use of timber), environmental concerns (which favour expensive imported timber) and durability (which dictates use of cement and brick). There is actually little difference in cost per square meter between houses built of the different materials, and it is difficult to be clear about cultural preferences. The most important issue is not cost but the bewildering range of house designs and the difficulty this presents to local people in making choices. (Vaux, 2005: 20)

Such multiplicity can also be viewed as an indicator of a lack of consensus among donors and implementing organisations on what exactly "best practices" are, in either policy or implementation (ALNAP, 2002: 95). Although perhaps an obvious statement, the need to take into account various factors in architectural design is not always acknowledged (i.e. factors such as culture, climate, natural hazard, standard of living, the local or national style of building, appropriate levels of services, and what kind of appropriate technologies could be introduced in the disaster situation).

2.5. Implementation

2.5.1. Reporting

While organisations are urged to be transparent in recovery programmes (Stiefel, 1999: 20), little literature can be found on the importance of reporting *to beneficiaries* in particular. Yet some examples can be found of the benefits of this approach, when taken.

> Where possible, the Iranian government does not relocate or attempt to combine damaged settlements. Rather, the policy is to rebuild them on their original sites (*darja sazi*). This is intended to minimize cost, save time, and prevent unnecessary conflict between the people and the government. The government also avoids certain actions such as reconstructing apartment complexes, building houses before the owners have returned to the settlements, and using prefabrication techniques. *Experience in Iran indicates that previously those actions were not popular with the people*. Rather, endogenous techniques and ones that use more local or national resources are preferred: they are said to reduce the nation's technological dependency. *A flexible planning approach is adopted so that feedback and inputs from people are easily incorporated to improve the quality of operations*. [emphasis added] (Amirahmadi, 1996: 164)

In addition to the numerous technical management lessons of the above passage, what this example illustrates is that the built environment stands long testament to either the accountability, or lack thereof, involved in construction programmes. Construction anywhere, once built, tends to remain long after it has served its purpose (Beyer 1965:54), reminding all those who see it, of the ways in which it was built, and the degree to which it responded to the wishes of local communities.

2.5.2. Coordination and management

Coordination is necessitated by the number of official and charity organisations working at the international, national and local levels (ESCAP, 1992: 292; Jaggles, 1997: 424). Some believe development organisations must take the lead in disaster management (Sirleaf, 1993: 307).

> There are less than 20 organisations responding to tsunami affected areas, including at least 6 international organisation and 10 NGOs… It could be imagined that coordination

> would have been relatively simple. However, this has not been the case. Whilst the transitional government is institutionally weak, there has been allegedly a lack of coordination leadership from usual international organisations, compounded by reportedly competitive behaviour. (UN OCHA, 2005)

If resources are abundantly available to international organisations, they have little need to coordinate with donors, the UN, or other organisations (Vaux, 2005: 48). Instead, efforts may focus on publicity.

> Each will be primarily concerned with fulfilling its own purpose and desire visibility or recognition for its efforts. While this may not appear congruent with being an organisation providing relief in a humanitarian crisis, it reflects the reality that NGOs have a charter and they must show results to their constituencies or their funding stream will suffer. (US Navy, 2005: 4, cited in Vaux, 2005: 26)

Sometimes unclear or – as above – conflicting mandates impede progress (UNRISD, 1993: 21). In summary, either underemphasis or overemphasis on coordination can lead NGOs to "subordinate the ultimate aim of helping stricken communities," (Anderson and Woodrow, 1989: 89).

Concerns have been raised – especially regarding community-driven construction – that decentralising finances leaves open the possibility of mismanagement and corruption. In response, some have suggested that a set of requirements may need to be in place in order to initiate community-driven construction; these requirements could include, for example, a strong sense of community, and the capacities to carry out such initiatives, to address technical and financial issues, and to coordinate with other sectors (Cliffe, 2003: 19). Nevertheless, local management is perhaps no more susceptible to mismanagement than other levels of management: regional, national, or international (ibid). Beyond the public sector, some look to the private sector to help "restore growth" and reduce disaster risk (Arnold and Kumar Jha, 2005). Advocates of private sector involvement cite the example of Japan after WWII, where land reforms and labour legislation enabled increased private investment in construction (Shimizu, 1989: 8-10).

> In the private sector such construction firms have the expertise and cost-effective technologies essential for effective reconstruction. By increasing investment, they can develop alternate safety nets and create a diverse and resilient economy better suited to weather future disasters. Governments and donors can help by increasing access to finance and promoting knowledge sharing and technology transfer with the private sector. (Arnold and Kumar Jha, 2005)

After the 2004 tsunami, the private sector – locally and internationally – was encouraged to participate in reconstruction. As with any situation, private sector participation there was dependent upon the sector's performance capacity. Returning to the issue of transparency, the private sector is equally responsible for upholding high standards, as mentioned above with respect to the public sector and international aid organisations.

2.5.3. Logistics

Disaster situations can pose risks and challenges – at both the personal and organisational levels – to the implementation of construction programmes (Bickley, 1997: 75). At the personal level, for instance, risks include disease and harsh weather conditions; at the organisational level, they include damage to infrastructure that affects the sourcing and delivery of construction materials. These risks can also spread to affected communities. In order to reduce risks to personnel, programmes, and affected communities, international organisations must take various precautions. This is usually done in the field of logistics. Davis and Lambert (2002: 109) defined logistics as, "getting the right thing to the right place at the right time, at the right cost". As such, logistics combines various elements, such as transport, communication, storage, and personnel management. In a disaster situation, the challenges of logistics are greater, due to damage to infrastructure and shortages of personnel, on the one hand, and to the uncertainty of the disaster situation, on the other hand.

Similar to disaster management, the key characteristics of construction management are complexity and a high level of human interaction (Uher and Lossemore, 2004: 10). Whereas, "management is about getting things done," "construction management is about getting thing built," (Miles, 1979: 5). While project management is concerned with managing ongoing operations such as manufacturing products or providing services with a long time period, construction project management focuses on delivering projects that are limited in time (before handover to end-users) (Uher and Lossemore, 2004: 5). Conventional procurement of design and construction is about "reconciling the client's objectives for the project with the particular characteristics of procurement systems," (Fewings, 2005: 84). Methods of procuring professional services, awarding construction contracts, and financing the constructed facilities can be quite different from one project to another (ICE (1995: 59). The International Federation of Consulting Engineers (FIDIC in French) has established various contract conditions, which some aid organisations (like the World Bank) have partially adopted.

> Universally, there are three ways to procure works or Service – direct negotiation, selective tendering or open (open to all say by press advertisement) tendering. The choice internationally depends on the value (normally valued in monetary terms), accountability and transparency… Tender documents, subject to subsequent contract types, should be as comprehensive as possible to include, but not limited to invitation and instructions, tendering data, conditions (general and specific), technical specifications, or bills of quantities. (Azmat Ulla, 2005a)

The IFRC South Asia Director and former Construction Delegate in Turkey, Azmat Ulla, explains that securities and drawings can potentially avert risks if they are comprehensive. However, "even with the best defined construction project in the world, no contract is “risk free”;

it is then a matter of good risk management," (ibid). Selection Criteria need to be set (to the degree possible[4]) before any Tender Evaluation Committee Meeting to ensure transparency (Azmat Ulla, 2005a). Various kinds of "selection methods" are possible, such as a "pass or fail" (Least Cost Selection) or point system (Value for Money) (ibid). In either method, technical prerequisites must be met before financial criteria is evaluated (or even seen – financial envelopes are to be returned sealed, if technical requirements are not met) (ibid). While legal systems differ from country to country, international organisations could establish general procedures for contracts and agreements (Kumar, 2005). Such documents require incorporation of clear and enforceable penalties for missing targets and poor construction quality.

As discussed above (see *Assessing needs*), a major impediment among international organisations is a lack of procedures in construction management, and training in construction-specific skills. Guidelines for recovery programmes were laid out in the UNHCR's *Handbook for Emergencies*, but were not specific to construction, and provided no exact procedures. As an example, a recent reconstruction programme evaluation in Gujarat was found by the programme lacked procedures and training in quantity surveying (procurement), contracts management, and construction finance (Chhetry and Shah, 2005; Azmat Ulla, 2005b). Staff payments were delayed due to a lack of procedures in place; meanwhile, unnecessary bureaucratic procedures were more focused on servicing the "system" than creating cost-effective impact for beneficiaries (ibid). Prior to a re-organisation, construction staff (delegates and management) were not highly qualified in construction (ibid). Financial reports were of little value to the construction progamme, and periodic financial management audits were needed (but not undertaken) to ensure accountability in construction activities (Azmat Ulla, 2005b). On a more international scale, an international review of construction needs within the International Federation of the Red Cross and Red Crescent Societies (IFRC) recommended that construction-specific audits be conducted, which would not only cover financial accounting, but would also look at bills of quantities and specifications, and verify these with the actual materials provided (ibid).

Conventional construction may have up to six budgets: (1) production; (2) cash; (3) debtors (money due in); (4) creditors (including allowing for growth); (5) capital expenditure; and (6) administration (again, including allowing for growth) (Miles, 1979: 123). These combined budgets (and especially the production budget) must be considered against the "sales forecast" in conventional construction (ibid), or the combined local and "donor budget" in the case of disaster

[4] For some kinds of contracts (e.g. admeasurements contracts), pre-defining criteria is easier than for others (e.g. lump sum contracts) (Azmat Ulla, 2005a).

contexts. The budgets should also allow for growth, which is particularly important for the creditors' and administration budgets (ibid). One lesson from conventional construction management is that reliance on one source of funding is risky.

> Ten thousand contracts for separate clients can represent a healthier workload than one hundred thousand prestige projects for a single customer. (Miles, 1979: 123)

This is equally true for construction management in disaster areas, where reliance on any single donor makes a project vulnerable to budget cuts or other unexpected circumstances that affect funding. Dependency upon donors makes aid recipients or implementing organisations vulnerable to donor constraints and aid conditionality. A last, and small note regarding logistics is the potential value of visual management tools, such as those developed in various software packages (e.g. *MS Project* and *Primavera*). These can be used to plan for the "introduction and termination of working capital, skilled and unskilled labour, plant tools and equipment, materials, subcontractors, information and communications," (Miles, 1979: 123).

2.6. Maintenance

2.6.1. Monitoring and evaluation

Monitoring and evaluation allows implementing organisations to learn from their previous experiences, and to prevent repetition of mistakes, in the event of future intervention. It can prevent disorganisation, mismanagement, or corruption. Lastly, and most importantly, it can identify problems early. In community-driven construction, monitoring and evaluation is extremely important to ensure transparency and accountability, and also to ensure that building materials were properly utilised in the constructed facilities (Cliffe, 2003). Some note, however, that monitoring and evolution with community-driven construction may be more expensive than with contractor-based construction (SIDA, 2000). The same caveats regarding needs assessment (see above) also apply to monitoring and evaluation: it should entail an inclusive process of data collection, verification, analysis and synthesis; and it should cover a comprehensive range of content, documenting local, national and international capacities and needs.

2.6.2. Training and institutional capacity building

In disaster, local populations and national authorities are said to become aware of disaster risks, and – despite constraints – more receptive to proposals for risk reduction and preparedness measures (UNDRO 1992:99).

> Lessons learnt from past experiences in many areas identify that changes are now necessary to current disaster management practice. The current approach is certainly not sustainable. In the past, too much emphasis has been placed on response and short term restoration measures. The opportunity should now be taken to introduce new initiatives for future management of disasters focusing on appropriate mitigation measures and levels of preparedness, and these measures should be fully integrated into construction work. Plans should be developed from the vulnerability assessments of natural hazards and training for disaster management should in the future be incorporated in development work programmes. (Broadbent and Broadbent, 2004: 8)

Disaster management can include three kinds of activities, all of which may be short- or long-term: rehabilitation, preparedness, and prevention (ESCAP, 1992: 291). Rehabilitation includes resettlement and relocation, restoration of community services, and assessment of the environmental damage (ibid). Preparedness became more important in the 1980s and 1990s (Jaggle, 1997: 624), and includes awareness raising and pre-planning for emergency and relief operations (ESCAP, 1992: 291). Lastly, prevention entails legislation, risk assessment, land use and zoning, building codes, and structural measures. Standards in construction and emergency services may cover: local accessibility within urban areas, for instance, where people can escape shaking buildings; as well as regional accessibility, such as construction type and height, and the speed of emergency and public services (Degg, 1994).

An important fact to note is that even if new buildings are constructed using disaster-resistant technologies or materials, existing building stock will mostly predate such techniques and regulation. Thus, lack of maintenance, or alterations and additions, will affect the quality of many buildings. The 1995 earthquake in Kobe, Japan, tragically illustrated the vulnerability of aging building stock. In the case of Kobe, the building code was sound, but its application was inadequate. Application of building codes can be influenced by monitoring and enforcement, as well as a number of external factors: the size of the local labour market, and its level of experience and technical skill; the type, quality, and cost of materials available; and the methods of financing construction. The combined result of these factors is that larger and well-financed projects often attract skilled professionals and are more highly monitored; by contrast, small projects may suffer poorer standards of construction. An example of this has been noted in an irrigation project in Mazar-I-Sharif, Afghanistan. The project fulfilled technical requirements, but where local institutional capacity was weak, the system suffered from lack of maintenance.

> It seems no twist of fate in these circumstances that, in present day Mazar-I-Sharif those neighbourhoods with the strongest sense of community are those which still benefit from an effective system of water distribution. (Leslie, 1995: 30)

This example – while different from the traditional example of building codes for earthquake-resistance – illustrates that regulation is not the sole determining factor in the application of the

building code – although it is arguably the most important factor for the purposes of disaster management.

Although some international aid organisations – through construction activities – work closely with relevant government institutions (such as ministries of health, or of public works and settlement), such cooperation does not always include long-term development and capacity-building (Vaux, 2005: 5). A case study of the IFRC's Maldives and Sri Lanka construction programmes highlighted that the sharing of expertise with bilateral partners was not covered by Service Agreements (Soylemezoglu and Chan, 2005). IFRC staff suggested that in future projects, information be shared between international organisations and their local partners (ibid). Taking this further, some aid analysts argue that loans or technical assistance are insufficient mechanisms for aid (Dudley, 1993: 10-18), especially if the chief beneficiaries are aid officials and consultants (Anderson, 1996).

> Whereas humanitarian assistance can often be justified for basic needs in disaster prone areas, it can be short lived, and even very limited in scope… Furthermore, the resources for such an approach can be considerable. It is thus reasonable to question whether better use could be made of a small proportion of these resources for future preparedness and mitigation measures. This would be particularly pertinent to a wide range of typical engineering works and necessary budgetary commitments. Perhaps better use could be made of the national resources adopting good disaster management practices, with a focus on building up capacities and capabilities under training programmes for the implementation of planning, mitigation, preparedness, response and relief measures at the times of national emergencies? (Broadbent and Broadbent, 2004: 5).

An important practice, rarely observed, has been to deliver funds to local organisations, who can then use these funds toward equitable salary payments to their staff. The two alternatives to this practice each have strong disadvantages; either (1) local staff – especially highly trained and experienced professionals – could seek employment in international organisations, which tend to have higher salaries; or (2) international organisations could limit their own employment to exclude local people. This latter practice has been widely observed, most recently in Iraq and Afghanistan (Broadbent and Broadbent, 2004: 6). As a result of these two practices, local authorities may not have the financial capacity to employ trained professionals to carry out building inspections and other maintenance operations. A complementary solution to this problem is to develop and implement – on an ongoing basis – ways to increase local capacity and skills.

> Community leaders and representatives of the public should be trained by government, donors, and specialised NGOs conversant with disaster management practices. The purpose of the training would be to develop a capability to undertake a phased work plan to both upgrade traditional constructions to be more responsive to hazards such as earthquakes and to impose an appropriate regulatory framework for any new works. (Broadbent and Broadbent, 2004: 10)

Developmental activities could promote:

- skills in operations, urban development, and management;
- good practices in construction;
- a culture of safe building; or
- appropriate organisational structures.

In general, the end goal would be to develop teams of well-trained professionals to work in the field of construction management and regulation. In addition to construction expertise (such as architects and engineers), these could include professions with expertise in sociocultural and economic issues, such as economists, social workers, psychologists, and others.

2.6.3. Future financing

While construction, monitoring, and evaluation may be financially supported (at least in part) by the implementing organisation(s) until the project is complete, the question remains as to who will subsidise maintenance costs? Housing may be handed over to individual owners, but what about shared facilities serving that housing? Or public facilities, like schools, roads, or health care?

> …it can never be assumed that once infrastructure is successfully built there will be a national capacity and capability to automatically take over the critical operation and maintenance of finished works. Moreover, the financial resources required for desirable levels of maintenance have often not been available. The benefits from new works were often never realised, and infrastructure often fell rapidly into disrepair. (Broadbent and Broadbent, 2004: 6)

In addition, local authorities and communities require financial resources to employ personnel, procure equipment, and upgrade training, in order to enforce the construction code and ensure proper urban planning. In disaster contexts, financial resources are often scarce, and lack of financial management prevents local authorities from carrying out these responsibilities. While initially, "external financial aid is very important to help rehabilitate vital social services, and provide infrastructure," (Colletta, 1996), the question of sustainability remains.

> The available domestic resources to address the consequences of these events are often very limited. Accordingly, external assistance has frequently been sought from the international community for relief and survival followed by restoration and reconstruction. But is this approach sustainable? (Broadbent and Broadbent, 2004: 5).

The alternative suggestion – that local authorities take responsibility for maintenance costs – could be controversial, especially in developing countries. Meanwhile, beneficiaries are often unable or unwilling to pay toward public facilities' maintenance, or the development of new urban schemes. One reason for this could be a lack of trust or sense of ownership. But also,

communities may be in a difficult economic situation, making any kind of payment burdensome. Financial sustainability is thus constrained by local political and economic conditions.

To conclude, finance can perhaps be viewed in a holistic way, in the sense that meeting community needs and wishes, and seeking to rebuild social, cultural, and other communal structures, can strengthen community cohesion and perhaps even financial capacity. This could be done, for instance, by addressing the economic issues described above, such as employment generation, and accommodation of existing and potential future livelihoods. In this broad context, perhaps communal fees collection could become feasible. It is worth noting that in disaster, sociocultural and political/institutional networks may be disrupted, and thus joining together to collectively finance facilities may not be easy. The absence of an equitable framework for fees collection could further generate tension within and between communities and public institutions. Collecting fees in a way that accounts for all the above factors can help to secure a sustainable social balance, as well as a sustainable financial resource. This would assist local authorities to carry out their responsibilities, of inspections, maintenance, urban development, and so on. In this way, sociocultural, economic, and political/institutional sustainability can join together to ensure that constructed facilities are safe and reliable.

Part III. Development of the proposition

2.7. Construction in cross-cultural contexts

The following five case studies are drawn from various sources. The first two are based on experiences as an intern in 2002 in Sri Lanka and Northern Ireland. The latter three are based on the work of six researchers, who documented their experiences and analyses of reconstruction projects carried out in the 1980s. Following a description of each, the five case studies are then compared in tabular form, using the recovery programme life cycle as a framework.

2.7.1. Sri Lanka

Fieldwork in Sri Lanka was conducted during an ongoing conflict – evidenced by strewn ruins of aeroplanes, numerous road blocks, military personnel, and curfews. The field visit was hosted by FORUT, a Norwegian Swedish based organisation. I was one of eight team members assigned to conduct fieldwork in the Anuradhapura, a town located in the centre of Sri Lanka. Anuradhapura borders the Vavuniya District, where fighting was ongoing between government troops and the Liberation Tigers of Tamil Eelam (LTTE). As a result, an influx of internally displaced people (IDPs) lived in Anuradhapura in welfare centres, relocated villages, and with friends and relatives. We examined coping strategies, relations among host communities and IDPs, NGO activities, ethnic minority issues, shelter, security, education, capacity-building, and food security.

This experience provided an insight into community resilience and the limits of government and outside intervention; NGO activities were creating dependency among communities on outside support. Problems in Sri Lanka were complex, and stemmed from the combination of armed conflict and government failure to address overall development. The conflict had exhausted government resources, and yet holistic reconstruction planning was required. What was most important, however, was that local people (including IDPs) coped remarkably well, making the most of the situation. The visit showed the benefit of community involvement, leading to greater prospects for self-sufficiency, and bringing people together through physical reconstruction activities.

2.7.2. Northern Ireland

Northern Ireland has been affected by a long period of armed civil strife, leading to massive destruction of houses and infrastructure, and displacement of people. The conflict in Northern Ireland is not only historical, but continues today in the form of inequality in access to resources – such as housing, education, and employment. Segregation between Protestants and Catholics has reduced tolerance of living in mixed environments, and systematic discrimination against Catholics in service provision led to the creation of the Northern Ireland Housing Executive (NIHE) to reduce such inequalities. The case of the Northern Ireland Housing Executive provides an understanding of housing settlement design and urban renewal in divided communities. One project in particular – the North Belfast Housing Strategy, 2000-2007 – is a concrete example of how housing investment can aim to make a full and positive contribution to a community's wider socioeconomic objectives.

The project illustrated four key points:

- Planning and implementing construction programmes, through community development and based on an understanding of context and local circumstances, can contribute to improved interpersonal and inter-communal relations.
- Although the situation was not optimal, changes were not imposed upon people. Instead, immediate needs and wishes were acknowledged, considered, and addressed.
- Promoting regeneration and social inclusion, through partnerships with other agencies, can encourage a holistic approach toward the nature and diversity of housing needs.
- Addressing housing needs alone would not have provided a solution to the multiple problems that existed – poor health and environmental standards, education inequalities, and unemployment. The project's key to success was the involvement of local communities in the regeneration process.

2.7.3. Vietnam

In October 1985, two typhoons struck Bin Thien province, in central Vietnam; 875 people died, 49,000 houses were destroyed, 230,000 houses were damaged, 2,600 classrooms were destroyed or damaged, and 6 hospitals and 250 health centres were damaged. Chantrey, Norton, and Nguyen (1990) describe a reconstruction programme that was developed to construct buildings illustrative of storm-resistant building methods. The aim was to demonstrate the benefits of these techniques, so that local people would adopt them. In essence, the buildings were not the central

element; rather, they were meant to illustrate techniques taught and promoted through local workshops, which were the central element of the programme. The programme was initiated by UNCHS, and implemented by four NGOs: two French and two Vietnamese.

Figure 2.3: Vietnam map.
Source: *Country profile: Vietnam* (2006).

The programme was able to identify technical ways of improving local technologies so as to make them more resistant to storms or typhoons. For example, "the re-introduction of small holes on the under-side of roofing tiles, which allow one to tie them down with wire to the batten," (Chantrey, Norton, and Nguyen, 1990). The programme developed "a process of training technicians and builders that had been tried and tested," bringing together teams that "represented a real [local] capacity to identify applicable techniques, evaluate them and undertake their diffusion," (Norton, 1995: 143). Overall, the programme succeeded in showing how local institutions mobilise resources and people, disseminate information, provide education, faciliate decision-making, and complement the skills of more centralised institutions. It also showed how external organisations can bring new perspectives on organisational processes, to direct local resources toward common goals.

Yet the implementing NGOs found that demonstrating technologies was not enough to convince people to use them. Norton (1995) recommended that in future, perhaps the argument could be made to individuals and families that if they invested in their homes before a storm, they would pay less in repairs afterward. He felt the programme had been given insufficient time, and the local NGOs had been given insufficient funds, to be able to spend the resources needed in communicating their findings to the Vietnamese public (and in particular, the households that could benefit from safer housing). A local study had proven that storm-resistance could be achieved in most buildings with just a ten percent increase in construction investment.

"Sustainability is about finding what can be done and maintained with local resources, rather than thinking about what could be done if one found resources from elsewhere," (Norton, 1995: 143).

Norton (1995: 140) acknowledged, however, that:

> …for the many families living in thatched, branch and bamboo structures, the extra cost of strengthening these buildings though small, would still remain very high to families whose income was negligible. What money there was went towards more immediate day-to-day needs.

In response to this fact, Norton (1995) argued that if success were defined as local adoption of the practices promoted (such as building regulations), then an integrated process of development was required; this would also thus address the diversity of risks that people faced.

2.7.4. Ecuador

In 1987, an earthquake in northeast Ecuador killed 1,000 people and caused thousands more to be evacuated. It damaged roads, buildings, and economically vital oil pipelines; 15,475 houses were damaged or destroyed, 56% of which were in rural areas. While aid was contributed to all sectors, housing was identified as a priority. Diego Jordan (1995) documents the development of one housing project in particular, in the municipality of Canton Pimamprio. The following discussion reviews his account, to learn how such programmes can be sustainable in future.

Figure 2.4: Ecuador map.
Source: *Country profile: Ecuador* (2006).

The housing project was funded by the UNCHS (which provided technical advice[5], vehicles, and educational materials), the Inter-American Development Bank, and Ecuador's Ministry of Social Welfare. These organisations covered all costs (about US$182,000) except labour; beneficiaries

[5] Technical advice was also provided by Ecuador's Bureau of National Housing (Jordan, 1995).

built their own homes. The project worked with 34 communities, aiming to build 356 homes and five communal buildings.

The project had two successes, one technical and the other organisational. Its technical success was to base its design on local technologies and materials, with minor modifications for safety. The first modification was a "hipped roof to balance and better distribute the weight to the walls, and concrete foundations," and the second modification related to making the traditional earth bricks using "L-shaped moulds to increase corner support and rigidity," (Jordan, 1995). The adoption of local methods and materials was felt to increase public acceptance of the buildings and their safety innovations (ibid). Additional details, like doors, windows and plastered walls, helped to increase popularity also. These reasons for acceptance, together with two participatory workshops and the training of local people as foremen, could be considered as an organisational success of the project. Local satisfaction with the design was a direct result of the project's attempt to involve local people in the development of that design.

The project began with one advantage: local communities had a pre-existing culture of self-help. Nevertheless, the building process was long and arduous, and took its toll on local communities. The project managers searched for a site with flat ground, to minimise the danger of a landslide. While they achieved their objective (in part due to a contribution by the Municipality), they excluded residents whose land was on sloping ground. This exclusion was later to cause problems in group cohesion and motivation. These were perhaps compounded when the project distributed tools and materials free of charge to all its members. This had the disadvantage of ignoring inequalities among beneficiaries; targeting – says Jordan (1995) – would have allowed consideration of these inequalities, so as to use fees from those able to pay, in order to provide additional support to those in need.

Yet staff were accustomed to a centralised government culture, and inexperienced in fostering community work. They focused on technical issues and timing, and not on sociocultural considerations (Jordan, 1995). Because they were members of the community, "some of the foremen, however, were able to work effectively for the solution of collective needs of the beneficiaries," (ibid). Despite their efforts, the construction process was still tiring, and would have been easier to handle, were it related to other activities in communities' domestic economies (ibid). Instead, it dragged on 12 months after its proposed 24-month period. Furthermore, the centralised running of the project made it difficult to "handover" to communities, and undermined community development (ibid).

Jordan (1995) points out an environmental lesson from the project. The key innovation – a timber roof – was predicated on the assumption that timber would be in adequate supply. Yet in the hilly region of northeast Ecuador, deforestation was a cause of increasing vulnerability from landslides. For this reason, the project chose not to source its timber from the communities in which it worked. Rather contradictorily, however, it sourced its timber from nearby communities – equally vulnerable to landslides. Moreover, no replanting scheme accompanied the massive extraction required for the houses' roofs. Using the scarce resource of timber, Jordan argues, thus reduced the replicability of the project's main safety innovation.

Lastly, the area was known for a high rate of migration between regions. Young men (and their families) moved frequently in search of work. The project, however, was established without taking such migration into account, and thus had no positive effects on those who needed to migrate for socioeconomic reasons.

2.7.5. Algeria

El Masri (1992) and Hireche (1987) have documented one of the most paradoxical construction projects of the 1980s. Following an earthquake in 1980 in the Algerian city of Al-Asnam (renamed Ech-Cheliff after the earthquake), a project was initiated to build 20,000 housing units. of 1980. Given that the area had been completely devastated by the earthquake – with 2,600 dead, 8,300 injured, 500,000 homeless, and two-thirds of the city destroyed – the Algerian Inter-Ministerial High Commission responsible for the project chose to import prefabricated houses from 24 foreign contractors. The houses, plus communal educational facilities, were all completed in two years – a relatively short and impressive period (El Masri, 1992: 59).

Figure 2.5: Algeria ma
Source: *Country profile: Algeria* (2006).

Yet the project was a disaster in many ways (El Masri, 1992: 59). The houses were set up on new sites, remote from one another and the old city. Families and their relatives and friends were randomly redistributed. Transport was seriously lacking, making travel extremely difficult for work, purchasing everyday goods, or social interaction. The educational facilities were poorly located, supposedly to prioritise speed, but still taking two years to complete.

The architectural design of the prefabricated homes were inappropriate to local lifestyles. The houses were built for an average European family, and were far too small for the average Algerian family of seven to eight persons. The indoor toilet was considered unhygienic; the kitchen's eight square metres was too small for large families, and added heat to the house. People felt the uniformity of the prefabricated houses lacked any character. As described above, the materials were imported, and the houses were prefabricated, cutting down on any employment opportunities that could have arisen from constructing the houses locally. The materials were also technically inappropriate – flammable panels, PVC tiles, and insulation all were serious fire hazards given the dry climate and the use of propane canisters for cooking.

Environmentally, the indoor air quality and climate was stifling. According to test by Hireche (1987) in 35°C weather, the indoor temperature was over 2°C hotter! This was due to poor insulation, housing layout, the size and direction of house openings, and the consequent lack of ventilation. As described by El Masri (1992: 65), "no intimate outdoor space is available on which the windows could be opened or where the family could gather in accordance with the local common practice".

The entire operation was centralised, building no local capacities and including no local participation. As discussed above, the location split families and communities and exacerbated socioeconomic vulnerability, while the houses' technologies, materials, and architectural design were all culturally inappropriate. Perhaps the two most difficult factors, however, were affordability and maintenance. People moved into the homes in the belief that the government had provided them free of charge. Instead, nearly three years after they moved in, they were told to pay rent at a rate four times higher than the pre-disaster rate, plus three years' rent retroactively.

The new "city" had no plan for maintenance, and the duties and rights of authorities and residents were not specified. Because the houses had been imported, they were not designed to withstand local conditions. The lightweight components were too fragile for the harsh climate or the local

methods of cooking and cleaning (El Masri, 1992). Designed to last 10-20 years (far short of local and international requirements), they instead began to deteriorate in their first few years. The local Algerian agency responsible for maintenance in the new city reported 2,500-3,000 repairs a year. With no spare parts for maintenance, and 24 different types of prefabricated houses, they were totally reliant on foreign manufacturers.

The city's residents responded in various ways to the situation. In attempts to regain the privacy lost in the new city, people kept their windows closed, and later built boundary walls around their houses (El Masri, 1992: 65). Because of the remoteness and unaffordability of the project, some families moved back to their original houses, and rented their new houses to other families, as a way to generate income. "In other cases the head of the family went back to the original house and left the new one for one of his married children," (ibid). People did their own repairs and alterations; in addition to boundary walls, they built kitchens and toilets outdoors. In the end, the project that had aimed for technical reductions in vulnerability increased not only socioeconomic vulnerability and local health hazards, but also the very technical vulnerability it had aimed to address.

2.7.6. Summary of cross-cultural experiences

The five case studies each illustrate different aspects of success or failure during the life cycle of a recovery programme (see Table 2.2). Researchers in each case study highlighted the aspects they felt contributed most to the programme's overall outcome. Thus, Table 2.2 is as much a reflection of these researchers' observations at the time, as it is of reality. In other words, some aspects that are nearly or completely absent in the Table (such as needs assessment, setting objectives, and reporting) may be due to authors' exclusion of these aspects – as either successes or failures. The Table therefore illustrates two things: (1) a compilation of cross-cultural recovery experiences; and (2) trends in researchers' analysis of such experiences.

It is therefore possible that each case study also experienced other successes, or suffered from other failures, and that these issues are closely related. For instance, the Algerian housing project was highly centralised, implying that failures were possibly also present in all other factors also: the needs assessment, setting objectives, reporting, and training and institutional capacity building.

Lastly, the Table does not indicate the subtleties of each case; for instance, some failures were mixed with success. In Ecuador, for example, the use of timber roofs was environmentally problematic, while simultaneously being a positive technical innovation to reduce physical vulnerability, and a technology well-integrated with local building traditions (i.e. affordable, and providing employment and livelihoods).

	Sri Lanka	N. Ireland	Vietnam	Ecuador	Algeria
Planning and design					
Assessing needs		✓			
Setting objectives		✓			
Siting/acquiring land				×	×
Technologies/materials/employment			✓	×	×
Architectural design				✓	×
Implementation					
Reporting					
Coordination and management	×	✓	✓	✓	×
Logistics			×	×	✓
Maintenance					
Monitoring and evaluation				×	×
Training and institutional capacity building			✓	✓	
Future financing	×		×	✓	×

× = failure ✓ = success

Table 2.2: Identified successes and failures of five cross-cultural examples.

2.8. Survey of practitioners

What remains absent from the literature on recovery from disaster are the contemporary views of practitioners today. To partially compensate for this absence, a survey of practittioners was undertaken for this thesis. The survey was drafted and initially distributed via electronic mail, to practitioners around the world, four months prior to commencing fieldwork (November 2004). While some responses were collected in this period, survey distribution continued until four months after fieldwork was complete (October 2005). The aims of the survey were to learn from and gauge: (a) organisational and technical experiences; (b) relations between donors, NGOs and beneficiaries; and (c) the sustainability of construction programmes to date.

By definition, surveys can contain open- or closed-ended questions, and can be conducted in several ways, including personal interview, phone interview, mail-out (self-completion), or a group setting (Hakim, 1987; Robson, 2002). This survey was conducted by mail-out (electronic mail), as well as over the telephone, and in person – the method used with each respondent depended upon prevailing circumstances (especially geographic location). The survey included both open- and closed-ended questions, to enable respondents to answer each question freely. The survey questions are listed in the Appendix to this thesis.

The respondents for the survey were chosen based on initial contacts (from previous experience and research in this field), and snowball sampling. The survey was distributed to 55 professionals in the field of disaster recovery, and the response rate was 52%. This was unusually high for a mail-out survey, for which rates often fall below 50% (Hall and Hall, 1996: 100).

The aim, in inviting a wide number of professionals to respond, was to learn from a variety of countries, contexts, and organisations. Some of the countries covered were: Turkey, India, Sudan, Indonesia, Iraq, and Afghanistan. Nevertheless, similarities cropped up, and the survey was perhaps evidence of the smallness of the aid world: only 15 donors were named, in total, and nearly 55% of all programmes were funded by the World Bank or UN organisations.

The survey's first section asked for background information on each individual and organisation. This included, for instance, the educational background of the respondent, as well as general information on the project where they worked: location, beneficiaries, time period, etc. The last two sections asked for additional comments (if any), key resources, and permission to use the survey results in the thesis. The four sections in the middle (B, C, D and E) comprised the principle portion of the survey. They are described below, in relation to the phases of the recovery programme life cycle: planning and design, implementation, and maintenance. For the purposes of the survey, however, planning and maintenance were grouped together, rather than planning and design.

1. *Planning and Maintenance*: The 17 questions in Section B covered the context of the recovery programme, and educational background (e.g. architecture, engineering) of the team involved. This section also looked at how the goals of the programmes were established, and who the donors were. Lastly, it looked at methods of monitoring and evaluation.

2. *Design*: Section C looked at technical aspects, local participation, and the level of integration between construction and other aid sectors, such as livelihoods, water and sanitation, and others (12 questions).

   Section E attempted to assess the extent to which local human resources and natural resources were involved in the initiative, and what the short- and long-term effects of the initiative were locally (12 questions).

3. *Implementation*: Section D referred to the strengths and weaknesses of the organisation, in terms of – for instance – logistics, coordination, and management (8 questions).

Thirty-seven respondents represented 16 organisations, which had deployed 34% of their staff to 13 disaster-affected countries. While some of the countries in which they worked had suffered armed conflict not compounded by natural disaster (Iraq, Palestine, Sudan), the majority were tsunami-affected countries (Indonesia, Sri Lanka, India, Thailand and Maldives). Sixty-nine percent of respondents had been deployed for about six months each.

Table 2.3 summarises some of the responses, in terms of the recovery programme life cycle. Because the survey covered general programming issues, the Table excludes elements that would relate to a specific construction project, such as: siting/acquiring land; architectural design; training and institutional capacity building; and future financing.

	Negative	Positive	Additional comments
Planning and design			
Assessing needs	32%		• About a third of respondents were unaware of their organisations' strengths and weaknesses. • They expressed concern about their organisations' capacities to meet project needs.
Setting objectives	100%		• Excluded beneficiaries from the process of setting objectives. o 30% said donors set the objectives. o 65% said their organisation set the objectives. o 5% said they jointly set objectives with donors.
Technologies/materials/employment		81%	• Used local natural resources and employed local people in administrative, professional, and skiled labour positions. • This was considerable, given that 90% were in areas where the built environment had been heavily damaged.
Implementation			
Reporting	95%		• Nearly all organisations failed to report to their beneficiaries, or even to include this as an aim.
Coordination and management		82%	• The majority felt coordination was positive. • 97% reported that other organisations worked in their area.
Logistics	33%		• A third felt their pre-departure briefing was insufficient.
Maintenance			
Monitoring and evaluation	82%		• Most respondents measured success solely in terms of the number of buildings constructed. • Even with this limited criterion, however, only about 63% felt they had met with success.

Table 2.3: Results of the survey among practitioners.

Part IV. COAM: A framework for sustainability

2.9. COAM as a planning tool

Table 2.4 on the following pages summarises the previous section of this literature review. The third column of the table lists the numerous suggestions made by the many writers on construction in disaster. These are correlated with the two first columns. The first column categorises suggestions according to the three phases of the recovery programme life cycle. The second column categorises them according to the four aspects of sustainability: environmental, sociocultural, economic, and political/institutional. The final column condenses the list of suggestions into twelve key criteria. These criteria can be used as a planning tool, for use in developing and completing a construction programme. Or they can be used as an evaluation tool, discussed further below.

Assessing needs Setting objectives Siting/acquiring land Technologies/ materials/ employment Architectural design	Political/ Institutional	• Includes assessment of: (1) implementers' needs and capacities: organisational strengths and weaknesses; staff skills, knowledge, experience, and time; (2) community and regional needs; (3) physical, economic, and logistics situation; and (4) local construction industry's technical capacity. • Assesses needs and capacities *iteratively* throughout the project life cycle; each subsequent assessment also includes the four elements listed above. Verifies data in the field and with communities, to the extent possible. Acknowledges potential data errors, and uses data consistently and transparently.	Reflexive
	Environ-mental	• Minimises the environmental impact of construction; and minimises environmental hazards to beneficiaries. • Considers internal – as well as external – environmental quality of the constructed facilities. • Uses environmentally sound building materials. • Incorporates the use of renewable energy sources in its design.	Environmental
	Sociocultural	• Assesses needs, and develops and *prioritises* objectives in consultation with local communities and authorities. • Considers communities' socioeconomic situation in site selection; ensures presence of basic infrastructure, and proximity to employment opportunities. Assesses the socioeconomic impact of the construction site. • Ensures clear ownership, in terms of acquisition, building regulations, and urban zoning. • Minimises the impact of future disaster, in terms of not only technical vulnerability but also sociocultural vulnerability, i.e. accessibility, environmental quality, sufficient space, etc. Recognises that inappropriate architectural design of constructed facilities may increase vulnerability, e.g. overcrowding, alterations, facilities' use in unintended ways, etc.	Socioculturally responsive
		• Selects needs assessment team to reflect goal of inclusivity, e.g. gender balance. Involves local community, including potentially disadvantaged groups, e.g. women, elderly, etc. • Involves local communities and balanced, professional team in site selection. • Ensures that local communities are represented and participate in all programme stages. Carries out construction in *partnership* with all stakeholders. Recognises that participation is more difficult in disaster-affected areas than in small development projects; and takes into consideration the changing socioeconomic structure of communities after disaster.	Participatory
		• Uses construction programmes as a tool to strengthen and promote good relations between disaster-affected communities. • Takes into account cultural differences between and within communities. Utilises construction initiatives to ensure positive cultural continuity. • Considers community, household, and individual needs, in terms of space and functional use. Generates facilities that are culturally acceptable and universally accessible – to the disabled and elderly, for example. • Recognises that compromises in quality control and good construction practices do not necessarily speed construction.	Socioculturally constructive
	Economic	• Enables communities to continue their means of employment and/or livelihood. • Promotes use of local construction methods and materials. • Creates jobs, and stimulates sectors like transport and construction materials production, and other services. • Constructs facilities that are affordable to purchase or rent, and to maintain.	Economic

Table 2.4: Criteria with which to plan and/or evaluate a recovery programme.

Reporting Coordination and management Logistics	Political/Institutional	• Demonstrates transparency and accountability, not only to donors, but also to recipients and local authorities. Collects data and keeps records, e.g. in a database.	Accountable
		• Institutes a firm organisational mechanism to prevent mismanagement of financial resources, especially if employing contractors. With local authorities and communities, prepares and implements a legal framework for construction issues. • Assists local authorities to prepare a manual for coordination and collaboration among authorities and communities. • Discourages political endorsement of inappropriate construction practices. • Recognises that speed and timing depend on logistical capacities, and therefore strikes a balance between these factors. Promotes teamwork, and locates logistical management processes accordingly, e.g. headquarters vs. field. Encourages continuity through long-term contracts (e.g. 2-3 years) for staff in implementing organisations.	Coordinated
		• Incorporates a supervision structure capable of adapting to unanticipated factors (environmental, logistical, demographic, etc.), identified in the course of ongoing work, iterative needs assessments, and monitoring and evaluation (see below).	Flexible
Monitoring and evaluation Training and institutional capacity building Future financing		• Conducts ongoing monitoring and evaluation – involving local communities – to gauge programme relevance, efficiency, effectiveness, and impact on beneficiaries, local communities, and regional development processes. • Identifies, acknowledges, and enables adaptation to unanticipated factors (see above note on being *Flexible*).	Informed
		• Assesses local authority capacities, in terms of structure, human and financial resources, and equipment. Undertakes professional training and institutional capacity building initiatives.	Institutionally developmental
		• Sets up an effective structure for fees collection that takes into consideration the local socioeconomic situation.	Financially sustainable

Table 2.4 (continued): Criteria with which to plan and/or evaluate a recovery programme.

What emerges from this table is that construction can contribute to sustainable recovery in four ways (Table 2.5), assessed by the twelve criteria (Table 2.6). Construction programmes can be:

Compatible with the environmental, sociocultural, economic, and political/institutional structures of disaster-affected communities;

Oriented to their long-term sustainability;

Achievable in disaster situations; and

Maintainable in the future.

In sum, planning and design can be compatible with the present and oriented to the future, while implementation and maintenance can be achievable in the present and maintainable in the future.

	Planning/Design	*Implementation/Maint.*
Present	**C**ompatible	**A**chievable
Future	**O**riented	**M**aintainable

Table 2.5: The four COAM factors.

COAM	
C	Reflexive
	Environmental
	Socioculturally responsive
O	Participatory
	Socioculturally constructive
	Economic
A	Accountable
	Coordinated
	Flexible
M	Informed
	Institutionally developmental
	Financially sustainable

Table 2.6: COAM: A framework for sustainability.

To put this into context, the following table situates COAM once again within the broader discussions of the recovery programme cycle, and the four aspects of sustainability.

	Recovery Programme Cycle	COAM		
Planning and design	Assessing needs Setting objectives Siting/acquiring land Technologies/materials/employment Architectural design	**C**	Reflexive	P/I
			Environmental	
			Socioculturally responsive	Sociocultural
		O	Participatory	
			Socioculturally constructive	
			Economic	
Implementation	Reporting Coordination and management Logistics	**A**	Accountable	Political/Institutional
			Coordinated	
			Flexible	
Maintenance	Monitoring and evaluation Training and institutional capacity building Future financing	**M**	Informed	
			Institutionally developmental	
			Financially sustainable	

Table 2.7: COAM, the recovery programme life cycle, and the aspects of sustainability.

2.10. COAM as an evaluation tool

If used as a planning or evaluation tool, COAM is not intended to be used as the only such tool, given that each programme is likely to have its own guidelines. In addition, if used as an evaluation tool, COAM will probably only be one of several influences in the evaluation; others include:

- who is carrying out the evaluation, e.g. internal evaluation, evaluation by related organisation, or independent evaluation;
- the reason for the evaluation, e.g. on donors' request;
- the evaluators' professional background;
- evaluators' defined roles and responsibilities;
- involvement of beneficiaries; and

- the amount of resources allocated for the evaluation.

Chapter 3. Methodology

3.1. Methodological approach: Evaluation as a research method

As mentioned above, the most intensive aspects of the research were focused on evaluating two case studies. This evaluation was unusual, in that it looked at not only the perspectives of the practitioners, but also those of the survivors (and especially their experiences and levels of satisfaction). In other words, not only were the case studies evaluated with respect to their own objectives (measuring, analysing and interpreting the changes that took place), but also even the objectives themselves were evaluated in terms of *how* they were conceptualised and implemented.

Evaluation as a research method is often used to inquire about the "real world" (Robson, 2002: 202). Yet identifying failure is too often easier than identifying success, perhaps because so many factors are involved that are not intrinsic to the project or programme under evaluation (Rubin, 1995: 5). Furthermore, some kind of criteria need to be established, to minimise the extent to which the research outcomes rely on any single person's point of view. In the past, criteria were often limited to the project goal: "Was the goal achieved?" was the main question. Increasingly, however, evaluation looks further, to understand relations between the project's aim, objectives, input, and output (European Commission, 2001). Looking at interrelationships between evaluation and programme implementation can sometimes reveal unanticipated insights (ibid).

Evaluation can be classified into two types, on the basis of the time in which the evaluation is conducted (Frechtling, 2002: 7). "Formative" evaluation is conducted during the project, and evaluates the impact of project activities and strategies upon players and institutions, at various phases of the intervention (ibid). "Summative" evaluation takes place after the project, and involves collecting information about outcomes, and the activities and strategies that led to them. Summarising these two kinds of evaluation in an analogy, "when the cook tastes the soup, that's formative; when the guests taste the soup, that's summative," (ibid: 8, quoting theorist Bob Stake). Figure 3.2 provides more information about each kind of evaluation, and the key questions it addresses.

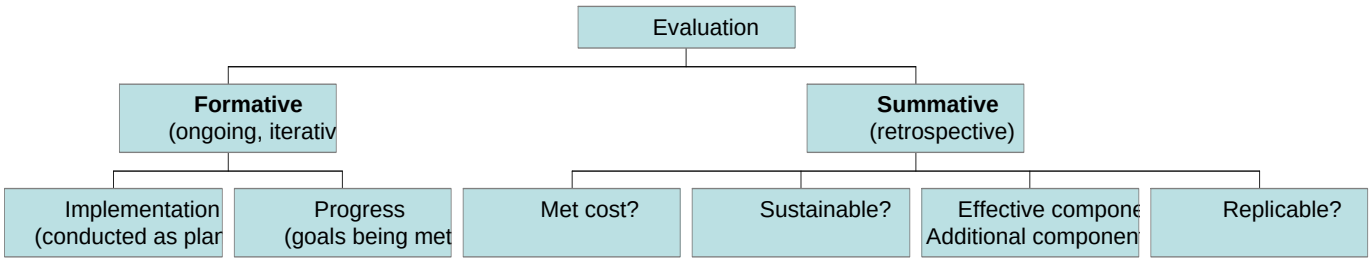

Figure 3.2: Evaluation components.
Source: Adapted from European Commission (2001).

Common understanding is needed of key points, such as a project's structure, connections, and outcomes (Frechtling, 2002: 22) or input, activities, and short-term and long-term outcomes (NSF). The key points listed here, however, exclude perhaps the most important element of a project (at least, in terms of evaluation): its aim. Perhaps a revised listing could be as follows:

1. the aim of the project: what will it contribute in the long-run?
2. the objectives: the operational reasons for the project;
3. the inputs: everything required in a project, including personnel, materials, and funding; and
4. the outputs: the results that can be delivered by the project as a result of the activities.

The European Commission (2001: 11) and Rubin (1995: 38) defined five indicators related to evaluation criteria: effectiveness, efficiency, relevance, impact and sustainability.

Effectiveness refers to the relationship between the outputs and the objectives of a project, and addresses three key questions. Is the project achieving its objectives? Is it engendering a difference in practice, or fulfilling its purpose (EC, 2001: 21)? Have planned benefits been delivered and received by key recipients (and/or donors)?

Efficiency refers to the relationship between inputs and outputs, in relation to economic cost (EC, 2001: 12-13). It addresses the question: How do activities transform resources into qualitative and quantitative outputs? A project may be effective, but costly or unsustainable, and thus inefficient (Rubin, 1995: 38).

Relevance relates the aim to the objectives and outputs. It assesses whether the project is unsuitable at any time, such as the time of its design, or the time at which it is being evaluated (Rubin, 1995: 38). A project's approach and strategy should be consistent with the problem and

intended effects (ibid). Relevance is a way to measure the links between the overall goal, policy, and need. This is a challenge, if the nature or priority of problems changes in the course of the project, or if new problems emerge (physical, political, economic, social, etc.).

Impact is the relationship between aim and objectives, and refers mainly to the experiences of the recipients. Impact can be economic, social, technical or environmental; it can be positive or negative, intended or unintended, short-term or long-term (Rubin, 1995: 39).

Sustainability addresses the question of whether the project will continue after external support is withdrawn (Rubin, 1995: 39). It concerns the long-term impact on large-scale development that could be sustained at various levels: sector, region, or country. Sustainability can be either social/institutional or economic (ibid), and assesses relations between: the capacity of local resources; how beneficiaries perceive the project; and how far beneficiaries are involved in finding the resources necessary to sustain the project.

3.2. Before fieldwork

3.2.1. Literature review and preparation for fieldwork

A literature review helps researchers to avoid prolonging dangerous and intrusive contacts with informants, by focusing on key issues and information gaps (Fielding, 2001). The literature review for this thesis was used – together with personal experiences in the field – to develop a comparative theoretical framework on social, economic, and technical aspects of construction in disaster (see Chapter 3). This is a common use for literature reviews – in combination with previous research and work – to articulate and propose remedies to recognised problems.

"Grey" literature was included in the review: materials from non-governmental organisations, United Nations reports, and documents from municipalities, local authorities, research institutes, universities, electronic websites, and local and international news agencies. These helped to understand the purpose, context and results of the projects in the case study. Much of this literature was analysed before travelling to the field work, but collection was ongoing during the field work. Access to information (through document collection, participant observation, or interviews) may not be granted in some circumstances. This may itself be a form of information, to understand which information is considered public and which is not (Hammersley & Atkinson, 1995: 54-55).

Learning about the area's conditions (before and after the disaster) prior to fieldwork helps later to understand the causes, implications, and analysis of collected data (Barakat and Ellis, 1996: 149-156). It is also important to avoid becoming a burden on the local population. The IFRC kindly provided documents on their work and on the area, by email, prior to fieldwork. Several phone calls with the office in Ankara were also helpful in preparation. Fieldwork was conducted over 14 weeks (1 March - 5 June 2005), and was planned by location. It began in Ankara, because governmental and international organisations are based there, and because the majority of construction programmes in the Marmara Region were run in centralised fashion from Ankara. Fieldwork then moved to Istanbul (where the remaining organisations were based), and then to the Marmara Region. Interviews were conducted with representatives of governmental and international organisations, as well as academics, and project beneficiaries. Close to the end of fieldwork, findings were shared and discussed with the IFRC staff in Ankara.

3.2.2. Survey of practitioners

This research is unusual in the field of disaster recovery, in that it includes the use of a survey unrelated to the case studies examined later. This was done to address a lack in documented first-hand experiences in the field of construction in disaster. Such information was required for the development of the framework (for sustainable construction), and could not have been obtained from existing literature. Research to date has principally been conducted through semi-structured interviews and participant observation (Barakat, 1993: 161-162; Zargar, 1989). Narratives and analysis by practitioners are rare, and in the field of construction, nearly impossible to find. The survey of practitioners and professionals was intended to partially fill this gap, although it was confined to a set of questions directly related to the topic of sustainable construction.

The questions of the survey are listed in the Appendix to this dissertation, and the results were presented in the previous chapter (section 2.8). Reflecting upon the usefulness of this survey to the broader research questions, the results were extremely helpful in framing later analysis of the fieldwork. Most importantly, they were helpful in developing the framework for sustainable construction, presented in later chapters of this thesis. Given that surveys are rarely used in research on disaster recovery, this survey illustrates that – as an exploratory research method – surveys could be further utilised in this field.

3.3. Fieldwork

3.3.1. Internship with the IFRC

The purpose of a case study is to establish relevant variables to help generate hypotheses (Homer-Dixon, 1994). The methods used to learn about the Marmara case study were both qualitative and quantitative. Researchers' choices inevitably comprise biases and constraints in the research, screening out some possibilities and maximising others (Feldman, 1981: 8). In researching disaster contexts, additional constraints can arise: trauma from the disaster may inhibit individuals from sharing information about their experiences. In such situations, "information tends to be the product of individual attempts to make sense of confusing and often threatening events," (Simmons, 1995: 43). Yet despite these difficulties in claiming "impartiality" in qualitative research, such research methods have strong advantages.

> What the methods share is flexibility in execution, deliberate interaction between the researchers and researched, and a richness of data, which stems from their largely textual nature and from their grounding in the language and experiences of the information (Walker, 1985: 7).

Close involvement with a particular organisation may enable or hinder the research, in terms of time, expectations of the research outcomes, and access to information, to locations and to individuals (Lofland & Lofland, 1999: 42-44 refer to access and sampling distortions). From past experience, working from within a local organisation was found to be helpful in research. However, such an arrangement may raise concerns about the inconveniences to the organisation potentially caused by the research, and about how the research can contribute locally. My affiliation with the IFRC made some respondents – in the health sector, and in local authorities – cautious in their discussions with me. Nevertheless, the internship enabled access to the IFRC archive in Ankara and other "grey" literature (i.e. internal reports, press releases, communications, etc.). It also enabled "snowball" sampling, i.e. interviewees supplied additional contacts for future interviews.

3.3.2. Semi-structured interviews

Interviews are useful to discuss topics in depth, to learn about others' experiences, or as a follow-up to surveys (McNamara, 1999). They help identify links between the theoretical background and the reality of a situation, and – if informal – they can address problems or issues outside the planned framework (in my case, for instance, they discussed unpredictable effects of the projects).

Interviews are generally of four kinds. Of these, I used what is known as the "general interview guide approach" or "semi-structured interviews". In other words, I had prepared questions with me, but often discussions would proceed freely without being constrained by questions (Burgess & Bryman, 1999: xviii). In rare cases, I used an unstructured format, similar to a lengthy conversation with few prompts (Paget, 1999). The other two kinds of interviews, which were not used, are either a series of closed-answer questions, or a series of open-ended questions. These approaches facilitate faster interviews that can be more easily analysed and compared; these aims were achieved instead by using a survey (see below).

Key research informants are individuals who, through their position and role, know much on a given subject (Samset, 1993; 42). In this study, the key interviewees were identified through the IFRC contact list, other print directories, email lists, websites, and personal contacts. Subsequent interviewees were chosen using snowball sampling, in which selection is carried out through recommendation from others. With each-passed on recommendation, the pool of interviewees grew, making it possible to interview a wide range of policy-makers and practitioners in the Turkish government as well as the other international and national organisations. Such sampling is recognised as unrepresentative and dependent on interviewee recommendations or the researcher's judgement (Overton & van Diermen, 2003: 43).

Various problems were envisioned with the use of interviews. First, an interview may raise expectations concerning the outcomes of the interview or research. Second, an interview may inconvenience the interviewee(s) (Overton & van Diermen, 2003: 40), and a one-way discussion may be exploitative (Brockington & Sullivan, 2003: 58). One way to address this inconvenience is to provide compensation, and another is to enable two-way discussion (Finch, 1999: 73-74). Finch argues, for example, that for feminist research, "the only morally defensible way for a feminist to conduct research with women is through a non-hierarchical relationship in which she is prepared to invest some of her own identity" (Finch, 1999: 75). Offering a written list of questions may be helpful, if it allows the interviewee greater choice and control over the interview.

In the case of this thesis, an important factor in communication within interviews was the prior translation of all interview and survey questions into Turkish. These were then tested among IFRC staff, before being used more widely. This was done to ascertain the correct usage of specific, technical terminology, and to reduce the likelihood of misinterpretation on the part of

interviewees, or on my part – as interviewers can sometimes misinterpret individual answers or even group dynamics (Brockington & Sullivan, 2003: 58-59). These communication issues were also reason to conduct the research in person – rather than by telephone or email – and to be reflexive on possible answers and problems with those answers. A last strategy to address communication issues was to include open-ended questions, to allow interviewees the options of broad answers, and to allow answers that criticised the narrowness (or other aspects) of the question.

3.3.3. Survey in Demetevlar Housing Project

The purpose of a survey is to gather information in a methodical manner, by asking standard questions and recording responses in a systematic way. A survey allows data to be analysed statistically, and to be summarised in a convenient form. It also helps to gauge different views on the same question, and can be especially useful in evaluating users' experiences with a given product. In this case, a survey was used to measure satisfaction among residents of the Demetevlar Housing Project.

A typical survey is comprised of questions with pre-determined answer categories, focusing on issues of interest. The survey for this research included such questions, but also included an open section at the end. In total, it was divided into five sections, and collected information on three key issues (the entire survey is reprinted in Appendices 2-5).

- *Residents' profile*: The first part of the survey looked at household structure and characteristics. It included general information about the respondent, including occupational and marital status, family income, and educational level.

- *Satisfaction*: This was covered in sections 2, 4, and 5. The purpose of these sections was to understand residents' perceptions of the project and related services, and to gauge their satisfaction with the performance of the main players. Section 2 was about household and living conditions after the earthquake, in terms of housing, infrastructure, and financial affordability. Section 4 assessed the cultural appropriateness of the housing, and explored residents' perceptions of modernity. Section 5 was an open section, to allow respondents to express their views on issues perhaps not covered in the survey.

- *Participation*: The purpose of Section 3 of the survey was to gain insights into resident involvement, and their levels of participation.

Sampling was necessary, as the Housing Project is comprised of 612 units. No sample can be perfectly representative, and may involve too much or too little generalisation (Zeisel, 2006). Furthermore, increasing the size of the sample does not necessarily increase its representativeness (Hall and Hall, 1996: 108). The aim of sampling, however, is to select individuals on a random basis, such that each person has an equal chance of being selected (ibid: 109). To do this, I requested a list of residents from the implementing organisation (the Project Implementation Unit in the Prime Minister's Office). Yet officials said no such list existed, so I divided the Project into blocks and floors, and used numbers to select a random sample of 12% of residents. Of these households, 41 provided completed surveys, describing themselves and their views on the Housing Project. As with interviews, the survey was tested before distribution; one of the residents volunteered to be the first respondent.

3.3.4. Direct observation and unstructured interviewing

Qualitative methods include three kinds of observation: participant observation, direct observation, and unstructured interviewing (Robson, 2002; Web Centre for the Social Sciences, 2006). Participant observation usually requires immersion in a context for a substantial period of time, whereas direct observation can be done in shorter time periods. Unstructured interviewing involves direct interaction between the researcher and respondent or group, and was described above in the section on interviews; it was used in community meetings, described below.

Responses to the survey in the Demetevlar Housing Project were informative, but required some kind of supplementary information. Given that I speak the language from studying and working in Turkey for five years (1991-1996), and given also that my visa would not allow me to stay for the lengthy periods required for participant observation, I chose to conduct direct observation. This method has significant advantages due to its informality, and its importance for spotting – perhaps otherwise unnoticed – effects on individuals and communities.

> A major advantage of observation as a technique is its directness. You do not ask people about their views, feeling or attitudes; you watch what they do and listen to what they say. (Robson, 2002: 310)

Understanding any community situation requires building relationships within that community (Samset, 1993:46). To help me do so, staff at the Turkish Red Crescent Society introduced me to

a number of community workers in the area. As the community workers were also resident in the area, they suggested we visit their friends' or relatives' houses. This was an opportunity to gain an inside glimpse into the dynamics and impact of the project on people's lives. Although this method was perhaps less representative, and was more time-consuming, it helped to frame the collected data into a more comprehensive picture that – as an outside researcher – would otherwise have been very difficult to do. Since information collected through observation is always dependent on the quality of the observation itself, imaginative ways can be sought to develop useful indicators (Feldman, 1981: 43). In this case, for instance, one indicator of wealth (to be verified against others) was the number of vehicles in front of homes.

After direct observation was found to be useful in learning more about the Demetevlar Housing Project, it was then used again in Düzce State Hospital. In both situations, it helped to:

- understand the socio-economic and cultural conditions of the population;
- learn unexpected effects, and developments not taken into consideration when the project was set up; and
- build a picture, to help in interpreting data gathered by other methods.

In Turkey, communities usually come together and discuss their grievances, problems, needs, and possible solutions, with a community leader, or *Mukhtar*. Knowing this from my prior experience in Turkey, I asked to attend such meetings in the Demetevlar Housing Project. These meetings were very useful to gather further information on the project, and made possible direct contact with the beneficiaries involved. The people in the meetings encouraged one another, discussing different issues concerning their lives. The advantage of this method is that it enables the observer to obtain validated data, because attendees are likely to confirm or correct one another's contributions. In such meetings, people express their opinions freely and with respect to one another's opinions. Therefore, it was possible to directly acknowledge and respond to people's verbal and non-verbal expressions, which allowed for a better understanding of their reactions, attitudes, and priorities. Group interviews may have some disadvantages – discussion could be dominated by some people, while others may not reveal information if they feel vulnerable or protective. To avoid this, I attended several meetings with the *Mukhtar* meeting several time, so as to have a wider basis from which to draw knowledge and information.

3.4. After fieldwork

3.4.1. Data analysis and verification

In qualitative research, the resulting collection of documents, notes and transcripts can be overwhelming (Kindon and Cupples, 2003: 222). This can be addressed by continuously categorising and theorising the information available, to identify what is of greatest relevance (Lofland and Lofland, 1999: 8). Consideration needs to be given to issues of credibility, dependability, transferability, and conformability (Lincoln and Guba, 1999: 398-422). Given that the research involves what Becker terms "subordinate" and "super ordinate" perspectives (in this case, the beneficiaries vs. the implementing organisations), consideration was also given to the possibility of bias in the research (1999b: 36). Becker observes that subordinate perspectives are more often subject to speculation and bias (ibid). He therefore recommends that equal treatment be given to subordinate and super ordinate perspectives (ibid: 36-37); this advice was followed, such that beneficiaries' opinions are equally (if not more heavily) weighted with the opinions of senior officials.

To address concerns regarding data quality, a series of similar questions may be posed to the same person (in the same interview or in follow-up discussions), or the same question may be asked of numerous individuals. These strategies can be summarised as: triangulation, persistent observation, and prolonged engagement (Lincoln and Guba, 1999: 403; Lofland and Lofland, 1999: 449-451). To the extent possible, information used in the final thesis was verified with the source and with alternative sources, such as other interviewees, documents and secondary sources. Extensive verification with interviewees could sometimes pose an inconvenience (Lofland and Lofland, 1999: 453), so a balance was sought, between verification and respect for interviewees' time.

Quantitative data analysis marks a stage where researchers start to concentrate on making sense of what has been discovered (Hall and Hall, 1996: 129). As with all surveys, the answers needed to be collected to allow comparison between different variables and categories, and to eventually work toward data analysis. Information that could be counted and measured was summarised in term of averages and percentages, and displayed in graphs and tables, using Microsoft *Excel* and *Access* software. The last section of the survey – an open section for additional comments – included qualitative data, which was translated, transcribed, and coded (together with the interviews above) using *NVivo* software.

3.4.2. Sharing the findings

An important stage in the research analysis involved presentation of the findings among groups of interested academics and practitioners. This took place in 2005 and 2006, when some of the research findings were presented at the annual meeting of the International Network for Urban Research and Action (INURA), as well as at an IFRC Reconstruction Meeting (in South Asia), and at Coventry University.

At the INURA conference, I received feedback on my work from other participants, and was also given the opportunity to learn about regeneration projects in Rome. An important contribution of the conference to my doctoral research was the emphasis on beneficiaries and inhabitants as having rights, not only in technical terms with respect to infrastructure, but also in socio-economic and cultural terms.

At the IFRC South Asia Reconstruction Meeting, I was able to share my work with the organisation that had provided the internship in Turkey. It was a way to bring my findings closer to policy-makers, and to participate in discussions on future policy and practice.

Lastly, at Coventry University I spoke to colleagues (faculty and students) about how I had conducted my research, and my research approach. The discussions there helped to consolidate my thoughts on methodology and research methods, as I was working through my data analysis and writing the thesis.

3.4.3. Challenges in the fieldwork

Carrying out fieldwork in disaster-affected areas can entail applying traditional research methods under unique circumstances. Although disaster research scarcely differs from general research methods, nevertheless, the conditions of research inevitably differ (Stallings, 2002: 21-25). In researching the Marmara Region, five challenges were encountered.

- Information – like plans or basic statistics about the area, its history, and socioeconomic characteristics – was very limited.

- Construction projects were rarely documented. Tracing back the construction programmes was extremely difficult, due to a paucity of documents, such as budgets, tender agreements,

drawings, specifications, and project diaries. National and international organisations involved in construction programmes seemed to have no records or archives; even project designers had no documentation of the projects.

- To obtain related studies by the government or other organisations proved exceptionally difficult, as some officials judged such studies to be restricted and "confidential".

- Key players in the planning and implementation of past construction programmes tended to move on quickly, making them difficult to contact. Expatriate individuals and organisations would move to work in other countries; while local people would perhaps be promoted to other positions (within the government, for instance), or shift to work on a private enterprise. This created difficulties in compiling a contact list and arranging interviews. As an example, the IFRC's Chief Architect and Civil Engineer (Construction Delegate) were in India and Indonesia, assisting with the post-tsunami reconstruction there.

- Lastly, not all institutions were open to visitors. The Middle East Technical University, for instance, is walled and gated, and visitors (including myself) are forced to explain themselves (and the purpose of their visit) to security guards, in an intimidating environment.

3.4.4. Reflections from the fieldwork

Because a case study is comprised of individuals, groups, or organisations, its value depends to some extent on the researcher's own qualities (Robson, 2002: 177-178).

> Case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon whining its real life context using multiple sources of evidence. (ibid, citing Yin, 1994)

Building on the above statement, therefore, case study research must be an active undertaking, involving far more than reading relevant texts. It is also more than a disorganised search for solutions, without first seeking to understand the nature of problems (Ziesel, 2006: 33). Instead, it is an integration of present experiences with past ones, to help identify – as well as address – a given problem.

> The research process requires doing everyday things in an orderly manner, and for an interesting purpose that can be generalised. These methods could be learned rationally and impersonally. The ability to develop concepts, which go beyond the data gathered, is a creative ability, to be learned as one learns skills. (ibid)

A challenge in fieldwork is to engage in local issues while simultaneously keeping in mind the long-term goals of the research. In the end, however, this is rewarding, as fieldwork provides unique experiences and practical skills. Fieldwork influenced my perceptions as a researcher. At times, situations could be cold and unfriendly, and at other times, heated discussions over sensitive issues. To interact within these situations meant learning diplomacy and the use of simple language; it meant avoiding asking convoluted questions, or questions difficult to answer. "Breaking the ice" was done by asking simple questions that interested individuals – questions about football leagues and kids' education, for example, proved to be very important to soften resistance, and to create opportunities to see more than anticipated. The following eight points are reflections on these experiences.

1. Interviewees' knowledge (especially in local communities) is always greater than that of the researcher or any outsider.
2. Contacts are key to facilitate field work.
3. Appearance and self-presentation are important to gain trust and respect. In some cases, casual dress may be most appropriate; however, in some cases (such as Düzce State Hospital), formal dress was found to be preferable.
4. Listening and paying attention are as important as keeping a focus on the main theme. Before starting an interview, a relaxed atmosphere can be created by asking general, factual, non-hostile questions.
5. Having a "Plan B" when interviewing people – especially senior official – is one way to take into account the possibility that an appointment may be postponed, or even cancelled (after waiting for hours…). Alternative plans could include, for instance, collecting some secondary information about the organisation, or visiting their library if they have one.
6. Persistence, but not pushiness, helps to overcome obstacles in arranging appointments with senior officials in the government or in universities.
7. Speaking the language improves interaction and helps to avoid formality with local people. It also helps to gain trust and integration within a community.
8. Carrying out fieldwork in a foreign country involves a time limit (due to visa restrictions) and expenses. Therefore, any opportunity for learning should be seized – in this case: attending IFRC meetings with senior government officials, attending seminars, and following popular media, such as television and the local newspaper.

3.5. Conclusions

Some of the methods used in this research are used widely – such as semi-structured interviewing, for example – but the context was somewhat unusual, leading to challenges and lessons that are not necessarily widely applicable. Prior experience was as important as literature on methodology (such as that of Hall and Hall, 1996, Robson, 2002, and Stallings, 2002). Taking all of this into account, however, perhaps some of the findings presented above, with respect to methods and methodology, could be useful to future researchers – especially those working in disaster contexts. The following chapters are a closer look at these findings and others, from fieldwork carried out in the Marmara Region of Turkey.

Chapter 4. Case Study Background

Figure 4.1: Simplified location map of the Marmara earthquake.
Source: http://quake .wr.usgs.gov/study/turkey

4.1. Introduction

> Two survivors had been rescued on the 17th, and although search and rescue teams continued to operate on the 18th, hope was fast dwindling. The region in which the search and rescue operations occurred was eerily silent, despite the presence of several dogs and handlers, some 20 soldiers in gas masks, two cranes, and other heavy machinery, and more than 30 rescue workers and press.
>
> The faint sounds of a survivor had been heard beneath the rubble, and everyone was listening intently. Heavy rain started when I left the epicentre region, causing much hardship in the tent villages, where most of the local population had once again taken refuge. (Bilham, 2006)

The statement above underlines the enormity of the Marmara earthquake in 1999, and illustrates the challenges faced in the relief and reconstruction efforts. Significant aid was provided to the Marmara region, with the purpose of providing emergency relief, and supporting long-term development (World Bank, 2000; IFRC, 2000). The aim of this chapter is to introduce the case study of the Marmara earthquake, and the reconstruction that followed. What will become clear in the following pages is that despite the severity of the natural causes, the chief cause of destruction was due to human activity. Beyond the disaster itself, the reconstruction was also significant for its focus on technical issues, to the detriment of environmental, sociocultural, economic, and political/institutional issues. Of the two organisations in this case study, the World Bank and the International Federation of the Red Cross and Red Crescent Societies (IFRC), neither developed a policy to address such issues through its construction programmes. These, and other issues, are discussed in the pages that follow.

4.2. Why study the Marmara region?

The case of the Marmara earthquake deserves study for numerous reasons:

1. The area is prone to earthquakes and is densely populated, containing 20% of Turkey's population (Marmara Region, 2006).
2. Marmara became the site of intense reconstruction, in housing, roads, water supply, schools, and hospitals. The IFRC Pro-Vention Consortium, for instance, provided over £1.2 billion for housing and hospital construction in the area (World Bank, 1999).
3. The seven-year period (1999-2005) that has passed since the earthquake allows study of the immediate aftermath as well as longer-term development.
4. One of the key causes of destruction was the lack of enforcement of building regulations prior to the earthquake. This was, in part, due to a lack of capacity among local

authorities, and an environment of rapid and unplanned urbanisation. Studying these conditions and their effects could possibly prevent further such occurrences.

5. Furthermore, disaster recovery efforts were characterised by a tendency toward centralised control (by the Turkish government central authorities). This is another important reason to study the case of Marmara – to better understand the role of the state in disaster recovery, and how this affects the outcome and sustainability of construction projects and processes.
6. Lastly, the case study of Marmara is not atypical, and may provide important findings for comparison with (or application to) other regions, both within and beyond Turkey.

4.3. The Marmara region in context

Marmara is one of Turkey's seven regions[6] (About Turkey, 2006), covering 67,000 square kilometres in the northwest of Turkey, and comprising 8.5% of the country (see Figure 4.2). It takes its name from the sea that runs through its centre, connecting the Aegean Sea in the south to the Black Sea in the north. Because of these water bodies, Marmara receives rainfall throughout the year, and has a generally moderate temperature – rising to 27°C in the summer, and falling below zero in winter (ibid).

Figure 4.2: Maps of Turkey's regional boundaries, and the Marmara Region's main cities.
Source: About Turkey (2006).

Marmara's climate lends itself to agriculture. For instance, Marmara provides 73% of Turkey's sunflower production, and 30% of its corn production (Marmara Region, 2006). About half of Marmara's agricultural lands are dedicated to growing wheat, and – in addition to sunflower and corn production – the remainder produce sugar beets, and other fruit and vegetables. Marmara is well situated for trade and industry, being located at an international crossroads. It has become

[6] The others are the regions of the Black Sea, the Aegean, the Mediterranean, and the three Anatolian regions: central, east, and southeast (ibid).

Turkey's main industrial region, and is considered the most developed of the seven regions. Its various goods range from textiles to yachts, and include: processed foods, clothing, cement, paper, petrochemical products, durable household items, and ships.

The city of Düzce, which is the case study for this thesis, was included in the Marmara region's reconstruction project, following the 1999 Marmara earthquake. It was also declared Turkey's 81st city by Turkey's Council of Ministers, in recognition of the damage it suffered, and in order to facilitate government assistance to the area. Yet in fact, Düzce falls within the Black Sea region (see Figure 4.3).

Figure 4.3: Düzce map.
Source: Düzce Municipality (2005).

It was also not the worst affected city after the earthquake. The construction that followed, however, took an unusually long time in Düzce, and was characterised by remarkably little consideration for the people involved (see Figures 4.4 and 4.5). For these reasons, it serves as an important example in studying disaster recovery processes.

Figure 4.4: Earthquake damage in Düzce.
Source: IFRC (1999).

Figure 4.5: Clearing the rubble in Düzce.
Source: IFRC (1999).

During the Ottoman Empire, Düzce provided timber to the navy, and became an important transport centre between Istanbul and cities in the east, like Sivas and Erzurum. Similar to the Marmara region as a whole, it benefited from transport routes, natural resources, and its centrality in relation to other cities. Düzce was also remarkable for its natural beauty and stable social structure, making it attractive for investment. To this day, Düzce provides numerous products, including timber, automotive parts, textiles, sporting guns, tobacco, cement, pharmaceuticals, and processed foods (meat and dairy products, wheatflour, nuts), and other agricultural products.

Yet Düzce has suffered heavily for its location on the North Anatolian fault, which stretches 1,200 kilometres from Kocaeli in the Marmara region, to Artvin in the Black Sea region. Düzce was hit by the 1944 Düzce earthquake, the 1957 Abant earthquake, and the 1967 Adapazari earthquake.

4.4. The Marmara earthquake: Disaster by design and construction

In 1999, two earthquakes hit northwest Turkey. The first, called the Kocaeli or Izmit earthquake (named after the cities at the epicentre[7]), occurred at 15:02 on 17 August, for 45 seconds, and measured between 7.4 and 7.8 on the Richter scale. The second, with its epicentre in Düzce, occurred at 18:57 on 12 November, for 30 seconds, and measured 7.2 on the Richter scale. The

[7] Although the exact epicentre was the town of Gölcük, near Kocaeli, and 110 kilometres from Istanbul (Sahin, Toksoz, Yagi, and Kikuchi 1999).

two earthquakes affected the cities of Gölcük, Yalova, Adapazari, Izmit, Istanbul, Düzce, Akyazi, Golyaka, Spanca, and Kaynasli. Some of these areas were almost entirely destroyed.

While the death toll of the second earthquake, 845 people, was lower than in the first earthquake, many (5,000 people) were injured, and 180,000 were made homeless. As winter fell, people from Düzce, Bolu, Kaynasli, and outlying villages were without shelter. Many of the displaced were missing, and presumed dead (Bibbee, 2000: 2).

Livelihoods across the region were affected. The earthquakes had destroyed cities and villages across an area twice the size of Switzerland (IFRC, 2000: 1). Although commercial and industrial infrastructure was only moderately damaged, severe damage was caused to houses and public facilities, such as schools and hospitals. Thus, the Turkish economy, and especially the local economies of the area, were severely affected (IFRC, 1999: 1).

Turkey experiences an average of 40 earthquakes each year, and in the past decade, a number of these have had severe effects on life and livelihood (Hurford, 2000: 7). Geophysicists had predicted the Marmara earthquake (Papageorgiou, 2000: 6). So the natural hazard was known; arguably, the true disaster lies in the vulnerability of the area, as represented by the inadequate quality of local construction, and the placement of urban settlements. The following sections therefore look at each of these three aspects in turn: the natural hazard, the construction quality of the buildings, and the location of urban settlements.

4.4.1. The natural hazard

Turkey is one of the most earthquake prone countries in the world, at the intersection of three tectonic plates: the Eurasian, Arabic and African plates. On the basis of the current official earthquake hazard zoning map of Turkey (see Figure 4.6), 92% of its area and 95% of its population are situated in zones of varying degrees of seismic risk (UNCHS, 1996). In 1992, a 6.9 earthquake occurred in Arzincan, and a 6.0 earthquake hit Izmir. In 1995, a 6.4 earthquake hit Dinar (mid-southwest Turkey); and in 1998, a 6.6 earthquake struck Adana.

Figure 4.6: Seismic map of Turkey.
Source: UNCHS (1996).

In the last century, about 84,000 people have been killed in 131 earthquakes in Turkey. Most of these were along the North Anatolian fault (mentioned above) where, over time, earthquakes have become increasingly frequent. Starting in 1939, the North Anatolian fault produced a series of major earthquakes, of which the 1999 event is the eleventh with a magnitude greater than or equal to 6.7 (see Figure 4.7).

Figure 4.7: Location of earthquake.
Source: USGS (2005).

The 1999 earthquake was unusual in two ways. First, two successive earthquakes with a magnitude of greater than 7.0 is a rare occurrence in world seismic history. Second, the damage in the 1999 Marmara earthquake was far more widespread than, for instance, that which occurred in the previous earthquakes in Arzincan and Dinar. The 17 August earthquake was so great, that it

broke the 140-kilometre long western part of the North Anatolian fault, in a "multiple rupture" process (USGS, 2000).

In geological terms, the earthquake was caused by northward motion of the Arabian plate, squeezing the small Anatolian block westward (USGS, 2001). The Anatolian block, on which Turkey rests, is surrounded in the north by the Eurasian plate, and from the south by the African plate (see Figure 4.8). Pressure from the African plate causes subduction (where one plate slides under another) at the Hellenic and Cyprus arcs; while to the east, the Arabian plate compresses the East Anatolian fault (ibid). The cause of the earthquake, hence, was the westward shift of the Anatolian block, felt across the North Anatolian fault.

Figure 4.8: Tectonic map of Turkey.
Source: USGS (2005).

An important aspect of the natural dynamics of the earthquake concerns what happened to the soils in the area. Ground motion, in areas where soils were soft, resulted in "liquefaction, loss of bearing capacity, and lateral spreading," (Mitchell, 2000: 19).

4.4.2. The construction quality of the buildings

The dangers of non-earthquake-resistant construction using reinforced concrete buildings have been evidenced in a number of earthquakes in Turkey, prior to the Marmara earthquake of 1999 (Bruneau, 2000: 37). In Erzincan, for instance, the city was rebuilt a short distance from where it had been destroyed in its 1939 earthquake, which killed 30,000 people (ibid). When a second

earthquake struck in 1993, it caused heavy losses; people were killed mainly by the collapse of buildings, in a situation that foreshadowed the Marmara disaster of 1999.

> The rate of urbanisation has been very fast in the Marmara Region, and sadly, the building control and supervision has been inadequate. (Professor Gülkan, expert in post-disaster reconstruction in Turkey, interview)

Turkey's building code, despite being strict, was rarely enforced. For instance, beach sand contaminated with salt was used in buildings' concrete supports (Hurford, 2000: 18). Collapses resulted from a lack of lateral supports. But weaknesses were not only structural: foundations failed; storeys were soft; columns were too weak to support strong beams; columns were insufficiently confined; and detailing practices were poor (Bruneau, 2000: 38).

Furthermore, the lack of adherence to building codes occurred as early in the construction process as the design stage (Balamir, 2001). Not only were production processes and negligence potential problems, but even the planning process contained inadequate attention to safety and building codes (ibid). These findings applied to buildings that had sought government authorisation (planning permission); an equal number of buildings were constructed without such authorisation, and were therefore unmonitored and unlikely to have been any safer.

While much uncertainty regarding building safety is natural – some conditions are impossible to predict or prevent – nevertheless, many of the hazards in construction today are caused by "manufactured uncertainty", a term designated by Turkish earthquake expert, Prof. Murat Balamir, to refer to the potential dangers generated by poor construction practices. As a result, natural and "manufactured" uncertainty combine a number of factors, all of which could lead to collapse: variations in local subterranean conditions; physical design of the buildings; manner in which the construction work was run; choice of structural materials; and methods followed in mechanical services, detailing, and so on (ibid).

4.4.3. The location of urban settlement

The tragedy of locating urban settlements in earthquake prone areas is that such decisions occur for reasons completely unrelated to the people who suffer.

> Economically and politically powerful local families influence decisions concerning the direction and location of future urban growth. As a result, urban areas extend towards these families' lands, which, by definition, are agriculturally fertile lands from which these families have grown wealthy. Yet these soils are also relatively weaker for town development and structural purposes. [These families'] social and political dominance will bring the final decision, even though democratic procedures were at work, rather than a technical viewpoint in opposition, if it ever existed. All urban development for poor and

> rich will then take place on weaker and less appropriate lands, a result for which, again, no single agent can be held responsible. (Balamir, interview).

Ideally, fertile valleys, located between major geological formations, should be reserved for agriculture. Because of their weak structural carrying capacity, they are the worst places to be in an earthquake.

> With the placement of roads and public infrastructure alongside these valleys and plains, such nodes become economically more attractive, concentrating further all human and productive resources in vulnerable lands, and collectively generating high risks. (Balamir, interview)

Despite four decades of urban expansion into seismic hazard areas, seismic hazard sensitivity was not incorporated into any city and regional planning (Suzculoğlu, interview).

4.5. The impact of the Marmara earthquake: The scale of the problem

The results of these dynamics was a dense population (see Table 4.1) living on unstable soils, in unsafe buildings (World Bank, 1999: 8).

Name	Population	Area (Km2)	% Urban Population	% Rural Population	Population Density
Bilecik	192.060	4.302	60	40	45
Bolu (Düzce)	553.022	10.887	48	52	51
Bursa	1.958.529	10.422	76	24	188
Eskisehir	660.843	13.841	78	22	48
Istanbul	9.198.809	5.196	92	8	1770
Kocaeli	1.177.379	3612	53	47	326
Sakarya	731.800	4838	45	55	151
Tekirdag	567.396	6.313	63	37	90
Yalova	163.916	848	67	33	193
Zonguldak	612722	3304	39	61	185
Total	**15.8164.76**	**64,365**			

Table 4.1: Affected areas and population densities.
Source: Adapted from Ministry of Public Works and Settlement (2000: 5).

The earthquake hit as people were sleeping, causing heavy losses (see Tables 4.2 and 4.3).

17 of August Earthquake 1999		12 of November Earthquake 1999	
Area	**No of Victims**	**Area**	**No of Victims**
Bursa	268	Bolu-Centre	48
Bolu/Düzce	270	Düzce-Centre	463
Eskisehir	86	Golkaya	1
Istanbul	981	Kaynasli	244
Kocaeli	9477	Akcakoca	2
Sakarya	3891	Kocaeli	1
Yalova	2504	Sakarya	3
Zonguldak	3	Yalova	1
Total	17480		763

Table 4.2: Human losses.
Source: Adapted from Ministry of Public Works and Settlement (2000: 5).

Sector	Assessment damage	Cost*	Note
Housing	35,074 housing units completely destroyed or needing replacement. 37,803 medium damage. 42, 805 light damage. Only 29% suffered no damage at all.	£0.8 bn to £1 bn	Government figures as of 9/9/99 do not include relocation of cities which could add significantly to the costs.
Education	43 schools were and 381 schools damaged. There is a need to provide textbooks, school uniforms, trauma counselling and other basic support to displaced teachers and student	£60 m	
Energy	Power generation, transmission and distribution Tupras refinery, environmental damage, national and municipal gas distribution systems	£265 m	
Transportation	Roads: Motorways, main highways and municipal roads. Railways: Heavy losses on 60 km of railway track . Wagon factory destroyed (also for responsible for maintenance. Port : Derince port facilities partially destroyed (2 cranes and 2 wharves)	£100 m	
Infrastructure	Includes water supply, wastewater treatment, public building (except schools, roads and medical facilities)	£60 m	Based on the assumption that 50% of infrastructure was destroyed or heavily damaged.
Health	11 hospital were experienced damages; 28 health centres were totally destroyed while 20 others were heavily damaged. Several pharmacies have also been destroyed.	£30 m	Does not include contributions from bilateral aid, INGOs and NGOs.
Communication	Buildings, national and regional infrastructure	£30 m	Based on Turkish Telecomm figures
Environmental	Effects of sewage, dumping of rubble, chemicals.	No figures available	

Table 4.3: Physical damages.
Source: Adapted from World Bank (1999: 44-45).
* Estimated replacement cost of damages.

The earthquake left 18,000 people dead, 50,000 injured, 350,000 affected in some other way, and some 400,000 buildings either collapsed or severely damaged (Bibbee, 2000: 6) (see Table 4.4).

Disaster	Magnitude (Richter Scale)	Epicentre	Deaths	Injured	Collapsed Buildings	Damaged Buildings
17 Aug 1999	7.4	Gölcük	17,100	44,000	77,300	245,500
12 Nov 1999	7	Düzce	845	4,948	15,389	26,529
Total	-	-	17,945	49,948	92,689	271,029

Table 4.4: Damage assessment.
Source: Adapted from IFRC (2000: 5).

Losses were estimated at £7-10 billion, including £1.2 billion in industrial facilities, £3.5 billion in buildings, and £1 billion in infrastructure (State Department for Planning, 1999: 11). Economic losses were nearly as high as physical losses, because factories and industrial facilities needed months to return to their pre-disaster production levels. GNP growth dropped by a percentage point. Funds needed for a bare recovery were as high as £5 billion, including £2 billion for housing alone (including temporary housing). The geographic scope of the damages covered 41,000 square kilometres (see Figure 4.9).

Figure 4.9: Space view of affected area.
Source: Gülkan (2001: 5).

The damage was estimated at £1.73-3.64 billion, the equivalent of 1.5-3.3% of Turkey's GNP – widening an already existing deficit (World Bank, 1999: 2). Indirect costs were estimated at £0.62-1.24 billion (0.6-1% of GNP), assuming that increased production elsewhere in the Turkish economy would offset some of the losses incurred (ibid). Reconstruction in the years 1999-2000 alone was predicted to cost £2.02-2.58 billion (1.8-2.3% of GNP), financed by long-term credits and "concessional" funds from international financial institutions and other states (ibid, 4). These would raise Turkey's GNP in 2000 by one percent – according to the World Bank.

The fatality rate from the earthquake was over 14.3 per thousand persons, and varied from province to province (ibid, 2). This was over five times the "natural crude death rate". In addition, many were injured and/or traumatised, and 400-600,000 people were left homeless, including 114,000 children of school age (according to estimates from the Turkish Ministry of Education). Employment losses in the affected areas ranged from 20% to 50% (ibid).

4.5.1. House losses

As shown in Table 4.5, 377,879 houses and premises were damaged in the earthquake (Bibbee, 2000: 7; Erdik, 2000: 5).

Area	High Damage		Medium Damage		Low Damage		Total
	House	Premises	House	Premises	House	Premises	
Bolu	2,334	219	6,099	902	5,767	1,016	16,337
Bursa	141	5	571	25	1,371	68	2,181
Düzce	16,666	3,873	10,968	2,573	13,070	1,605	48,755
Eskisehir	90	21	167	18	398	32	726
Istanbul	3,073	532	15,102	2,510	17,870	2,280	41,367
Karabuk	0	0	76	0	106	2	184
Kocaeli	35,845	5,478	41,091	5,861	45,606	6,221	140,102
Sakarya	24,678	5,146	18,406	3,764	27,230	2,699	81,923
Yalova	13,895	751	14,540	1,159	12,685	1,885	44,915
Zonguldak	108	6	311	3	952	9	1,389
Total	96,830	16,031	107,331	16,815	125,055	15,817	377,879

Table 4.5: Damage to houses and premises.
Source: Adapted from Ministry of Public Works and Settlement (2000: 5).

Over 120,000 housing units were heavily damaged, or collapsed (Bendimerad, 2000: 2). Turkish disaster laws require the national government to replace all homes destroyed; this is akin to a zero-payment insurance policy, and thus a severe disincentive to seek home insurance (World Bank, 1999). As a result, homeowners were uninsured prior to the 1999 earthquake (ibid). Housing reconstruction costs alone were estimated at £3.5 billion (Bendimerad, 2000: 2). The damages covered the Marmara region, an area of roughly 20 kilometres by 200 kilometres. In towns along the seacoast, such as Kocaeli, the majority of the buildings collapsed. In the Düzce earthquake, damage was concentrated in Düzce and Kayanasli. The Düzce earthquake epicentre was located about 6 kilometres south of Düzce, where most of the buildings, already moderately or lightly damaged by the Kocaeli earthquake, had collapsed. Even some of the buildings that had been reinforced following the Kocaeli earthquake collapsed (MPW, 1999).

About 23,400 buildings were damaged, of which 16,400 were heavily damaged or had collapsed. This meant that 93,000 housing units and 15,000 business units were heavily damaged; a further 220,000 housing units and 21,000 business units were moderately damaged. As many as 120,000 families were left homeless, 18,373 people died, and 48,901 were hospitalised, of whom about 40% were left permanently disabled (MPW, 1999; Bibbee, 2000: 7). Over half a million survivors were in need of homes following the earthquake. Human loss and physical damages were four times greater than those of the 1995 Kobe earthquake in Japan. Most of those affected in Turkey were upper middle-class residents of multi-storey apartment blocks. Due to rapid

urbanisation in the years prior to the earthquake, the majority of this housing stock was of poor quality. The extended periods of high inflation prior to the earthquake had generated a high real interest rate, which impeded development of the mortgage market and property insurance, as well as large-scale housing development, and the industrialisation of housing construction (Bibbee, 2000: 12; Erdik, 2000: 3).

The public cost of designing and building 80 m^2 flats (to replace destroyed homes) is £17.5 million, excluding the cost of acquiring land in standard locations (Bibbee, 2000: 14). The average cost of repairing a moderately damaged house is £6,000, and a lightly damaged house, £2,000. Using these estimates, the total budget required for direct housing investment and alternative cash benefits would be £0.8 billion.

Before the earthquake, high rates of industrialisation and urbanisation created an ever-present need for inexpensive housing. The number of housing units being built outstripped municipal capabilities to regulate and supervise construction. Bureaucracy and a lack of accountability (among municipal officials) created disincentives for proper control. As stated above, the government's guarantee of housing provision in disaster created a disincentive for private insurance – and arguably, even created incentives to build low quality housing, with poor earthquake performance (Erdik, 2000: 5). Two decades of rapid growth and industrialisation in Marmara had attracted a significant migrant population and raised demand for housing. Local builders met his demand with 5-6-storey buildings of reinforced concrete, typically suffering from inadequate engineering and faulty construction practices, and passing without inspection by the local authorities. In past urban earthquakes, the numbers of buildings damaged beyond repair were approximately equal to the number of deaths. In Gölcük, a small town near the epicentre, about 7% of the population lost their lives (Erdik, 2000: 7).

Construction in Turkey is typically comprised of reinforced concrete for the outer walls, and reinforced masonry for the inner walls, structured in a symmetric floor plan. Inner walls – unintentionally – become the first line of resistance to the lateral movements of earthquakes. Yet these inner walls are simply hollow clay bricks, often with inadequate mortar at the joints. When these fail, outer walls provide this resistance. These too, however, are low quality concrete, with inadequate reinforcement, and poor detailing. Inflexibility in critical parts of buildings causes damage of varying severity; the worst kinds are "hinge" mechanisms (partial collapse) and pancake-type collapses.

An important qualification is necessary here: buildings that perform well in an earthquake are not necessarily of superior design. The motion caused by an earthquake varies significantly from place to place. Some areas might experience heavy motion, while others are relatively unaffected. Therefore, assessment of ground motion variability is important before judging building strength (Erdik, 2000: 19). Yet despite this variability, contrasting the performance of buildings that survived with those that collapsed provides evidence that conformity with the design code, and good construction practices can limit damages during strong earthquakes (Erdik, 2000: 20; Bruneau, 2000: 39). In summary, damages were caused by five factors:

Poor building materials quality: The strength of the concrete was, in general, well below the values specified in the building codes. The use of smooth reinforcing bars (as opposed to deformed bars) was also common.
Soft storeys: Soft storeys increased deformation demands and P-Delta[8] force effects, and forced the first-storey columns to dissipate all the energy. This caused many collapses.
Strong beams and weak columns: Deep beams, used with flexible columns, contributed to the early failure of columns.
Improper and poor detailing of reinforcement: Insufficient anchorage, splice length and confinement severely limited the ductile response of the reinforced concrete frames.
Short columns: Improperly designed inner walls limited the height of the columns, leading to shear failures (Erdik, 2000: 15).

Steel structure buildings fared much better than those of reinforced concrete, because the steel was more ductile (Erdik, 2000: 16; Bruneau, 2000: 48). Due to its expense, however, it was rarely used prior to the earthquake, and found mainly in industrial structures (ibid). A large automotive plant under construction, for instance, was undamaged, except from strains caused by geological factors (ground settlement and fault trace intersection).

Yet not all steel structures fared well: a railcar factory, poorly designed and relatively old, received heavy damage, and partially collapsed. Usually, the two reasons for collapse in steel structures were: inadequacy of anchor bolts at column bases, and failure of brace connections; or local buckling in concrete-filled steel pipes used in wharves.

[8] P-Delta is a non-linear effect that occurs in every structure where elements are subject to axial load. P-Delta is actually only one of many second-order effects. It is a genuine 'effect' that is associated with the magnitude of the applied axial load (P), and a displacement (delta) (Dobson).

Many of the better-built, pre-fabricated industrial facilities also survived the earthquakes intact (Erdik, 2000). Nevertheless, a significant number of pre-cast, reinforced concrete buildings collapsed, due to failure of the beam-to-column connections. A portion of these collapses was observed in incomplete structures that lacked exterior walls (ibid).

4.5.2. Hospitals and schools

Public hospitals and schools (but interestingly, not private ones) survived the earthquake better than the general building stock (Erdik, 2000; Bibbee, 2000: 14; Ministry of Public Works and Settlement, 2000; World Bank, 2000: 45). In construction, such buildings are assigned a safety factor of 1.5, meaning that the load for which they are designed is 50% greater than average (in terms of earthquake resistance). Their typically simple symmetrical layout, and absence of "soft storeys", also provided protection during the earthquake (ibid). Nevertheless, of the 47 hospitals in the earthquake's area, 12 were damaged beyond repair. In addition, 28 health centres were totally destroyed, and 20 others were heavily damaged. About 50% of the 550 pharmacies in the area received various levels of damage. Forty-three schools and 21 secondary schools were damaged beyond repair; another 267 basic education schools, and 114 secondary schools received minor to moderate damage (ibid).

Although physical damage to the health sector was modest – in comparison to the earthquake's overall effects – the impact on health services was significant (World Bank, 1999: 45). Many of the hospitals were unequipped to handle the complexity of certain injuries; some people – in the aftershocks – had jumped from buildings, causing leg fractures. The most seriously injured were evacuated to Ankara and Istanbul. Of the 523 pharmacies in the area, 313 were destroyed and 124 damaged – leaving only 129 intact.

The earthquake destroyed or damaged many primary and secondary schools in the Marmara region: 22 basic education schools (grades 1-8), and 21 secondary schools were irreparably damaged, requiring £14 million to replace (World Bank, 1999: 47). Another 267 basic education schools and 114 secondary schools were damaged, and required rehabilitation worth £7 million. Of this total £21 million, 90% was required for construction and 10% for furniture and equipment (ibid).

About 547,000 students were enrolled in the destroyed and damaged schools, and about 21,000 teachers taught in those schools. As an interim measure, the Ministry of Education asked students to relocate to other schools in the vicinity. Those students who had been made homeless (114,000) moved, together with their families, to stay with relatives elsewhere in Turkey. Some students were unable to attend school for other reasons, such as their parents' unemployment or other household disruptions as a result of the earthquake (World Bank, 1999: 47).

4.5.3. The infrastructure damage and losses

The transport, energy, and communications sectors were heavily affected. Oil and gas production facilities suffered extensive damage, highlighted by the fire damage to Tüpraş oil refinery. Municipal oil and gas pipelines were moderately damaged. Telecommunications damage included ruptured transmission lines, station damages, and damages to buildings and network facilities. Office buildings, water pipelines and supplies, wastewater treatment, sewerage systems, and other structures accounted for additional damage to municipal infrastructure. Damage to the transport infrastructure included 60 kilometres of the Ankara-Istanbul highway, as well as damage to the railways, and numerous harbours. The electricity grid was extensively damaged, especially its underground cable lines (Bibbee, 2000: 9).

On the whole, the budget needed for repairs was estimated as follows: £2 million for energy transmission; £62 million for energy distribution; £200 million for the highway system; £30 million for the railway system; £20 million for the ports; and £63 million for telecommunications (Erdik, 2000).

4.5.4. Damage to industry and losses

As stated earlier, the earthquakes' epicentres were considered home to tourism, as well as Turkey's heavy industries, including: petrochemicals production; power plants; manufacturing and repair of motor and railway vehicles; basic metalwork; production and weaving of synthetic fibres and yarn; paint and lacquer production; and production of tires, paper, steel, pharmaceuticals, sugar, and cement. Numerous foreign companies have affiliates in the region, including (among others): Goodyear, Pirelli, Ford, Honda, Hyundai, Toyota, Isuzu, Renault, FIAT, Bridgestone, Pepsi, Shell, and British Petroleum.

Damage to industry was more expensive than that in other earthquakes of similar magnitude. The damage included: cooling tower collapses; damaged cranes; collapse of steel, reinforced concrete frames and prefabricated structures; damage to piers; and extensive equipment failures. Over 1,000 industrial facilities were damaged, including the country's largest refinery, which burned for six days after the earthquake (Bendimerad, 1999: 1).

Telecommunications were severely damaged when the fault rupture cut the Ankara-Istanbul connections, and damaged two sub-stations – initially interrupting power across much of northwest Turkey. The Istanbul-Ankara motorway and railroads also received heavy damage, including a collapsed overpass, which held back transport into and out of the region during the first week of the disaster.

Overall, the extent of damage to industry depended on various conditions: distance to the (North Anatolian) fault, site conditions, quality of construction, anchorage condition of machinery, and toughness and redundancy of fire fighting facilities. To some, the earthquake provided a unique opportunity to investigate the performance of industrial facilities subjected to substantial strong ground shaking under near-fault conditions (Erdik, 2000).

4.5.5. Economic and business losses

Losses due to extensive business interruption were substantial, as compared to the physical damage. The Marmara Region accounted for around one-third of Turkey's output, and the preliminary assessment showed the effects were severely damaging on GDP in the short term (Alexandra, 2000:5). Estimates of total wealth and income losses range from £3.5 billion to £11 billion. Estimates for the loss of physical capital accounts range from £2.7 billion to £7 billion; the housing sector accounts for roughly 40% of this (ibid). Average total loss (physical and socioeconomic) may be in the range of £12-13 billion, about 7-9% of the nation's GDP.

Long-term damage significantly exceeds immediate damages, due to reduced tax revenues, emergency assistance costs, and three other reasons identified by the World Bank (2000): (1) losses from a tax payment deferral announced by the Turkish government; (2) credit subsidies from loan refinancing and new loans to small and medium enterprises that sustained damage in the region; and (3) postponed non-tax revenues from public enterprise privatisation. All of this will result in an estimated £4.5 billion load on public finance – of which £2 billion would be needed for housing construction (State Planning Organisation, 2000).

Yet revenues were also forthcoming: one year after its initiation, the special "earthquake tax" and paid military service scheme had generated £2 billion (later mounting to £2.3 billion) (Erdik, 1999; Bibbee, 2000: 12). Foreign finance (including the World Bank, European Union, and others) generated another £1.7 billion. The initial 5% decline in GDP in 1999 came to an end in the first half of 2000, and led to a subsequent annual increase of 5% (ibid).

But on a personal level, losses were heavily felt (see Table 4.6). Among the self-employed, and in small- to medium-sized enterprises, 24-50% of jobs had been lost (World Bank, 1999: 38).

(in Thousands)	**Turkey**			
Total Population	63,500			
Total Employment	20,800			
	EQ Zone	**Kocaeli**	**Sakarya**	**Yalova**
Employment	1,364	1,061	250	54
Estimated Job Loss	321	216	79	26
Percentage	23.5	20.4	31.6	48.1

Table 4.6: Job loss estimates.
Source: Adapted from World Bank (1999: 38).

Microenterprises and small enterprises – such as retail shops, handicrafts, and artisan workshops – were the hardest hit by the earthquake (Bibbee, 2000: 12; Erdik, 2000). They lost most of their working capital, their premises, and key family workers. While the total capital stock and value added of micro- and small enterprises might be relatively limited, their large number could bring these losses to significant levels.

About 6,000 small shops (employing less than five persons) and 1,500 small enterprises (employing 5-10 persons) were severely damaged by the earthquake (World Bank, 1999). Insurance coverage for these small and micro-enterprises is very limited; they are undercapitalised and have limited access to funding.

About 20,000 small businesses were forced to terminate their operations, leaving about 140,000 people jobless. Job losses could be as much as 45% of the pre-earthquake labour force in the earthquake-affected region. Yet some are optimistic of recovery for the self-employed, based on government credit incentives, debt rescheduling, and assistance for rebuilding. Nevertheless, losses in small businesses alone are estimated at about £0.7 billion, and can have additional adverse socioeconomic effects due to loss of employment, production, and economic linkages with larger firms.

4.5.6. Environmental damage

During the earthquake, sewers broke, the Tupras refinery spilled oil, and the Region's surface waters – including the Marmara Sea – were polluted by wastewater and debris (World Bank, 1999: 48). The sewerage system ruptured in multiple locations, affecting not only groundwater and surface water, but also piped drinking water, as water and sewer pipes had often been placed side by side underground or in trenches. Some municipalities coped with their wastewater by diverting it to the Sakarya River, which drains into Lake Spanca, the main potable water supply in the Marmara Region. The extent of the pollution caused a temporary decrease in oxygen content in the water, and affected aquatic wildlife and the ecosystem as a whole (ibid).

In the first days after the earthquake, debris and rubble were disposed directly into surface waters, such as the Sakarya River and Marmara Sea. Thirteen million tons of rubble required clearing. A stationary recycling plant was set up to process the rubble, but large quantities of reinforcement bars in the construction waste caused severe damage to the plant. As a result, much of the waste from construction and demolition was not processed, and was instead deposited in 17 dumps, designated by the Turkish Ministry of Environment and municipalities. Despite this management, however, some of the waste did end up at the coastline.

The rubble was mainly from collapsed and damaged buildings, and was comprised primarily of construction materials, mixed with household goods and personal belongings (Baycan and Petersen, 2002). It also contained material from small- to medium-sized enterprises that had operated in the damaged buildings. Some of these materials contained small amounts of chemicals, paints, and solvents. In addition to damaging the aquatic environments, these materials comprised a hazard for the teams and contractors involved in the clean-up and reconstruction (ibid).

4.6. Reconstruction of the Marmara Region

According to the World Bank (1999: 8), the earthquake created the most difficult emergency management crisis faced by any nation of its time. Across a vast geographic area, communication systems were destroyed, and thousands of people were trapped in destroyed buildings – including many of the officials expected to initiate response efforts. Emergency response resources were

also severely damaged. Immediately after the earthquake the demand for emergency aid was overwhelming, and efforts to respond began.

The organisations involved numbered over 140, including 61 public organisations – 27 of which were national ministries and departments, and 10 of which were provincial or municipal offices (*Cumhuriyet*, 1999). In total, 24 cities and provinces (plus national-level organisations) contributed personnel and assistance (ibid). Twenty percent of the organisations were non-governmental. These sent search and rescue teams, field hospitals, medicines, tents, blankets and cash. Organisations varied – some were scientific, while others were humanitarian (ibid).

Some sources state that the Turkish government had prepared a national emergency plan prior to the disaster (Comfort and Sungu, 2001: 6). In compliance with this plan, the Office of Disaster Affairs activated the National Crisis Centre and the Prime Minister's Office. Other key ministries and departments activated their own crisis centres, including the Ministry of Public Works and Settlement, and the ministries of Health, Foreign Affairs, and Transportation (ibid).

The response plan was governed by National Disaster Law No. 7269, implemented by national organisations in the first three weeks after the earthquake. The large number of non-governmental organisations of varied sectors – professional, charitable, humanitarian and research – represented the significant commitment and sympathy of other nations toward the Turkish people affected by the disaster. It also, however, meant that relief efforts were very difficult to coordinate. In addition, the government response alone was locally perceived as frustratingly delayed (World Bank, 1999: 4; Mitchell, 2000: 19). The *Turkish Daily News*, for instance, published an article, entitled, "Earthquake victims continue to see the mistakes…" (Çevik, 1999).

> In the 12th hour of the disaster, as the people tried to pull survivors or even deceased loved ones out of the rubble of the collapsed buildings, there was no sign of any authority who would help them. And that includes the military units. In the fair 48 hours of the disaster, people were still left helpless. Even foreign crews and rescue teams did not understand the reason why the Turkish authorities were so slow and so ineffective. (ibid)

Staggering losses of human life were in part caused by delays in the emergency response (Bibbee, 2000: 8). Because the earthquake struck in the early morning, in a densely populated area, many people were caught inside destroyed buildings – including, as stated above, officials responsible for relief efforts. In the first decisive hours, rescue activities were carried out by on-site survivors mobilising themselves in an ad hoc way.

Immediately following the earthquake, three critical infrastructure elements failed: communications, electricity and transport, which were severely damaged and inundated by crowds driving into the region (World Bank, 1999: 8-9). The national main fibreoptic, which was the backbone of telephone connections into the region, was damaged. At the same time, damage to two main power substations caused a widespread power blackout across Turkey. In addition to this, an overpass on the motorway between Izmit and Ankara collapsed.

The scene of the earthquake was chaos. Survivors tried to rescure their family members and neighbours entangled and trapped in the debris (Mitchell, 2000: 119-134). Government search and rescue activities were painfully slow. Criticism of the government was widespread among the public and in the media. Trained personnel for emergency response were in short supply, as was heavy lifting equipment and search dogs. Physical and mental exhaustion exacerbated Turkey's most costly natural disaster.

An estimated 1,000 international search and rescue teams flooded in, many of them within the first 48 hours. These, at least, were able to bring equipment and dogs. However, lack of coordination between the international search and rescue teams resulted in friction between those who tried to hear sounds from possible survivors buried under the destroyed buildings, and heavy equipment operators who wanted to bulldoze, load and carry off the destroyed buildings.

Despite extensive experience in implementing disaster response plans in prior earthquakes, and despite activation of the Prime Minister's Office within hours of the Marmara disaster, no on-scene response from national and provincial public agencies appeared for at least four days. Many of the survivors recalled waiting in desperation for four days before any help appeared. When the response came, it was also fraught with problems. Disorganised and unplanned distributions, for example, resulted in food aid being dumped on the ground, without reaching the people who needed it.

The earthquake saturated, damaged and destroyed some of the key medical facilities in the Marmara Region, such as Izmit Social Insurance Hospital and Düzce State Hospital. Fortunately, some medical facilities were only moderately damaged, and were able to provide emergency care in undamaged wings, and outside in the hospital grounds and gardens. Yet the number of injured in need of care was far beyond the capacity of the region's hospitals. With the help of international organisations and foreign governments, 20 mobile and 16 permanent hospitals were put into service.

About 15 million people whose houses had remained intact nevertheless remained outdoors, in fear of aftershocks. As many as 600,000 were homeless, 200,000 were living in the streets, and 62,000 families lived in 62 tent sites throughout the area (Mitchell, 2000: 125). The government pledged to erect tents and prefabricated homes. Relocation to proposed tent sites, however, was resisted due to their remoteness.

Some of the migrants, who had come to the Marmara Region for employment, returned to their places of origin, because they had lost their jobs in companies such as For-Koc, Pirelli, Toyota, and other large firms. Some of these – 30,000 – were given official notice of their moves, but many did not bother with this administrative formality.

4.6.1. The Turkish government and NGOs' reconstruction programmes

In the aftermath of the earthquake, the Turkish government declared a state of emergency, and launched relief efforts. In addition to tent "cities", people gathered in informal "clusters" of makeshift shelters, pitched close to the people's damaged or destroyed houses and flats. A large relief operation was conducted by the Turkish authorities, the Turkish Red Crescent Society (TRCS), the International Federation of the Red Cross and Red Crescent Societies (IFRC), and other international agencies. This aimed at addressing the basic needs of 300,000 to 400,000 people. Within a few weeks, efforts focused on 250,000 people still in need of assistance (IFRC, 1999).

In retrospect, however, relief efforts were slow (Mitchell, 2000: 126). TRCS facilities for food distribution were not visible until seven days after the earthquake (ibid). Some large businesses and private organisations donated food to the survivors, and water bottling companies donated water. But sanitation was a critical issue. There were no portable toilets for several days. The TRCS was not only criticised by the media for its slow response, but also for the quality of floorless canvas tents, and for selling burial shrouds to bereaved families. Despite the success in preventing fatalities caused by hunger, exposure or spread of disease, the operation soon became problematic. In addition to the difficulties of access and communication, there were apparent failures in coordination, in understanding needs, and in the integration of the roles and functions of the main actors. The perceived lack of speedy response by the military and other state bodies, and the torrential rains experienced by those living in makeshift shelters a week after the earthquake, created a high profile media campaign attacking the state's disaster response, in

which the TRCS was implicated. The focus narrowed on the perceived disorganisation of the authorities, and the inadequacies of the traditional TRCS tents that had been widely distributed.

Regarding the coordination and deployment of international and national resources, the Turkish government stated explicitly that the government had complete control over the coordination and allocation of resources in the event of disaster. Therefore the predominant planning, logistics and delivery mechanisms were created by the government for this disaster: the Crisis Management Centres (CMCs) supported by Logistical Supply Coordination Centres (LSCCs), in the early stages of the emergency response fund, were channelled through this system.

However, many argued the government performance was very poor: confused in coordination, slow in response, indecisive, and lacking in leadership and initiative from the regional authorities. While the disaster was indeed formidable in scale and complexity (collective trauma was but one example of this), preparedness planning and training was lacking. The large resources led by the central government in Ankara were hampered by bureaucracy, delays and a lack of clarity. In addition, although a detailed disaster plan had been made by individual ministries, the TRCS, the army, the civil defence, no simulations or exercises had taken place based on the integration of these bodies (Hurford, 2000: 32).

The Turkish government had no official comprehensive reconstruction programme before the Marmara earthquake (Kurita, 2001: 6). International organisations – such as the World Bank, UNDP, the EU, and others – worked with the Turkish government to draft the main reconstruction programmes of the Marmara region. The planned reconstruction required heavy investment and technical assistance, and funds were provided by financial institutions and aid organisations, including the World Bank. In the end, the World Bank, the United Nations Development Programme (UNDP), the EU, and other international organisations and donors outlined a comprehensive Framework Programme, which was financed by the European Investment Bank and the World Bank (see Tables 4.7, 4.8 and 4.9).

Programme	Total amount (GBP million)
Turkish government's Earthquake reconstruction programme	1,470
World Bank's comprehensive Framework Programme	1,000

Table 4.7: Turkey's reconstruction programmes.
Source: Adapted from Kurita (2000: 6).

Programme		Total Cost (GBP million)
1.Social Aid	Housing Support	111.2
	Support for rebuilding and repair	60.7
	Cash lump-sum payment	21.3
	Subtotal	193.2
2. Social security benefits		13.5
3. Other social projects		16.3
4. Business rehabilitation	Tax deferments	130.9
	Assistance for small-Scale enterprise	12.9
	Credit programme	2.3
	Subtotal	146.1
5. Reconstruction and disaster damage mitigation	Housing	619.7
	Land management and building standards	20.2
	Infrastructure	252.8
	Disaster issuance	153.4
	Emergency response system	61.8
	Subtotal	1,107.9
Total		**1477**

Table 4.8: The cost of Turkey's reconstruction programmes.
Source: Adapted from Kurita (2000: 7).

	Component			Cost (GBP Million)	Source of funding
A	Disaster Response System and Risk Reduction Strategy	A1	National Emergency Management System	61.90	World Bank, Turkish government
		A2	Disaster insurance Scheme	153.40	World Bank, Turkish government
		A3	Land use Planning and Enforcement of Construction Code	6.62	World Bank, Turkish government
		A4	Cadatre Renovation and land Management	13.60	World Bank, Turkish government
		Subtotal		235.52	World Bank, Turkish government
B	Trauma Programme for adult			3.90	World Bank, Turkish government
C	Construction of Permanent Housing in Bolu, Kocaeli and Yalova			164.79	World Bank, Turkish government
D	Project Management			7.13	World Bank, Turkish government
E	Business Rehabilitation			61.64	European Investment Bank
F	Construction of Permanent Housing in Bolu, Sakarya, Yalova, Istanbul, Bursa and Eskisehir			99.48	European Investment Bank
G	Repair of Existing Housing Stock and Healthcare Facilities			355.12	European Investment Bank
H	Rebuilding and Repair of roads, water supply Systems, wastewater system and Power distribution Networks			78.50	European Investment Bank
	Front-end Fee			2.84	
	Total Programme Cost			**1,008.92**	

Table 4.9: The cost of the World Bank's Comprehensive Framework Programme.
Source: Adapted from World Bank (1999: 110).

A multitude of national and international organisations responded to the disaster (Mitchell, 2000: 127-128). For example, the IFRC launched an appeal for US$7 million toward emergency aid. International organistaions from all over the world – such as Direct Life Intenrational, Mercy Corps, World Relief, Catholic Relief Services, UNICEF, and many others – responded with financial, medical, or material assistance. This was followed by support from the European Investment Bank, totaling £14.6 million, toward emergency assistance in the form of tents, blankets, medical supplies, water purification equipment, and mobile kitchens. The Gulf Cooperation Council pledged £225 million toward reconstruction programmes (see Figure 4.10).

According to the IFRC (2000), the overall response to the second earthquake was better, as organisations were already established on the ground, and the government and military took a much more comprehensive role in coordination. However, the issue of shelter once again became critical, and the Turkish Government increased its efforts to fulfil an existing pledge to provide 26,000 prefabricated houses by the end of November. The TRCS and the International Federation refocused on the provision of tents and the setup of construction programmes, as well as continuing with supplies of food, hygiene and medical items. Once again, urgent issues arose with more tent cities, and the immediate psychosocial needs of the population. Again, however, the numbers of people in acute need of relief declined rapidly.

Figure 4.10: The scope of regional reconstruction.
Source: Gülkan (2001: 48).

4.7. The culture of disaster construction

Since the Marmara earthquake of 1999, other earthquakes have struck Turkey, with the most recent in 2005 in the town of Bingöl. The earthquake caused a massive number of deaths, and

structural damage. The human tragedy which resulted from this earthquake was also attributed to the poor construction of the buildings. This event raised questions as to whether the Marmara earthquake lessons were learned and incorporated into current construction practices.

In an effort to find answers to these questions, I interviewed Canan Saritaş, a senior manager at the State Planning Organisation. His responses were based on first-hand experience in helping set up policies and strategies to regulate the construction sector. He also referred at times to discussion papers and studies written by various authors, such as Penny Green (2004). Saritaş identified six reasons for the recurring high death toll caused by poor construction in earthquake events in Turkey: (1) inadequate economic policy; (2) corruption in central and local authorities; (3) building amnesties; (4) poor planning; (5) poor training of technical professionals; and (6) the high rural-urban migration rate.

1. Inadequate economic policy: Saritaş suggested that, in order to understand the reason for poor construction practices in Turkey, we should look back to the liberalisation of the Turkish economy in the early 1980s. The liberalisation of the Turkish economy, the lifting of protectionist trade policies, and the privatisation of public lands, all led to land becoming available for development. This, in turn, made possible the increasing influence of capitalist enterprise in housing and, interdependently, on the emergence of unregulated construction companies.

   These companies and individuals relied on populist government practice, and were able to build on undeveloped public land before it became available for sale. Contractors or developers relied on the fact that these illegal housing developments would eventually be given planning permission on the eve of election. Contractors and developers were well aware that the newly elected local authorities would pass building amnesties. These amnesties would then either allow the public land – already home to a great number of unlicensed housing developments – to be sold to individuals or firms, or allow more storeys to be built in the existing developments.

   Hundreds of individuals, with neither capital nor technical capacities, set up construction firms, relying on friends in local authorities to win the contracts. These new firms made a fast profit, but compromised the quality of construction. In addition, on many occasions, local authorities indicated that zoning regulations may not be enforced in the run-up to an election, which led to individuals building an extra storey onto their existing building.

2. Corruption in central and local authorities: Obtaining planning permission from the local authority in Turkey, involves three steps: design permission, foundation permission, and occupancy permission. Between these three processes, there is much scope for possible corruption. Saritaş described how social networks are behind the relationship between clients and the construction industry. For instance, the successful bidder in a government construction project is most likely to come from the same town as the Minister or the Head of the Department that deals with the project. Being from the same political party is also a prerequisite.

   Misuse of public funding in rebuilding housing in the earthquake-affected region occurs in high levels of the central government. The Minister of Public Works and Settlement set up a construction company with his father, explained Saritaş, in order to sell construction materials and equipment. It is believed that he forced construction companies to buy materials from his company, that he favoured certain companies, and that he disqualified rivals from bidding by removing key documents from their files.

3. Building amnesties: Because of the building amnesties (mentioned above), contractors and developers do not look for better architects or designs, but for those who can direct their firm according to the expectations of the contractors, in terms of profit. Since amnesties are so predictable, sometimes public land or forested land is advertised for sale or rental – at low prices – before the amnesty has even been passed.

4. Poor planning: Despite the fact that the Turkish Earthquake Code is highly comprehensive, it offered little protection in 1999 and the following earthquake in Turkey. Saritaş believes – based on information from the Turkish Earthquake Engineers' Union – that less than 25% of buildings in Turkey conform to the Code. He attributes this to the failure of local authorities to enforce building regulations, due to a lack of capacity in assessing designs and in inspecting construction sites.

5. Poor training of technical professionals: Saritaş also believes that training of engineers and builders plays an important role in Turkish earthquake disasters. Upon completing their degrees in architecture on engineering, graduates are legally permitted to take full responsibility for the technical aspects of a construction project. Taking such responsibility at

such an early stage may have led to inadequate construction, with fatal consequences during earthquakes.

6. High rural-urban migration rate: Hundreds of people, for political and economic reasons, migrate from rural and conflict areas in southeast Turkey to seek employment and social security in economic centres, including the main cities and industrial areas of the Marmara region. This has created pressure for more unauthorised settlements.

The interview with Saritaş explored the question of why earthquakes were repeatedly and increasingly disastrous in terms of human life and damage to the built environment. His six key points addressed the root causes of widespread destruction. His remarks are useful in reflecting upon the disaster and the response. Reviewing these aspects, it can be seen that the first priority in the aftermath was the emergency response: search and rescue, food, medical services, and the rebuilding of physical elements, such as housing, schools, hospitals and other infrastructure. This began relatively early, as these elements are crucial components of the entire recovery process. Experience shows, however, that disasters have strong potential for disrupting the most basic social infrastructure and that the process of restoring these functions can be very difficult and challenging. By the end of January 2000, the relief operation began to wind down, and the international organisations concentrated more on an integrated approach to rehabilitation and reconstruction; other programmes, such as social welfare were also considered.

4.8. Conclusions

Seven years have passed since the two devastating earthquakes in the Marmara region of Turkey. After the Marmara earthquake, the immediate blame was placed on contractors and the construction practice as a whole, as being the cause of the structural damage and failure that led to high death tolls and physical destruction. No one can deny the role of professionals and individuals in the building process: contractors, architects, civil engineers, planners, clients, and the construction inspectors of the local authorities. All contributed to transforming the natural hazard into a human disaster. Yet the overall nature of the environmental, sociocultural, economic, and political/institutional structures in Turkey also made the population vulnerable to earthquakes. Therefore, it is almost ethically incorrect to point the finger of blame at any one group or profession.

The international community and international organisations, in attempting to support the reconstruction efforts in the Marmara region, set up reconstruction plans and strategies to help the Turkish government technically and financially. But due to the lack of a focused reconstruction framework, the economic and social conditions for most of the Region's population remain the same as before the disaster. The high rate of unemployment is leading to new waves of immigrants seeking jobs in the industrial towns. The new demand for housing and construction, in response to migration, could be sowing seeds for renewed disaster in the region.

Added to this recipe are the politicians who run for local authorities, giving promises of insurance exemption and planning permission for illegal settlements to win the election. Furthermore, enforcement of planning and building regulations is hampered by poverty and political inefficiencies. Just as disaster can hinder economic growth – through the loss of infrastructure and productive assets and development opportunities – it can also provide opportunities for growth in the construction sector, which can contribute substantially to GDP during reconstruction (Alabala-Bertrand, 1993). This raises a key question: as a consequence of the Marmara earthquake, could international organisations and the Turkish government plan and implement successful construction programmes, which incorporate the lessons learned from the long list of earthquakes which have already occurred? For now the question is not if, but when, the next earthquake will hit in Turkey.

To examine the question above, this study focused on two construction programmes aimed to provide the stricken communities with much-needed long-term facilities. The aim of such facilities was to protect communities in the event of future disaster. Yet, as was found in the fieldwork, the two programmes pursued this aim while paradoxically not taking into consideration the socioeconomic dimension of life in disaster areas.

Chapter 5. Research Data

5.1. Introduction

This chapter presents the research data collected within the two case studies: the World Bank's Demetevlar Housing Project, and the IFRC's Düzce State Hospital. The two projects were chosen because they illustrative of the reconstruction efforts as a whole, and because they were relatively well documented. The IFRC office in the area offered logistical support for the field research. The data below – from observation in each case study – is supported at times with information from communications with external academics, government officials, and beneficiaries. Data collection on the architectural design of the constructed facilities relied on information in architectural drawings and weekly progress reports. Data collection from contractors and programme planners was limited, as neither organisation kept the record of the names of professionals who were involved in the construction projects. Therefore, field visits were important to supplement documentary materials, and to explore community views of the constructed facilities. The data collected in each case study project is presented below, structured according to the recovery programme life cycle: planning and design; implementation; and maintenance.

5.2. The IFRC and Düzce State Hospital

5.2.1. Planning and design

In December 1999, the Turkish Red Crescent Society requested that the International Federation of the Red Cross and Red Crescent Societies (IFRC)[9] commission a needs assessment for reconstruction. The IFRC set up an assessment team in the earthquake-affected areas, covering logistics, relief, health, water and sanitation. The team was composed of representatives from American, Austrian, British, Finnish, French, Iranian, and Spanish Red Cross and Red Crescent Societies. In consultation with government officials, the Turkish Red Crescent Society (TRCS), UN agencies, and other organisations, the IFRC identified the number and immediate needs of

[9] Although the IFRC was officially formed in 1991, its roots go back to 1859. The Red Cross was created in 1863 as the International Committee for Relief to the Wounded. Following World War I, Henry Davison, the President of the American Red Cross, initiated an international medical group, later to become the League of Red Cross Societies in 1919. The League aimed "to strengthen, and unite for health activities, already-existing Red Cross Societies and to promote the creation of new Societies," (IFRC, 2006). Its objective was to improve the health of people in countries that had suffered greatly during the four years of war. In 1983, it was renamed the League of Red Cross and Red Crescent Societies, and finally in 1991, it took its current name, the IFRC.

communities affected by the earthquake. The needs assessment indicated extensive damage of housing and infrastructure (as described in Chapter 4).

The assessment proposed projects in a number of sectors, including construction (in housing, health, and education), water and sanitation, food provision, and disaster preparedness and mitigation. In total, 40 possible construction projects were identified (with participation from local authorities). Following this, representatives from 18 Red Cross and Red Crescent Societies offered Turkey an operational planning and information meeting in Ankara, in February 2000. There, they agreed upon 14 rehabilitation and reconstruction projects in the health, education, and social sectors. The resulting document provided an overall framework for subsequent IFRC programming, and included a list of projects, such as schools, hospitals, health centres, kindergartens, orphanages, centres for the elderly, and centres for the disabled.

The aim of the reconstruction programme was to meet the needs of the population, taking into account recent population growth. Programme objectives were partly technical: to disseminate the use of new seismic techniques among local practitioners, and to exchange information with appropriate authorities and institutions, in order to enhance the seismic structural stability of buildings and infrastructure. Hence, technical vulnerability was a key issue for the reconstruction programme.

The specific objectives included the following:

- Identifying projects that communities and local authorities have recognised as necessary.
- Identifying projects where existing staff and operational structures are in place prior to the commencement of reconstruction activities.
- Working within the plans of ministries and local authorities for reconstruction.
- Working pro-actively with local authorities in developing conceptual designs that are appropriate and have sustainable post-construction operation and maintenance.
- Ensuring that the local authorities are owners of the project, from conceptual design to the operation and maintenance [of the schools and hospitals].

The total cost of all proposed projects was anticipated to be US$32 million. The Federation committed to funding two of the projects, and 13 projects found interested donors among National Societies from Japan, Kuwait, the UK, and Switzerland, among others. The projects were categorised into four, according to funding status. Projects in the first category were the

most likely to be implemented first, as their funding had been obtained, and they were included in the budget (Table 6.1 lists these projects below).

Main Area	Project Title	Location	Total Budget US$	Total Budget CHF	Donor
Reconstruction & Rehabilitation of Health Facilities	Sakarya State Hospital	Adapazari	1,800,000	2,955,600	Japanese RC
	Düzce State Hospital	Düzce	1,800,000	2,955,600	Japanese RC
	Izmit State Hospital	Izmit	610,000	1,001,620	Singapore RC
	Kandira State Hospital	Kandira	61,000	100.000	Various
	Korfez Hospital	Izmit	650,000	1.067.300	Kuwait RC
	Psycho-social Centre	Izmit	22,000	35,200	Kuwait RC
	Kocaeli SSK hospital	Izmit	55,000	90.310	Various
Reconstruction & Rehabilitation of Education and Social Facilities	Arifiye Dormitory and Rehabilitation Centre	Adapazari	165,000	270,930	Japanese RC
	Arifiye Orphanage Kindergarten	Adapazari	110,000	180,620	Japanese RC
	Barbados Hayettin High School	Gölcük	770,000	1,264,340	Japanese RC
	Izmit Inkilap Primary School	Izmit	770,000	1,264,340	Japanese RC
	Samat Primary School	Bolu	450,000	738,900	Japanese RC
	Namikkemal Primary School	Düzce	830,000	1,362,860	Japanese RC
	Izmit Cubuklu Primary School	Izmit	450,000	738,900	Kuwait RC
Total Budget			8.543.000	13,991,482	

Table 5.1: IFRC construction programmes.
Source: Compiled from information in IFRC documents (fieldwork, 2005).

Other than this categorisation by funding status, objectives and projects were not prioritised. According to the IFRC Regional Delegate, the main reason for not having a "priority list" was because donors would not support expensive and sequential construction projects (Kelimue, interview). A senior IFRC official explained further:

> Because of the lack of a clear construction policy in the IFRC, the construction programmes were donor-driven, as these types of programmes were seen as excellent methods of channelling large amounts of funding, in a way that is good for visibility. The donor organisations tend to put pressure on the implementing organisations, influencing decisions related to the construction programmes in any context, without a clear policy, and lacking any technical capacity in the Head Office to guide the actions of the IFRC delegation. (Azmat Ulla, interview)

The end result was that each project was implemented individually, on a "project-by-project" basis with neither integration nor prioritisation (Kelimue, interview). In addition, each Ministry or local authority seemed to have its own priorities, in its own sector – resulting in construction programmes being far from integrated. The Ministry of Health, for instance, identified hospital needs in certain parts of the disaster-affected area. Within this context, the Düzce State Hospital project was begun.

The project was intended to provide a much-needed medical building, to be built within Düzce State Hospital's existing compound. Site selection was carried out by the IFRC, taking into account information on needs, provided by the Ministry of Health. Local authorities were not involved in site selection. While some attributed this to the Ministry of Health's heavy responsibilities at the time (Yilams, interview), others felt the government was overly centralised and thus incapable of involving others (Şenli, interview). Düzce State Hospital administrators and chief medical staff considered the location of the new hospital to have a number of serious drawbacks (Şenli and Yilams, interview). The new building was set within the back of the existing hospital compound, surrounded by damaged buildings, and difficult to reach from the main roads (see Figure 5.1). The hospital's proximity to surrounding buildings blocked any sunshine that would have fallen on the long sides of the building. Due to its lack of integration with pre-existing sections of the hospital, the hospital's Director of Medical Services explained, moving patients from one section to another was extremely difficult and inhumane (Şenli, interview).

Figure 5.1: The site plan of Düzce State Hospital.
Source: IFRC documents (fieldwork, 2005).

The building structure was based on a technology new to the area. An IFRC official explained that they chose to use steel for their structure, because the quality of steel structures is easier to assess than that of reinforced concrete (Azmat Ulla, interview). Prior to the earthquake, he explained, construction was often inadequately improvised, due to a lack of design. Since quality control was seen as the main cause of structural failures during the earthquake, IFRC officials wanted to ensure the same mistakes would not be repeated (ibid). Yet introducing a technology, which was new to the region, required an experienced contractor. Finding such a contractor was difficult, in an area where structures were usually of reinforced concrete. As a result, the project took longer than planned (completion was expected September 2001, but delayed to June 2002), and its building methods cost twice as much as conventional ones.

Meanwhile, many defects were reported in the steel structure (IFRC progress report). Local technicians unfamiliar with the building methods found it difficult to identity structural problems as they occurred, and the annually required check for rust or defects was a prohibitively expensive process. In some places, welding was porous, containing voids that were difficult to paint, and thereby allowing for corrosion at critical points. The opposite problem also occurred: columns were painted prior to welding, implying that welding was applied to painted surfaces, thus reducing the quality of the welded joint. Rough welding of secondary elements onto primary structures reduces the strength of the primary elements, and affects the entire section. Most of the materials required for maintenance needed to be sourced from abroad, adding to already high costs. IFRC documentation did not indicate budgets allocated for maintenance, and most funding seems to have gone toward materials and equipment required in the construction of facilities; the amount of funding allocated for labour remains unclear.

Steel is a very good thermal conductor and, without effective thermal insulation, it absorbs the temperature of the outdoor environment and stores it inside the building. The hospital's indoor environment, therefore, tended to be hotter in summer, and colder in winter than the outdoor temperature (Şenli, interview; Yilams, interview). Hospital windows, meanwhile, were so large and unwieldy that staff and patients found them difficult to keep opening and closing (Yilams, interview; field visit, Düzce State Hospital). Due to its proximity to the main road, the hospital became unbearably noisy when windows were opened. Furthermore, nothing prevented insects from flying through open windows, and mosquitoes were ever-present due to a nearby river and marshland. As a result, the hospital relied on a heating and cooling system that only functioned for a few hours each day, and was insufficient to keep the entire hospital ventilated (ibid). Lighting was also artificial. In addition to its poor location for lighting (in the midst of other buildings), the hospital's design did not optimise the use of daylight. The building was rectangular, with the long sides facing north and south, and the short sides facing east and west. Thus, despite a skylight in the centre, the building's positioning and design lost most of the Sun's rays.

During the planning and implementation of the Düzce State Hospital's construction, not one IFRC official met with hospital staff (Yilams, interview; field visit). The IFRC explained that, "we were under pressure to build the hospital as fast as possible; we did not have time for consultation," (Azmat Ulla, interview). The design, as with most IFRC projects, was undertaken by a private firm, Istanbul-based *Tugal Çevre Teknolojisi [Proje Müşavirlik Mümessillik Ltd*. IFRC officials later explained that it was in fact a replica of the Sakarya State Hospital (Balu,

interview); replication was intended to save time and money (Azmat Ulla, interview). The design took six months. The result was a two-storey building with about a 145-bed capacity. However, neither the ground floor nor the first floor was designed to be accessible to the main building elements. Figures 5.2 and 5.3 demonstrate a lack of accessibility to the internal elements of the building. This was true not only for patients, but also for staff. For example, the figures illustrate that vertical accessibility (through stairs and elevators) was insufficient for the 220 patients' beds in the hospital. In fact, the entire building was serviced by only one staircase, and one lift. One of the nurses expressed concern about this, in case of emergency. It was difficult to take a patient to the operating theatre, which was located upstairs. Moreover, there was no substitution for the lift, in case of a technical breakdown or a power failure, which was very common in Düzce.

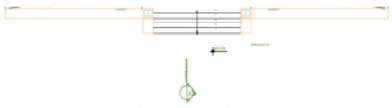

Figure 5.2: Düzce State Hospital, ground floor.
Source: IFRC documents (fieldwork, 2005).

Figure 5.3: Düzce State Hospital, first floor.
Source: IFRC documents (fieldwork, 2005).

Relations among staff and patients – said the doctors and nurses – were not as friendly as they were supposed to be. Some patients and nurses would have liked a separate, women-only wing. Most nurses and female patients came from very conservative social backgrounds, and female patients felt very uncomfortable and exposed, during routine medical check-ups carried out by nurses. The unmet need for privacy created tension between patients, which reflected on their relations with hospital staff. Hospital staff did not feel that the hospital was any more "modern" for this fact. Furthermore, they worried that its design was inflexible and would not accommodate expansion to match projected future needs. None of the staff liked the appearance of the building; some patients felt they were in a factory, rather than a hospital (see Figure 5.4). Although staff and patients felt that the building structure was safe, they were still afraid of multi-storey buildings.

Figure 5.4: Düzce State Hospital.
Source: Fieldwork (2005).

5.2.2. Implementation

Fears also surfaced regarding financial management. One hospital official (who preferred to remain anonymous) had doubted the project would be completed, as he suspected funds were being mismanaged. While there was no evidence to substantiate this claim, there was also no evidence to the contrary, because finances were not transparent. The project's Memorandum of Understanding (prepared by the IFRC) specified that officials should "use the funds provided by the Federation for their stated purpose," but provided no guidance on how compliance with this directive would be communicated: Düzce State Hospital officials did not know the total amount of money received and spent on the hospital's construction; nor did they know how the funds for the hospital's construction were utilised (Yilams, interview). Documentation was a weak point in general, not only in finance. No documents could be found, for instance, to indicate any of the following: (1) a complete listing of projects; (2) written information about projects; (3) specific needs and capacity assessments prior to each intervention; or (4) information on organisational structures for future operation and maintenance of constructed facilities. In other words, projects went relatively undocumented, and were neither preceded by needs/capacity assessments, nor followed by plans to keep the facilities running. The IFRC Regional Coordinator in Turkey stated that regular records were not kept, and that the IFRC relied on information provided by the local authorities, which was then verified by the IFRC local construction delegate (Balu, interview).

According to the IFRC Regional Delegate and the IFRC Regional Coordinator in Turkey, the working life of the Federation was often frustrating and constrained (Kelimue, interview; Balu, interview). Several international organisations were working on construction programmes in the same areas as the IFRC. Competition for funding caused duplication, resource wastage, and long delays (ibid). All of this affected the timeliness of interventions, and ultimately, the wellbeing of the disaster-affected community. The Head of the Delegation was under pressure to establish a working relationship with the Turkish Red Crescent Society (TRCS), and simultaneously to coordinate a number of Participating National Societies (PNS). To compound problems, indecision over whether to locate IFRC central offices in Ankara or Istanbul led to senior management shuttling between the two cities. Division of daily management functions into two locations created an environment conducive to polarisation. Staff issues often depended on personal understanding, rather than formal lines of reporting and responsibilities. Salaries were a concern: national staff salaries used to be higher and tax-free; the drop in salary that was associated with relocation to Ankara had demotivated the staff.

The IFRC construction team was comprised of three local engineers and – rather inexplicably – two biologists. Senior construction professionals felt their pre-project training and briefing had been insufficient (Kızılkan, interview). Staff were frequently overburdened, and asked to manage a number of projects, located some distance from one another. For instance, for four years, the entire Düzce State Hospital project, plus water supply projects for Kinrab and Düzce, were supervised by one person (Kızılkan, interview). He and others expressed concern regarding the technical supervision and monitoring provided by their organisation. They felt they had limited time to visit ongoing construction projects. At the field level, their discussion also reveals a lack of effective and timely communication and equipment delivery; these factors were especially challenging, given that most construction was carried out in remote areas.

Among the problems encountered was the relative lack of expertise among logistics staff, and the complex process by which any implementing organisation had to raise requisitions and deliver materials. In terms of construction bidding, a relative bid analysis did not work in such a context, as there were no effective guarantees against any irregular tendering process. Yet the process that was in place – whereby the Logistics and Health Departments worked jointly on specification – was difficult to navigate. When the Department of Health made a very general request, Logistics staff felt themselves unqualified to specify the request further, despite their own insistence on full specification for all requisitions. This resulted in delays, which in turn, created tension between the Departments. One of the main logistical problems was the capacity of the Istanbul airport.

IFRC Regional Coordinator, Ervin Balu, explained that Turkish authorities assured international organisations that Istanbul airport customs would immediately clear equipment delivered, without delay (interview). These authorities – police, customs, and border officials – did indeed fully facilitate the flow of reconstruction materials into the country. Nevertheless, the absorption capacity of the Istanbul airport facilities was soon overwhelmed, and the Federation made plans to shift deliveries to the Ankara airport if needed, for onward transport by road to the affected area (ibid). To compound matters, construction of Düzce State Hospital was set back due to poor soil conditions, causing delay. Lastly, one factor that had not been anticipated was the rapidly growing population in the Düzce area; hospital staff felt the hospital increasingly could not cope with a population that was not only increasing naturally, but also due to high migration rates (Şenli, interview).

5.2.3. Maintenance

Analysis of key IFRC documents, together with discussions among senior officials, revealed a highly quantitative and technical understanding of monitoring and evaluation. Projects were evaluated on the basis of numbers, such as the number of housing units, the number of schools, and so on. Monitoring and evaluation was carried out by external consulting firms, rather than internally. These evaluation criteria and methods may have been due to the scale of the IFRC's construction programmes, which necessitated substantial financial and human resources for any monitoring or evaluation (Ergünay, interview). Locally, monitoring and evaluation remained weak. Düzce's Municipality had no adequate construction control mechanism, for inspecting construction work carried out by contractors in the area. A Municipality officer (who preferred to remain anonymous) explained that contractor corruption was well known in Turkey, and that some contractors were prepared to do whatever they could to maximise their profit margins (interview). The Municipality lacked the resources needed to employ sufficient numbers of construction inspectors. In addition, because the inspectors' salary scale was very low, it was difficult to employ highly experienced structural engineers. Lastly, developing and sustaining a proper inspection structure was likely to be difficult, given that building permission and building amnesties were not granted through regulation, but rather only through personal networks, bribes, and electoral politics (Saritaş, interview).

The Municipality of Düzce experienced severe financial problems in meeting the cost of inspection and of developing an urban plan for future population growth. Before the disaster, common practice was to charge fees for planning permission. While local authorities claimed that

fees were low (perhaps to justify potential future increases), community members claimed they were high (perhaps to prevent future increases). Whichever the case, planning charges were insufficient to meet the costs of inspection and maintenance. This was evidenced in everything from the limited roads network, to everyday disrepair in Düzce State Hospital (see Figures 5.5 and 5.6).

Figure 5.5: Damaged door, Düzce State Hospital.
Source: Fieldwork (2005).

Figure 5.6: Electricial damage, Düzce State Hospital.
Source: Fieldwork (2005).

Two years after its construction, maintenance in the hospital was visibly lacking. Internal walls, made of gypsum boards, were crooked, because the adhesive bonded ineffectively with the steel structure; essentially, the two materials were incompatible (Yilams, interview; field visit, 15 May 2006). The entire steel structure swung. During the winter rains, water gushed from the roof. The maintenance department was scarcely able to keep up with the problems reported, and the costs were untenable (Şenli and Yilams, interview).

5.3. The World Bank and the Demetevlar Housing Project

5.3.1. Planning and design

Like the IFRC and other organisations, the World Bank set up an assessment team shortly following the earthquake. The team consisted mainly of international staff, with two national staff, no one from the local or affected communities, and few women. In response to their needs assessment, the World Bank developed the Marmara Earthquake Emergency Reconstruction (MEER) Project, to promote both short-term reconstruction and long-term disaster preparedness. Project components include: an emergency management and response system; a disaster insurance scheme; land use planning; enforcement of construction codes; cadastre renovation and land management; a trauma programme; and construction of permanent housing. Implementation of the MEER project was through Turkey's Project Implementation Unit (PIU), a sub-section of the Prime Minister's Office. The aims of the World Bank were to "support economic recovery" and "resume growth", as well as "to develop an institutional framework for disaster risk management and mitigation," (MEER project documents). To achieve these aims, the following objectives were set:

- Upgrading disaster response systems.
- Rehabilitating the damaged business sector, and reducing the social effects of the earthquake.
- Reconstructing and repairing affected housing and municipal infrastructure.

The World Bank, in coordination with the United Nations Development Programme (UNDP) and the EU, drafted a comprehensive framework programme, financed mainly by the European Investment Bank and the World Bank. Table 5.2 shows the breakdown of the framework, and the cost of the projects.

Component				Cost (US$ million)	Source of funding
A	Disaster response system and risk reduction strategy	A1	National Emergency Management system	110.17	World Bank, GOT
		A2	Disaster insurance scheme	237.00	World Bank, GOT
		A3	Land use planning and enforcement of construction codes	11.78	World Bank, GOT
		A4	Cadastre renovation and land management	24.21	World Bank, GOT
			Subtotal	419.16	World Bank, GOT
B	Trauma programme and adults			6.890	
C	Construction of permanent housing [Blou/Düzce, Kocaeli and Yalova]			293.32	World Bank, GOT
D	Project management			12.69	World Bank, GOT
E	Business rehabilitation			109.72	European Investment Bank
F	Construction of permanent housing [Blou/Düzce, Sakarya, Yalova, Istanbul, Bursa and Eskisehir]			177.07	European Investment Bank
G	Repair of existing housing stock and healthcare facilities			632.12	European Investment Bank
H	Rebuilding and repair of roads, water supply systems, wastewater systems and power distribution networks			139.73	European Investment Bank
	Front-end Fee			5.05	
Total programme Cost				**1,795.75**	of which US$505 million was loaned by the World Bank

Table 5.2: Cost breakdown of the World Bank's reconstruction programme.
Source: Compiled from information in MEER project documents (fieldwork, 2005).

Although objectives were not formally prioritised – either in the programme or in individual projects – the Table above indicates that housing seems to have taken the bulk of the budget. Within a week of Turkey's urgent appeal after the disaster, the World Bank provided US$252 million for emergency recovery assistance, and lent another US$505 million for construction of 11,502 new homes in eight different areas. In one of these areas, the Demetevlar Housing Project was built. In contrast to the rapidly drawn plans described above, the project took five years to complete. Site selection for the project was undertaken by a five-member committee – an architect, two civil engineers, and two geologists – representing the Ministries of Agriculture, Environment, and Public Works and Settlement. In part due to a difference in opinion between the latter two Ministries, the process was extremely difficult, expensive, and time-consuming (Ergünay, interview). Disaster expert, geologist and professor, Hüsyein Güler, was one of the five members, and explained that the main criterion for the site selection was geological safety. The site eventually chosen was a relatively large area (see Figure 5.7) of prime agricultural and forested land (Güler, interview).

Figure 5.7: The site plan of the Demetevlar Housing Project.
Source: World Bank/PIU documents (fieldwork, 2005).

The newly selected site was initially the collective property of the government, and construction was financed by the World Bank loan. According to the Project Implementation Unit – which built the project – occupants were not yet the owners of the houses (Ovayrut, interview). Nevertheless, in a survey of resident opinion, 24% said they owned their homes (fieldwork, 2005). Ownership was further complicated by the fact that most of the original occupants had left the project. Only 10% of the homes were occupied by the original beneficiaries; the rest had either sold or rented their flat, and moved elsewhere in search of employment – some even returned to the damaged area of Düzce (*Mukhtar*, interview). This, said the local community leader, or *Mukhtar*, was clearly a waste of resources: "the location of the housing project was not convenient for the earthquake survivors of this area". He explained that those who owned land had moved to be close to their land: partly to rebuild – or participate in rebuilding – their original homes, and partly to minimise problems in restoring their previous livelihoods. Even the new residents, however, were dissatisfied with the location: while about 91% of respondents said that the location was either average or poor, only 9% only said it was excellent. These 9%, however, were all retired individuals, who had moved to the area to escape Turkey's big cities, like Istanbul or Ankara. The majority said they would rather live outside the area; 85% wished to return to their previous homes; and 88% would have liked access to land, in order to build a house that would suit the personal needs of their household.

The project was six miles from the city centre, and the roads were very rough, and neither well-maintained, nor signposted. Whereas before, residents had lived in communities where they worked and interacted, the new commute to their places of employment brought additional responsibilities and isolation. Residents were further economically burdened by the additional distance required to travel daily to their places of work. Transport was especially costly because public transport was only available for limited hours in the day. The location also lacked commercial areas and key infrastructure, with incomplete pavements and natural gas pipelines – the backbone of any heating system.

> Some of theses areas – poor locations with narrow roads – make the neighbourhood frightening at night. If given connecting two-way roads, the area could be used as a commercial centre. The present shopping centres are not suitably located, and all are three-storey buildings. Only the ground level could be used to supply people's basic needs – but what kind of a business could be run from the second and third storeys?
>
> In addition, the shopping centres are badly planned, with no car parking facilities, and in some places, no shop windows. By 2010, the shops will be unusable due to lack of parking space. The municipal parking is very expensive. The open market is dirty and in bad condition. The telecommunication system is poor. There is only one ATM unit for a population of 20,000, and we have to go to Düzce to do all our business. We only come here to sleep. On the minimum wage, it is impossible to cope. The new hospital is located in the opposite area; there is neither a road nor good transport. (Bakkaloğlu, interview)

Another resident said that the area lacked social facilities, such as a sports hall, or cinemas (Avaşar, interview), while a third pointed out that what was really needed was a natural gas supply system, "as soon as possible," (Avci, interview). Almost all stressed that they were missing their old homes and places. Ninety percent found adaptation to their new homes very difficult. They longed for the "old days" before the disaster, remembering friends, social interaction, and old neighbours. The new areas were perceived as strange, and adaptation took a long time, causing both stress and unhappiness. Housing was allocated on the basis of a draw, dividing friends and families, and bringing others into close proximity at random. Nor were facilities provided to aid in making friends and building a community.

> People here are from different places; we do not know each other. In our old place, we used to have coffee shops, parks, and shops. The new area has very few. (Kayacan, interview)

Some of the residents claimed that, at times, they felt like outsiders.

In addition to being distant from services, the location was also too close to environmental disturbances. The odour of organic fertiliser from nearby agricultural land, together with the mosquitoes that bred in the nearby irrigation canal, meant that windows were kept closed for most of the summer (see Figure 5.8). In winter, they were kept closed to keep out the cold. Poor indoor air quality affected the performance of the heating and cooling systems, and even the use of the building; the community relied completely on electrical power and natural gas – where available.

Figure 5.8: The irrigation canal passing by Demetevlar Housing Project.
Source: Fieldwork (2005).

As with other World Bank/PIU projects, the Demetevlar Housing Project was designed by the Turkish company, *KEY*: *Proje ınşaat sanayıı, ticaret limited şirketi*. Government officials explained they chose to contract the project for speed, quality, and low cost (Yıldırım, interview; Ovayrut, interview). They also mentioned that such an approach placed responsibility with the contractors, and was therefore considered less problematic for the government and World Bank. As stated above, World Bank grants and loans totaled US$757.7 million, and – as with the IFRC budget – were mostly spent on materials and equipment. Similar to the situation in IFRC projects, no detailed World Bank/PIU budgets were available indicating the share of funds spent on labour. In Demetevlar Housing Project, US$14 million was spent to house 622 households (Ovayrut, interview). Each household was then asked to repay this – US$22,500 each – plus interest, over 25 years. Residents unanimously responded that their flats in the housing project were unaffordable.

> These houses were built to help the earthquake survivors, whose houses were destroyed, and they should be free of charge. Houses should be given freely. If, in any way, we had been asked to pay for these homes, we would have been opposed. We do not find it rational. (N. Aydin, interview)

The residents were mostly teachers and civil servants, or worked in other professions with similarly low incomes in Turkey. Nearly none had a private source of income; 95% of residents surveyed said their income was insufficient to meet their needs. Monthly income was entirely consumed in household expenditures, with no money left to pay instalments to the World Bank.

In terms of appearance (see Figure 5.9), the reinforced concrete buildings of the Demetevlar Housing Project satisfied the majority of residents; only 19% indicated otherwise. When asked about the exterior housing facades, 93% said they were acceptable. Yet the facades were not water-resistant, water often leaked into dwellings from the exterior walls, and basements suffered water leakage and high humidity. Building materials were of low quality, including fittings, windows, doors, and paintwork; faulty water systems in bathrooms and kitchens caused serious problems.

Figure 5.9: Demetevlar Housing Project.
Source: Fieldwork (2005).

A senior government engineer explained that both the relocation and the "modern" housing design of the Demetevlar Housing Project aimed to modernise people's way of life (Ovayrut, interview). By contrast, one resident defined modernity in a way perhaps representative of the relocated community:

> In our old houses, we could reach everything. We were living with our friends and relatives in an area we liked. When we moved to these houses, we realised we were victims. Modernity does not mean living in a flat with a modern façade. Modernity, to us, means having places that fit our culture, and suit our way of life. (Kader, interview)

Ninety percent of residents surveyed felt unsuited to apartment living. None of the residents felt the housing met their social and cultural needs. Figures 5.10 and 5.11 illustrate two standardised options for beneficiaries, the E-plan and G-plan. As shown in the figures, these flats consisted of two bedrooms, one living room, one kitchen, and one bathroom. The average family size was five persons. Most of the residents objected to the insufficient number and small size of the rooms, and worse, the lack of privacy. Eighty-one percent felt that their flat was too small, and that they were constrained by a lack of space. No facilities – bedroom or bathroom – were available for guests. No space was provided for residents to remove their shoes on entering their homes – a practice universal in the region. The residents considered the "European-style" toilet unsuitable. One woman expressed her frustration about the size of the kitchen – blaming the designer and planner for not knowing that a Turkish woman spends most of her day in the kitchen. Washing and drying areas were also inadequate, she said.

Figure 5.10: E-type plan.
Source: World Bank/PIU documents (fieldwork, 2005).

Figure 5.11: G-type plan.
Source: World Bank/PIU documents (fieldwork, 2005).

Each flat was located in a three-storey building. Because they were multi-storey, and due to their layout, modifications would have been very difficult and costly – if possible. While most residents felt their buildings were safe, further discussions revealed a fear of multi-storey buildings, and a preference for single-storey houses. Single-storey houses, with the same number and type of rooms, were available to the disabled and elderly, in the C-plan layout (see Figure 5.12). Entrance to these homes, however, was up a series of steep stairs, contradicting the purported aim to provide accessible housing (see Figure 5.13).

Figure 5.12: C-type plan.
Source: World Bank/PIU documents (fieldwork, 2005).

Figure 5.13: Steep stairs leading to houses designed for disabled and elderly people.
Source: Fieldwork (2005).

Throughout the planning and design described above, beneficiaries were not involved; needs assessment, objective setting, site selection, technologies, materials, employment, and architectural design were not discussed with the beneficiaries. In the survey of residents in the Demetevlar Housing Project, 70% of respondents felt they should not be involved, as the government was more informed and more capable of making decisions. Only 25% disagreed, and felt they should be involved in the construction programmes that would shape their lives.

5.3.2. Implementation

Residents had no information on the total cost of the project and how the allocated funds were utilised. Discussion with a senior official, Elif Ayhan, gave the impression that the World Bank/PIU were only responsible for reporting to the Turkish government and donors. Ayhan considered all project documents to be confidential, making it impossible to obtain any documention on the World Bank/PIU's reporting process. In a discussion with the community leader *(Mukhtar)* of the Demetevlar Housing Project, he explained that the lack of information on how the project was funded led beneficiaries to believe that the World Bank fund was a grant, not a loan.

One of the World Bank's reconstruction objectives was to enact new building regulations, addressing issues like construction supervision and insurance. But these were difficult to implement; Prof. Polat Gülkan, a Turkish expert in Disaster Management, explained the local situation:

> Regulation implies an existing lack of incentives to promote good construction practice. Local authorities hide behind an illusion of assuring quality, fully aware that this is difficult to achieve. For example, if homeowners decided to upgrade their buildings, this is not currently recognised in increased benefits.
>
> The regulation now has been replaced by purely technical methods of earthquake safety, but this has affected the improvement of spatial planning of settlements. The current building construction supervision decree is directed mostly at checking designs when, in fact, violations occur at the construction site. (Gülkan, interview)

Some in the government argued that compliance was low because local authorities, as well as national politicians, often promised amnesties to squatters (and others who failed to comply with building regulations), in order to win the election (Saritaş, interview). Insurance schemes were also questionable. According to a senior Turkish government official, the World Bank forced the Turkish government to amend their disaster mitigation law by enforcing the disaster insurance scheme (Saritaş, interview). But when the earthquake insurance regulation became effective in September 2000, insurance companies had not yet begun to sell the insurance (Gülkan, interview). When homeowners found they were obliged to purchase insurance but none was on

offer, the issue was brought to media attention, and implementation of the decree was immediately suspended for two months. This was an unfortunate signal, as it gave the impression that the government was not serious about exercising its own policy (ibid). Six years after the insurance scheme's initiation, not one resident of the Demetevlar Housing Project had complied with the scheme.

Meanwhile, supervision on World Bank/PIU projects was judged lacking even by the supervisors themselves. They felt they had insufficient briefing and training before taking up positions, and that communication and equipment was insufficient to cope with the remoteness of project sites (Ovayrut, interview). Logisitics in the Housing Project and other World Bank/PIU operations were centralised. For example, the main procurement decisions were made by the PIU in Ankara (Ayhan, interview). Lack of clarity in the local and international procurement process caused tension between different departments. All materials relating to procurement and disbursement were required to be specified at an early stage of the project, which caused problems because – given the quantity and quality of materials and labour available in the disaster situation – such specifications could only be determined after the compilation of the project.

5.3.3. Maintenance

Like the IFRC, monitoring and evaluation was quantitative and technical, measured in numeric terms, such as the number of facilities constructed. Project documents – such as the World Bank/PIU's project appraisal – did not clarify any monitoring and evaluation systems for construction projects. As described above, organisational structures were tenuous and cumbersome, even to carry out daily operations, let alone to conduct monitoring and evaluation on an ongoing basis. International personnel (as evidenced in a number of interviews) made little connection between monitoring and evaluation, on the one hand, and successful project completion, on the other. Little to no training was provided by international organisations in monitoring and evaluation techniques. Local authority involvement was lacking in the Demetevlar Housing Project, according to its residents. Sixty percent of residents were disappointed with local authority performance, while only 30% were satisfied with it (although these results may be due in part to problems between authorities and residents at the time of the survey). In the end, as with the IFRC's Düzce State Hospital, external consultants reviewed the Demetevlar Housing Project.

World Bank/PIU documents provided no indication of any organisational structure for ongoing operation and maintenance of constructed facilities. None of the residents of the Demetevlar Housing Project paid fees toward the maintenance of the infrastructure, or the annual inspection of their building, performed to ensure the safety and durability of the building. Yet the local authority had very limited choice: they could not introduce a higher charge for economic and political reasons, and the community could not afford to pay for either maintenance, or enforcement to ensure compliance with building regulations. "If people cannot afford to insure their property, how can they afford to pay a maintenance charge?" asked the community leader *(Mukhtar)*.

5.4. Conclusions

Düzce State Hospital and Demetevlar Housing Project represent the dilemmas faced by many construction initiatives in disaster contexts. The findings in each case study project are perhaps typical of those in many other projects around the world. The above paragraphs presented these dilemmas in the chronology of the recovery programme life cycle: planning and design, implementation, and maintenance. The next chapter looks at them within the COAM framework, to analyse how some of these dilemmas could have been minimised, or at least addressed. The COAM framework is thus tested as an evaluation tool, although its ultimate purpose would be in the actual carrying out of a project, with the aim of bringing about a form of construction in disaster that contributes to long-term, local community sustainability.

Chapter 6. Analysis

6.1. Introduction

This chapter is an analysis of the research data presented in the previous chapter. It is structured according to the COAM framework, in order to bring out key issues that arise from the data. Indirectly, this chapter asks: to what extent were the four traditionally neglected aspects incorporated (environmental, sociocultural, economic, and political/institutional), and what were the consequences of this incorporation or lack thereof? The *practical* aim of this analysis is to evaluate the case study programmes using a standard method (see Chapter 3) whereby results are compared to objectives. This was not always easy, however, because – as was found through fieldwork – few construction programmes set clear objectives. The *theoretical* purpose of this chapter is to assess if the COAM framework is useful in evaluating the two case study projects – and more importantly – to assess if the COAM framework could have been useful to either project at the time of its planning and implementation. As part of this assessment, an underlying question – woven throughout the following sections – concerns the potential costs in terms of time and funding, that may arise as a result of implementing COAM. Are the costs of ignoring sustainability issues greater than the costs of incorporating them? After the following discussion, the chapter returns briefly to this question in the concluding section.

6.2. Compatible

6.2.1. Reflexive

An important inconsistency in both the IFRC and World Bank needs assessments was the lack of attention to each organisation's own strengths and weaknesses, as well as external factors such as political events or even weather. A useful activity would have been a kind of internal needs assessment, to examine the availability of funds and human resources. While working in a disaster situation is understandably stressful, staff should not feel overly burdened, and a fair assessment of staff capabilities and time would help to prevent overwork. To make the best use of existing resources, work should be allocated according to staff strengths and skills. For instance, the IFRC construction team was partly composed of biologists, raising questions as to the compatibility of their educational background with the requirements of their posts. They themselves explained they had been provided with inadequate training and pre-project briefing, which they felt had affected their ability to monitor and supervise projects. If some kind of

internal needs assessment had been carried out, perhaps implementing organisations could have set viable and clear objectives, that could have best utilised their existing resources. Lastly, neither the IFRC nor the World Bank needs assessment addressed local professional and institutional capacities; the two organisations limited their involvement to the provision of technical and financial support.

The out-migration that occurred in the aftermath of the earthquake may have negatively affected the local and national economy, and therefore, the needs of affected people. These changes necessitated an updating of the needs and capacity assessment, in order to differentiate needs and capacities from one project to another. Needs assessments carried out in the aftermath were kept (and relied upon) for the following years, rather than new assessments being carried out. Lastly, needs were assessed on the basis of information from local authorities, verified by international organisations' construction delegates. Such methods may be susceptible to inaccuracy, if social, economic and technical facts were to be misused – for instance – to obtain more funds or to justify the relevance of the project. The UNDP office in Ankara, for instance, was often provided with data overestimating the scale of the problem (Doğan, interview).

6.2.2. Environmental

Environmental impediments to health and comfort lead to low satisfaction among beneficiaries. Analysis of the design of both Düzce State Hospital and the Demetevlar Housing Project reveals the lack of consideration given to energy use, health, the sustainability of construction materials, and choice of location. Of the total energy consumed in the world, buildings directly consume 30%, and indirectly consume a further 20% (Agenda 21, 1996: 68). The energy required for climatising the hospital was probably greater than that of any other building in the hospital compound, primarily due to its steel structure and lack of effective wall and roof insulation. Although the Demetevlar project's concrete is preferable to steel in terms of thermal characteristics, nevertheless, it still cannot provide an adequately comfortable indoor temperature. To conserve energy, therefore, some kind of insulation is required. Neither the hospital nor the housing project used energy-saving technologies, such as insulation, or passive heating and cooling. In addition, neither project made use of any kind of renewable energy. Turkey – and Düzce in particular – enjoys long hours of sunshine, year round. Yet solar energy is not used. Slight modifications of the roofs and walls could have reduced negative environmental impacts, reduced the running costs, and increased the life spans of both projects. Lack of ventilation also led to poor indoor air quality (field visit, Düzce State Hospital; field visit, Demetevlar Housing

Project). Common indoor air pollutants (like lead paint or wood dust) can lead to severe health problems (Agenda 21, 1996: 61). Indoor environments can sometimes be more polluted than outdoor ones (ibid). Since many people carry out most of their life activities indoors, indoor environmental quality is essential for health and comfort. Clean air reduces illness, influences wellbeing, and affects the efficiency at which our bodies can function. Unfortunately, neither project achieved this standard.

Temperature, comfort, and lighting are three key indicators, not only of building quality, but also of potential effects to the external environment (through energy use, and so on). A government official confirmed that environmental issues were not given priority in the "emergency situation" following the earthquake (Yıldırım, interview). This statement was reinforced by observations during the fieldwork, the results of the surveys, and discussions with key professionals.

> Turkey is endowed with an abundance of natural resources, which meets the country's needs for construction materials. (Yıldız Aydın, Deputy Director, Project Implementation Unit, Prime Minister's Office, interview)

Yet Turkey consumes only certain of these materials, in large quantities. Furthermore, these are not renewable. To maintain and support long-term construction, Turkey could optimise its use of existing resources, as well as use renewable, recyclable, and recycled materials. None of these options were considered in the two projects studied here. Aydın explained that the use of renewable or recycled materials is uncommon in Turkey. Yet recycled materials – like construction waste or demolition rubble – could easily be used for construction elements, such as roads, sub-bases, or even concrete. This, however, may require a high technical capacity. More importantly, it requires changes in current construction practices and processes, in order to promote ecologically sustainable materials.

6.2.3. Socioculturally responsive

Construction can sometimes concentrate on technical vulnerabilities, to the detriment of sociocultural, economic, and environmental vulnerabilities. These latter kinds of vulnerabilities – including poverty, unplanned urban settlements, or exploitation of resources – are often what transform natural events into human disasters (Davis, 1979: 3; Blaikie et al., 1994). Both the IFRC and World Bank tended to measure needs and outputs in terms of the number of facilities built, and their type, e.g. housing, schools, hospitals, or other infrastructural elements. Ideally, however, the question should be raised concerning the extent to which these facilities aimed to meet needs, in terms of not only (earthquake) hazard resistance, but also cultural, economic, and environmental appropriateness. These measures of appropriateness should be assessed in the

initial planning stages, because they then determine the location, tenure, and land use, which – in turn – define the type of facilities needed.

While in theory, a unified reconstruction programme requires clear objectives and defined priorities in order to be effective (Davis, 1989:22), in practice, projects were carried out in no particular order, and with no integration. On the one hand, the objectives set for IFRC and World Bank construction programmes (to restore living conditions and reduce vulnerability) met essential needs. On the other hand, however, neither organisation seemed clear on how to go about meeting these objectives. The World Bank was technically more capable, and therefore had more policies in place to guide their construction programmes. However, World Bank projects tended to take long periods of time, increasing the vulnerability of affected people. Perhaps an elementary aspect of setting objectives is that prioritisation requires close consultation with – and participation of – all stakeholders.

This applies also to site selection. In both projects, the site was selected with the intention of reducing risk. Yet in Düzce State Hospital, the selected site – while efficient – nevertheless increased urban densities, identified as key reasons for the extensive damage caused by the earthquake. In Demetevlar Housing Project, the people for which it was built chose to live elsewhere, thus making the "relocation" futile. In any event,
searching for a "safe" zone along the North Anatolian fault has been called pointless, as the entire area is hazardous (Ergünay, interview). Vice Chairman of the National Earthquake Council, Oktay Ergünay, argues that the principal cause of destruction during the earthquake was not poor soils, but rather, poor foundation design, and a lack of enforcement of the construction code (Ergünay, interview). What would have been more important to tackle than relocation, he said, was inappropriate use of land resources, and the lack of accurate, low-level zoning schemes to assess natural hazards on a local scale – schemes that could potentially assist local authorities in local land use planning.

Ownership of the Demetevlar Housing Project is not yet clear. The question left hanging is: who will repay the World Bank loan? Because this has apparently not yet been finalised, it lingers as a conflict waiting to happen. It will, in all likelihood, trigger future clashes among beneficiaries, as well as between beneficiaries and the government.

In general, beneficiaries seemed dissatisfied with the constructed facilities in both the Demetevlar Housing Project and Düzce State Hospital. Analysis of the projects identified, designed, and

implemented reveals a patronising and paternalistic attitude among government and international organisations: people were asked to "modernise" their lifestyles to conform to the projects imposed upon them. Cultural norms were not acknowledged even in the smaller aspects of design. One resident's view of modernity, quoted in the previous chapter as "having places that fit our culture and suit our way of life", is supported in literature on disaster recovery: construction must be "developmental in terms of safety standards and construction techniques," but varied "in matters cultural" (Alexander, 1989: 234). In both the housing project and Düzce State Hospital, subdivision of areas could have created the privacy people sought (in the hospital, for example, staff and patients requested a separate, female wing). Instead, a standardised model was pursued to save resources and time – which it did not. A peculiar interest in "modernisation" prevailed in the designs (by Turkish architects), and combined with an underestimation of the importance of local community participation – although it was local communities who were the ones suffering from the disaster, and who were to live and work in the environments created.

6.3. Oriented

6.3.1. Participatory

Ideally, a participatory and holistic approach to construction would entail an integrated, professional, team process, in which the professional planning and design teams interact with beneficiaries and stakeholders throughout the construction project, to evaluate the design suitability, cost, quality, future flexibility, efficiency, occupant acceptance, and overall environmental impact. Some literature supports this view, and promotes participation at early stages:

> The "whole building" process draws knowledge from all the stakeholders across the life cycle of the project, from defining the need for a building, through planning, design, construction, building occupancy, and operations. (Prowler, 2006)

Looking at the early stages of reconstruction in Marmara, neither the needs assessment of the IFRC nor the World Bank was conducted by a gender-balanced team. The insufficient number of women on the teams lessened the chances for involving women from earthquake-affected communities. One human rights and gender equity activist explained the importance of designing programmes (including needs assessment teams) so as to maximise local communication:

> The role of women is essential to have reliable information in a needs assessment. In the aftermath of the Marmara earthquake, the situation was chaotic. In general terms, the flow of information was simply not reliable, and mostly consisted of rumours. Even the government did not have accurate and timely information, because governmental decision-making did not follow a procedure.
> Women in this situation are very talented in collecting information on their gender priorities – such as shelter, livelihood, and essential services – and disseminating

> information in their own style. Therefore, women's skills in the collection and sharing of data offer a very important element in the needs assessment process after a disaster.
>
> Women understand their development priorities and what is going on in their area. They know who is living where, how spaces are utilised to meet family need in the house and in community infrastructure…who lives there, who is sick, wounded, and pregnant or having small children, and who is most in need. (Akaçar, interview)

The point here is not that an organisation can or should obtain meticulous statistical and technical information. Rather, the point is that some of the most reliable information can be obtained from the beneficiaries themselves.

The lack of public participation in site selection, together with the fact that none of the site selection team were architects or planners, arguably contributed to the low satisfaction rate among beneficiaries, and the outright rejection of the relocation by some beneficiaries. At the time of relocation, neither the hospital staff nor the housing project residents were aware of the problems to come: transport, building type, cost, and – in the case of the housing project – the repayment scheme. The *Mukhtar*'s testimony, together with interviews among key residents, illustrate that the location of a housing project is a critical element in people's acceptance of the project – and subsequently in their recovery after a disaster. The practice of relocating survivors far from their original homes and community resources is common in many disaster recovery programmes internationally. Yet this poor choice in location – for the construction of human settlements – may lead to project failure, and specifically, failure to meet the original objectives set for the reconstruction programme. In the case of the Demetevlar Housing Project, the project that had originally aimed to house survivors was, in the end, either sold or rented by the majority of those survivors. Meanwhile, the consequences of excluding beneficiaries in the design stage was evidenced in both Düzce State Hospital and Demetevlar Housing Project. The hospital's design, for example, took six months, in which not one consultation session was held with hospital officials, in order to address crucial social and cultural needs.

Yet the survey in Demetevlar found that people were not interested in participating; 70% felt they should not be involved. These findings were confirmed by subsequent discussions with academics, who felt that communities' passive attitudes were a longstanding response to "the top-down and centralised nature of the Turkish government since its inception in 1924" (Karanci, interview).

> The results are right; these answers are to be expected from a community that relied on the government for every aspect of their lives. Turkey is the 'Father state' in most people's eyes. One of our studies in the region found that the people expect that most reconstruction work will be carried out by the state. (Karanci, interview)

While sociology professor, Nuray Karanci, believes the inadequate government response to the earthquake has tempered people's trust in their government, focus group discussions in Düzce suggested the attitude of dependency appears to be intact. In these discussions, Demetevlar residents expressed high expectations of the government to "find a solution". The implications of this dependency in a disaster-prone area are worth reflection. First, had communities taken pride in their own constructed facilities, perhaps building quality would not have been so poor, and therefore not have had such disastrous consequences in the 1999 earthquake. Second, if such dependency continues, little incentive will be present to engage in disaster mitigation strategies. Yet if such dependency is to continue, projects could – at the very least – become more socioculturally responsive and constructive if planned with some kind of prior understanding of the *diversity* of sociocultural characteristics of a population.

6.3.2. Socioculturally constructive

During interviews, people highlighted the inflexibility and poor performance of the design, the lack of durability and inefficient maintenance of building elements, and their unmet personal spatial needs and requirements. The Demetevlar housing structures were limited to two bedrooms and one living room – far too small for the average Turkish family of five. Houses were seemingly provided irrespective of family size, in a standardised format, so as to keep costs low and to economise on size and space. The location and design were chosen on the assumption that people would accustom themselves to them: extended families would diminish to a nuclear family structure, and the concept of privacy would change. These expectations seemed present, despite the rather contradictory aim of speed in all construction projects. The standardisation of the homes created an inflexibility that would eventually limit who could and could not live there. People accustomed to "living on the land" felt confined in apartments. Housing was allocated on the basis of a draw, a method oblivious to the preferences and differences among beneficiaries. Families of differing socioeconomic and cultural backgrounds were lumped together, causing tension due to their differing lifestyles. Construction and structural problems made the adaptation process more difficult, again causing tension.

Reflecting on the fact that the hospital's design was a duplication of a pre-existing hospital, it seems the hospital was built with little consideration to its entire lifespan. Constructed facilities can be likened to a living creation, with a birth, life, and death. Using this metaphor, a flexible and tailored design is important, based on accurate information about the numbers of beneficiaries and possible growth in these numbers. Flexibility in design is essential, in order to

allow for future expansion, and to prevent improper building expansion in disaster-prone areas. Yet this was not the case in either project; because they were multi-storey, this structure was inflexible – no changes or additions could be made. In addition, the location and layout of both projects further discouraged future development possibilities.

Six years after the disaster, people were still afraid of multi-storey buildings. Given these sentiments, there is little evidence that the designer had any experience whatsoever in tackling the issue of people's fears and preferences in the design stage. The design, apparently, was carried out under constraints of finance, and of the number of beneficiaries in need of accommodation. Disaster-affected people received low priority from the designers, whose main concerns seem to have revolved around recouping their costs. Lastly, aesthetic appearance may seem trivial in a disaster context, but in reality is very important. It can contribute to (or detract from) psychological healing, a sense of pride in achievement, a sense of strength and safety, and a will to overcome the difficult days of the disaster. Both the Demetevlar Housing Project and Düzce State Hospital represent missed opportunities to reconstruct communities – socially and culturally – to help overcome past disasters, and resist future ones.

6.3.3. Economic

According to project managers in both the World Bank's Demetevlar Housing Project and the IFRC's Düzce hospital project, contractors were employed to achieve: (1) speed, (2) quality, (3) reduced cost, and (4) accountability. Yet on all four counts, and in both projects, contractors failed to meet expectations. While donors specified materials, local companies decided on architectural design. This led to incompatible choices in materials and technologies, and prohibitively costly maintenance – affecting important criteria such as durability and flexibility for upgrading or expansion. Generally speaking, new technology requires highly skilled work, supervision, and time – elements especially difficult to establish in a disaster context. Perhaps the best technology transfers involve materials that are compatible with the local environment, and conducive to a high level of local participation. In the case of Düzce, highly skilled work, supervision and time were scarce, while the proposed new materials were neither locally compatible nor conducive to participation. The result was poor implementation and quality at high costs borne – ultimately – by beneficiaries.

Ironically, while cash-strapped beneficiaries – residents, staff, and local authorities – were asked to repay loans (to the World Bank) and/or support ongoing maintenance, substantial amounts of

money were being injected elsewhere in the "development economy" of private sector firms, development organisations, and the Turkish government. Given the funds invested in construction activities (see Table 6.1), construction in Marmara had the potential to be a major source of employment and economic revitalisation.

Donors	Fund/ Credit
European Union	Euro 600 Million
World Bank	US$ 757.5 Million
IMF	US$ 316.5 Million
European Investment Bank	Euro 450 Million
Other organisations	US$ 140 Million

Table 6.1: External credit and aid organisations.
Source: Adapted from OECD (2004: 85).

Aid agencies spent over US$2 billion in the Marmara Region. Although Düzce State Hospital and Demetevlar Housing Project together cost more than US$16 million, nothing is known concerning how much of that budget was allocated for increasing employment. In the absence of exact figures, or even estimates, I will suggest that one-third of a typical construction project is allocated toward labour. This suggestion is based on my own experiences in construction in disaster areas, and is merely meant to illustrate that construction projects can contribute to employment, no matter what percentage is chosen. If, for instance, this estimate of one-third were chosen, the IFRC and World Bank construction programmes alone, over a period of 3-5 years, would have generated at least US$5 million for employment in the relatively small area of Düzce. This capital injection in the construction sector could also have promoted other sectors, such as construction materials production, and transport. Given that any outside income has the potential to generate further local income (the "income multiplier factor"), the potential of construction programmes for socioeconomic recovery is substantial. A last point to be made here, is that *labour-intensive* construction has significant advantages, when considered in this wider context of socioeconomic recovery. In summary, economic revival of the disaster-affected area could have been possible, had the construction programmes in Düzce promoted employment and supported livelihoods. However, not only did the location and design negate possibilities for employment and livelihoods, but the projects themselves did not incorporate ways in which to benefit local communities and end-users.

6.4. Achievable

6.4.1. Accountable

Neither the IFRC nor the World Bank ensured full accountability during its assistance to different construction projects, due to various reasons such as: the methods of initiating the projects; their concept of accountability; and, in some cases, the constraints brought about by funding conditions. In the two case study projects, this had detrimental effects on public trust in the implementing organisations. Proving the allegation that construction funds for Düzce State Hospital were misused would necessitate a thorough investigation of the project's financial breakdown. While this was not undertaken, some lessons can be learned from the allegation itself. This example highlights the existence of distrust among the different levels of hospital officials that, arguably, is caused by a lack of accountability. The IFRC had no mechanism in place to prevent possibilities of fraud; nor did it report to either the hospital administration or the Ministry of Health. According to the Memorandum of Understanding for Düzce State Hospital, the IFRC's concept of accountability was restricted to simply allocating funds for their given purposes. It did not include reporting to beneficiaries or local authorities.

According to some, not reporting to beneficiaries or local authorities is common in international organisations. Walker (1995:25) argues that international organisations feel themselves accountable only toward their donors, not their beneficiaries. The availability of international donor funds following a disaster, he says, can create a kind of market, in which aid organisations compete, and strive to obtain funds by maintaining the donors' interests first. Such an understanding of accountability may undermine the important transition in thinking, among programme developers, from relief to development. The responses to the survey of practitioners (described in section 2.8) illustrate that accountability is usually understood as being responsible to programme donors. Only six out of 36 professionals said that their programme had methods of reporting to beneficiaries as well as donors.

In the case of the World Bank/PIU, documentation on the Demetevlar Housing Project was considered confidential and closed to the public. Given public preconceptions of construction in Turkey as a corrupt, get-rich-quick sector, a closed approach to information unfortunately leads to speculation. Had the people in Demetevlar been provided with clear information on the cost of construction, everyone would have known how much they should pay back and when. As a result of the lack of communication in the project, people became strongly opposed to paying or

contributing to the construction of their housing, assuming it was already covered by a grant from the World Bank. To improve accountability in construction programmes, partnership and participation can play an essential role for making accountability more practical and achievable. Local authorities and beneficiaries could be invited into partnership with international organisations, in different stages of planning and implementation of construction programmes. This would end the discourse of "accountability" – organisations would not need to "report" to beneficiaries if beneficiaries were involved as partners in the programmes from their initiation to their completion. It would also bring benefits to the construction programme as a whole.

6.4.2. Coordinated

In the aftermath of the earthquake, the Turkish government was overwhelmed by the influx of international organisations, and was slow to assume coordination and management responsibilities. This may have caused some tension between international organisations and the government. In order to have avoided risk of duplication, resource wastage, and long delays, an umbrella group for international organisations could have been formed to help the different organisations coordinate in the disaster-affected area. Instead, a lack of mechanisms for defining strategy and coordination affected all recovery programmes, including those in construction. Lastly, in terms of project management, a gap in knowledge and experience – especially in the field of construction supervision – was evidenced between organisations' central offices and the personnel in the field offices. Key issues in construction are supervision and legal responsibility for building safety (Ergünay, interview). Private sector, commercial construction companies were involved in the Marmara reconstruction from the outset. While involvement of the private sector is important to revitalise the local economy, a vague legal framework leaves open the possibility of corruption. This is not to imply that mismanagement of funds occurred; but rather, nothing is in place to prevent it from occurring. International organisations, such as the IFRC and World Bank, stand to benefit from the creation of such a mechanism.

One lesson learned from these two case study projects was that high-level coordination has little impact if partnership relations are not built at the local level. As stated earlier (see Chapter 4), the coordination process helps to strengthen the institutional structures of local authorities, and plays an important role for the long-term sustainability of construction programmes. The World Bank and the IFRC encouraged the involvement of government bodies, local organisations, and local authorities, as part of their approach to implementing reconstruction programmes. Specifically, while the IFRC worked with the TRCS, the World Bank worked with the PIU. Both programmes

played a very important role in improving local technical and institutional capacities (of the TRCS and the PIU) to deal with construction programmes, in the event of future disaster. Nevertheless, this was not reflected on the local authorities, nor on the local communities affected by the earthquake. Although the IFRC coordinated closely with related ministries, such as the Ministry of Health, in the construction of the Düzce State Hospital, it did not involve the local authorities or even the TRCS in the construction of this project. In addition, the project had little impact on empowering the institutional capacity of the Ministry of Health, as no new disaster mitigation was introduced following the completion of the project.

6.4.3. Flexible

Implementing organisations are often faced with the unexpected – such as the soil conditions in building Düzce State Hospital, and the land issues that delayed the Demetevlar Housing Project. In both case study projects, too little time was given to draft realistic strategies for implementation, especially given the uncertainty of the disaster environment. Flexibility implies an ability to respond to environmental, logistical, demographic, and other changes. On the basis of the international case studies presented in Chapter 2, key logistical operations include procurement, transport and storage. In the case of the Marmara earthquake, however, other logistical factors were found to be more of a challenge. Although the earthquake caused serious damage to infrastructure – especially communications and road, rail and even sea transport – this appeared not to be an issue. Instead, the main logistical issues were the capacity of the airports, the bureaucracy of the government, and the capacity of staff to carry out their duties. These highlighted the importance of timing to the implementation and completion of construction programmes; construction programmes need to be planned, and their materials procured, before construction programmes can be carried out in the field. No construction programme can be achieved without clear procurement procedures, and the capacity to carry out the work. More importantly, logistical planning and strategies require clarity in terms of three issues: a common understanding of the situation, procedures, and roles of personnel.

As stated earlier, the Marmara region was the heartland of industrial and economic growth in Turkey, and high migration rates were prevalent even prior to the 1999 earthquake (see Chapter 4). It was therefore expected that such migration would continue to be a coping mechanism after the earthquake, and that massive demographic changes would occur – with people constantly moving to or from the earthquake-affected area. Discussions with local people confirmed that considerable numbers of people from surrounding areas were moving in to work in the industrial

sector of the region. This perhaps could explain the concerns of Düzce State Hospital's Administrative Director, Güney Yilams, when he mentioned that the capacity of the hospital could not cope with the increasing number of newcomers to the area. Meanwhile, in the Demetevlar Housing Project, demographic change was taking place at a more micro scale. As mentioned earlier, only ten percent of the targeted beneficiaries were still living there at the time of fieldwork. The remainder had left, declining to live in the project, and explaining their reasons as being related to insufficient space for their social and cultural lifestyle. Given these examples, one conclusion to be drawn is that flexibility is essential to ensure successful project completion. Toward this aim, monitoring and evaluation can be a tool to foresee possible external changes, and to help the project adapt in its early stages and during its implementation.

6.5. Maintainable

6.5.1. Informed

Monitoring and evaluation were not present in either case study project, and therefore, neither project was able to foresee the challenges that would later become significant obstacles. Monitoring and evaluation is one of three components that can help to sustain a project from its initiation until after its completion; the other two components – described below – are the project's human and financial resources. Monitoring and evaluation is arguably made exceptionally difficult in disaster contexts, where time, skills, and training are all in short supply. As such, perhaps the kind of evaluations expected under non-disaster circumstances (described in Chapter 3) are not to be expected under disaster circumstances. However, perhaps some kind of modified version can be initiated, because monitoring and evaluation are so crucial in ensuring sustainability and good practices in the field of construction – and especially construction in disaster areas.

Evaluation depends on objectives being set, and methods being established for data collection. Yet setting objectives was not a common practice in either the IFRC or the World Bank/PIU. Furthermore, project documents illustrated the reasons for haphazard planning and poor monitoring systems. These documents specified no monitoring mechanisms, and lacked qualitative objectives and indicators to measure the impact of the project on the disaster-affected community, such as 'improving community solidarity' or 'establishing a safe building culture' in the affected area. Such objectives need not be overly ambitious; gauging the 'safety of a constructed facility' may be a very difficult task, for instance, but measuring the 'effectiveness of

building inspection processes' is a reasonable objective, and perhaps the bare minimum in an earthquake-prone area.

6.5.2. Institutionally developmental

The lack of institutional capacity and human resources for the inspection and supervision of construction in the Marmara Region prior to the earthquake requires further attention. To date, experts and scholars have focused on the poor performance of buildings and infrastructure during the earthquake, and have established this to be one of the main causes for the high death toll of the Marmara earthquake (see Chapter 4). At the heart of this poor performance was a situation of rapid growth and urbanisation, during which construction activities took place without proper planning or supervision. Poor workmanship and detailing were (and still are) poorly examined or cross-checked, or never inspected at all. Addressing these issues during the implementation and maintenance of constructed facilities is essential for their long-term sustainability, and for reducing the vulnerability of disaster-affected communities in the event of future disaster. While no single policy can be applied to the wide variety of construction companies working in the Marmara Region, nevertheless, the private sector contractors that are employed in reconstruction could be monitored more closely to enforce building regulations. This appears to have been the case in projects supported by the IFRC and the World Bank: good standards and practice were well-enforced. But no structure was put in place to ensure this continues into the future. Without such a structure, changing the culture of poor building would be very difficult.

The case study of Düzce provides an important example in this respect. Düzce Municipality requires resources and trained staff to ensure construction practices are sound. Furthermore, construction inspectors need not only to be well trained, but also well paid. International organisations, such as the IFRC and the World Bank, could have developed a training programme, and increased cooperation between local authorities for training their construction inspectors in the area. Such training and capacity building – for construction inspection and urban planning – could have been supported through the existing budgets allocated for construction. This would have indicated – and been part of – a comprehensive, long term vision for training and capacity building that, in the end, would reflect on the wellbeing of the communities living in the disaster-prone area. Neither the IFRC nor the World Bank/ PIU undertook any initiative for the training of the local authorities' architects and engineers; nor did they provide any of the equipment necessary for personnel to carry out building inspections and to enforce the building code. Training and institutional capacity building were needed to enforce the construction code

and the maintenance of the constructed facilities. Irrespective of the technical sophistication of construction programmes, if local capacity – in terms of institutions and individuals – is not addressed, the construction practices initiated by the programme will not be sustainable in the long-term.

6.5.3. Financially sustainable

The discussion in the preceding sections highlighted that Düzce State Hospital scarcely had the resources to carry out simple maintenance, which raised serious concerns: if the visible, minor elements of the building could not be inspected and repaired due to financial constraints, what about the invisible, major elements such as the steel structure – which requires annual maintenance? In Demetevlar, people are less willing to pay for local authorities' capacity building (to carry out crucial services, such as building inspections) than they are to pay for gas, electricity, or telephone bills. This may be due in part to the enforcement of bill payment through penalties, such as cutting the services of those in arrears. It may, however, also relate to issues of trust and feelings of community inclusion and membership. (Re)building sociocultural networks is thus vital, not only to individual and community happiness and wellbeing, but also to collective initiatives such as upgrading and maintaining shared facilities.

In conclusion, some kind of framework could be developed to assist local authorities or other stakeholders establish a fees scheme, which can pragmatically ensure sufficient fees are collected, by considering the economic situation of the people. Financial resources are the cornerstone of any system for inspecting and maintaining constructed facilities and/or new urban areas. A mechanism to sustainably procure and manage these resources, for these purposes, is therefore crucial to consider in disaster mitigation measures in the future.

6.6. Conclusions

As evidenced by these case studies, aid organisations may use new technology in their design and implementation, but may simultaneously neglect the importance of a locally appropriate physical design and location for constructed facilities. This may stem from varying definitions of what comprises "compatibility". In this thesis, compatibility was defined above as involving the least waste of resources and time, in order to produce something both operational and functional – with respect to the multifaceted aspects of disaster-affected areas. By contrast, some of the disaster professionals interviewed in the IFRC and World Bank defined compatibility in terms only of

time, resources, and quality. For them, construction was confined to materials statistics, standard contracts, and production of the constructed facilities; the concept of a locally appropriate functionality was absent.

In this vein, some have argued that sustainable recovery requires not only more investment, but more importantly, a shift in attitudes, in the direction and management of investment (Dudley, 1993). It may even require altered time periods:

> Disaster planners should take heed of this approach [incorporating sustainable development in planning guidelines] and recognise both the magnitude of the task and the timeframe required to incorporate change in the development planning process. (Fox, 2004: 4)

Yet, in the case studies of this thesis, would additional funding or time have been required to alter perceptions of compatibility, or to apply other aspects of COAM? This question was posed in the introduction to this chapter, and arose in various sections. The section on participation, for example, noted the absence of public consultations during the six-month design period of Düzce State Hospital. This section also mentioned the inadequate numbers of women on needs assessment teams. An in-depth cost-benefit analysis is especially challenging due to the qualitative nature of costs/benefits associated with either incorporating or ignoring COAM: happiness, comfort, trauma, community cohesion, and so on. Nevertheless, the strategies suggested for a more participatory approach (such as consultations and gender-sensitivity) seem relatively affordable – both in terms of funding and time. By contrast, this chapter has described the costs of avoiding this approach – costs in money, time, and personal and collective stress among the affected communities.

If change may be within economic reach, then why has it not taken place? In Chapter 4, Canan Saritaş, a senior manager in Turkey's State Planning Organisation, was quoted as identifying six obstacles: (1) inadequate economic policy; (2) corruption in central and local authorities; (3) building amnesties; (4) poor planning; (5) poor training of technical professionals; and (6) the high rural-urban migration rate. In essence, he described a macroscale structure that impeded change at the microscale. His views are concordant with findings in similar situations, both historically and internationally. For example, citing the work of Kevin Lynch (1990) on reconstruction in 1666 after London's Great Fire, Vale and Campanella (2006: 346) write that "the most ambitious plans were thwarted by entrenched property interests". On the basis of a number of contemporary case studies, they explained further:

> The power of property rights to stabilize the forms of cities – or stymie their evolution – cannot be overemphasized. Particular building codes and practices may change in an effort to limit future vulnerability to disaster or attack, and destruction may even inspire new types of architecture, but larger urban patterns are not easily or readily altered.

> More generally, the inertia of urban resilience is produced by a combination of undiminished geographic advantages, long-term investment in infrastructure, and place-dependant business networks.
>
> Disaster spurs re-investment and creative destruction as long as the source of urban economic strength remains fundamentally unaffected. Capitalism, in this sense, outflanks catastrophe. (Vale and Campanella, 2006: 346-347)

These assertions explain much at the macroscale, and correspond well to a number of local interpretations of reconstruction in the Marmara Region. Focusing on the macroscale, however, leaves few avenues open for positive change. To find these avenues, therefore, requires a return to the microscale, to the individual recovery programme or construction initiative. It is at this scale that COAM is aimed.

Chapter 7. Conclusion

7.1. The aim

The purpose of this thesis was to produce a framework for construction to support sustainable recovery from disaster. This purpose arose from repeated personal experiences working in areas of conflict and natural hazards. How many times has the world witnessed a massive construction effort – meant to alleviate suffering amid disaster – gradually become a process from which the supposed beneficiaries actually benefit little? This point is frequently made with respect to development projects in general, but it has especial relevance to the field of construction, about which few publications have spoken in specific. As described in this thesis, construction is frequently the most expensive component of a recovery programme. When the parties dealing in construction are entirely unrelated to the supposed beneficiaries, the project inevitably begs the question: who is benefitting most?

To deal with this question in a political or institutional sense alone is insufficient. While critiquing these circumstances and pinpointing the structural inequalities is important, the steps that follow must be of a slightly different nature, determining: how can the construction process bring wider benefits? This is of course a political and institutional question, but it is also a question about the technical aspects of the construction process: environmental considerations, sociocultural details, and economic aspects. Through the lens of these factors, the key question concerning sustainability emerges: Is the process on the whole appropriate, and does the process (and not only the product) contribute to a better future?

The point of this thesis was to look at the details of the construction process in disaster contexts, and to think about how this process could be more sustainable, in the meaning of sustainability given above: suited to the present, and a source of betterment for the future. As stated above, original interest in this research stemmed from being personal witness to a series of contexts in which sustainable recovery was insufficiently supported during construction processes. However, this personal interest quickly broadened into a realisation that the problem is widespread, as testified by the number of documented incidents with similar problems. Behind this thesis, therefore, was the aim to bring together documented and undocumented lessons from experience, in order to build on success and to learn from challenges, through an easy-to-use, flexible framework for future use.

7.2. The result

The framework for sustainability in this thesis provides three sets of conceptual tools. The first is an abbreviated description of a recovery programme's phases (planning and design, implementation, and maintenance) and the activities within its "life cycle": assessing needs, setting objectives, siting/acquiring land, technologies/materials/employment, architectural design; reporting, coordination and management, logistics; monitoring and evaluation, training and institutional capacity building, and future financing.

The second contribution of the framework is a brief definition of sustainability, as comprised of four aspects: environmental, sociocultural, economic, and political/institutional.

The final and core contribution of the framework is a series of over 30 characteristics that a recovery programme could have in order to support sustainable local recovery. Listed in the second chapter in Table 2.4, these characteristics represent a distillation of the literature on construction in disaster, and a synthesis of both literature and personal experience. Also in Table 2.4, these 30+ characteristics are further aggregated into 13 criteria with which to plan and/or evaluate a recovery programme. Thus a programme could be seen to contribute to sustainable recovery to the degree that it is: reflexive, environmental, socioculturally responsive, participatory, socioculturally constructive, economic, accountable, coordinated, flexible, informed, institutionally developmental, and financially sustainable. Lastly, these 13 criteria are grouped into four key factors that essentialise how construction in disaster can contribute to sustainable recovery, by being: Compatible, Oriented, Achievable, and Maintainable (COAM). Together, these three columns form the foundation of the framework, and are categorised so as to correspond to the other two pillars described above: the recovery programme life cycle, and aspects of sustainability.

This last feature – the interconnectedness of the framework – is perhaps the most salient. The point here is that when the thesis recommends that the construction process contribute to sustainable recovery, this recommendation is not made solely in the abstract sense. Instead, the purpose of the framework is to relate this recommendation to very specific actions that can be taken, and which have been recommended by the literature and/or proven by experience.[10] So ideally, those planning a recovery programme – and its construction processes in particular –

[10] Usually the opposite is the case, however. Experiences of *not* having a particular criterion have proven how important that criterion is, rather than experiences of having that criterion (e.g. a programme that does not "promote use of local construction methods and materials" – the 16th recommendation in Table 2.4).

could run through the framework as a kind of checklist, which moves from general to specific questions: Is the programme compatible? Is it environmentally sustainable? Has it minimised the impacts of construction? Are the building materials environmentally sound? And so on… The first question would be derived from the four COAM factors, followed by questions related to one or more of the four aspects of sustainability, and concluding with questions from the 13 general and 30+ specific criteria listed in Table 2.4. All of these questions correlate to the recovery programme life cycle, and thus to the rough chronology of the proposed programme.

Of course, no framework can be universal, and to claim to be so would be against the entire approach of this thesis, which is to support localised solutions. The framework therefore, is intended as a springboard for further work. This "checklist" and the kinds of questions it poses are intended as the bare minimum, a rough guide to the lessons learned to date – which may not necessarily be the lessons of the future.

One place that the framework has proved useful, however, is the case study of the thesis: the Marmara Region of Turkey, following two earthquakes in 1999. While the general findings of the fieldwork – in two construction projects by the IFRC and World Bank, respectively – are first presented in chronological order (in Chapter 5), they are then analysed using the proposed framework as a source of critical inquiry (in Chapter 6). The kinds of questions described above, therefore, are asked retroactively rather than prior to the projects' implementation. The framework is used as an evaluation tool, rather than a planning tool. The result is that the two programmes – different in many ways – can be usefully compared, as well as individually evaluated. Moreover, the issues that appear to be problems (as described by the key informants of the fieldwork) can not only be highlighted for future action, but can also serve as lessons, thus making each project evaluation valuable beyond its own frame and scale. Through the framework, therefore, the process of evaluation becomes important not only to the project under evaluation, but also to other projects in the future that have similar aims.

7.3. The method

Reflecting on the way in which this thesis was conducted, the methodology of "evaluation" has proven highly useful in testing the framework in relation to case study projects. Because of the framework, the evaluation was unusual in that it looked not only at whether objectives were met, but also at the very process of developing those objectives in the first place. The methodological approach of meeting with survivors, and not only project officials, was also instrumental in

bringing about the results described above. Much of the chapter on Research Data, for instance, was based on the views of the projects' end-users.

Looking back, the fieldwork methods were well-suited to this aim of involving a wide spectrum of people including – most importantly – the people using the facilities today. The fieldwork involved collecting grey literature, conducting an international survey, embarking on an internship with the IFRC, and investigating two case studies. The research methods included semi-structured and unstructured interviews, a random-sample survey in one of the case study projects, and direct observation (with community workers living in the area; and attending local meetings held with the community leader). The interviewees were chosen using snowball sampling, to include policy-makers, practitioners, and project participants or end-users. Verification, transcription, analysis, and the presentation of results was mostly done afterward, allowing for more time to conduct interviews and observation during the period of fieldwork.[11] All this coincided well with the objective to listen to and learn from the people living in the Düzce area – where the two case study projects took place. Viewed from a broader theoretical perspective, the value of this thesis to the literature on construction in disaster is derived in main part from the contributions of these individuals: the people who live with the consequences of construction processes implemented in disaster contexts. Without their knowledge, and without placing their knowledge at the heart of the research methodology, this thesis would have far less to contribute.

The research methods were therefore rewarding, despite being challenging. In retrospect, the challenges faced were perhaps not unique, and may represent challenges typically faced when the aim is to learn from local experience. For instance, studying a small case study area, and especially studying its transition through a period of disaster, is not easy. Little information was available about Düzce in general, and even less on the construction programmes implemented after the 1999 earthquakes. Some officials considered what little information was available to be "confidential", and institutions could at times appear forbidding. Meanwhile, many of the project officials had moved on long ago, leaving few to fill in the information gaps. Reflecting on all of these experiences, some of the lessons learned were listed in Chapter 3: informants know best; contacts are key; appearance of the researcher matters; listen, create a relaxed atmosphere; make alternative plans in case appointments are broken; persist; speak the language; and maximise all opportunities to learn in the limited time of fieldwork. In this conclusion to the thesis, little more

[11] The results were presented in a number of venues: discussions about the rights of the beneficiaries took place at an international conference; policy implications were collectively outlined in an IFRC workshop; and the research methods were shared with academic colleagues.

can be said about research methods; the key point is simply that no fieldwork is easy, and that what fieldwork teaches is as much about the researcher and the research methods as it is about the research subject (in this case, construction in disaster).

7.4. Recommendations

On the topic of construction in disaster, and its contribution to sustainable recovery, much remains unknown. Building on the findings and proposals of this thesis, at least five large areas lie open for future research:

1. *Empowering local authorities*: Local authorities lack trained professionals and the equipment needed to monitor (and therefore enforce) construction codes. Research is needed to evaluate capacity building initiatives to date (in terms of their strategies, experiences, etc.), in order to draw lessons for future initiatives.
2. *Training and institutional capacity building*: Professionals such as planners, architects, civil engineers, and construction inspectors, are scarce in the field of disaster management. Research is needed to further identify and address deficits in technical knowledge and practices, to develop training materials, and to draft curricula for the training of construction professionals.
3. *Private sector involvement*: Research is required into collaborative construction efforts, between the private sector, local communities, local authorities, and international organisations. Research could provide a basis for setting up policies and guidelines (for international organisations) concerning private sector involvement.
4. *Community building*: A key theme in this thesis – construction as a tool to rebuild socioeconomic structures – is still an understudied issue. Further research on this theme is important for future construction in post-disaster contexts.
5. *Empirical uses of the proposed framework (COAM)*: The COAM framework has yet to be used in the field. Were it to be used, future research could review its utility, and potentially contribute to modifications, corrections, and/or additions.

One additional area for research is not as easily categorised or quantified, and that is the issue of equality and social justice. As hinted in the introduction to this thesis, issues of equality and justice are too often seen as peripheral in technical discussions of construction in disaster. Yet what this thesis illustrates is precisely the opposite: a multi-faceted vulnerability renders hazards into disasters; and recovery is mainly predicated on issues at the personal and community levels. These issues may translate into technical issues, but the technical issues remain symptoms, not

causes. This was seen most starkly in the Demetevlar Housing Project where exclusion from the construction process resulted in a distant location and inappropriate architectural design, culminating in a difficult economic situation for those who lived there, and thus leaving no financial resources for vital maintenance. The worse case, however, was Düzce State Hospital, where the structure received no maintenance, and even small maintenance jobs were ignored out of necessity. The technical issues were inseparable from other kinds of vulnerability, and the ability for local people – in either the housing project or the hospital – to pursue a sustainable recovery was hampered rather than helped by construction processes (from planning and design to implementation and maintenance).

Some insights into these dynamics can be found in recent work on "resilient cities". Following a compilation of case studies – from Tokyo to Tangshan, Mexico City to Los Angeles – editors Vale and Campanella (2006: 335-355) draw twelve axioms. They argue that "narratives of resilience" are a political necessity for "saving face and retaining public office", whereby disasters both "reveal the resilience of governments" and enable such claims of resilience to be publicly contested (ibid: 340). Vale and Campanella highlight the link – both symbolic and material – between local reconstruction and "national renewal", and the significant financial role played by "outsiders". They mention the real and metaphoric connection between physical reconstruction and psychosocial/spiritual recovery, and the opportunities for recovery driven by remembrance and "the power of place" (which well describes the strategic industrial importance of the Marmara Region, for example). Thus, they acknowledge the common view of disaster as opportunity (e.g. UNDRO, 1992: 99), a view that was equally expressed by international development practitioners working in Marmara:

> Disasters provide opportunities to identify vulnerabilities, generate funds, improve quality, promote standardisation, involve community, create jobs, use local resources, and bring international professional and institutional support and other assistance. (Azmat Ulla, 2005b)

Yet they add something that few people have said openly, especially in the literature on construction in disaster: "resilience casts opportunism as opportunity".

> There is a fine line between capitalizing on an unexpected traumatic disruption to the fabric of a city as an opportunity to pursue some much-needed upgrading of infrastructure and facilities and the more dubious practice of using devastation as a cover for more opportunistic agendas yielding less obvious public benefits. (Vale and Campanella, 2006: 348)

This statement can by no means be applied to the organisations researched in this thesis, yet it is one of the first statements to probe the construction industries that enter in the aftermath of disaster.

In their introduction, Vale and Campanella ask a series of questions, which they then answer using case studies written by international experts on cities around the world. Yet the level of inquiry remains predominantly national rather than local, and data is secondary rather than primary. While their conclusions are strikingly perceptive, they recommend that future research supplement their answers with "close analysis [of] the micropractices of recovery," (ibid: 353). This thesis responds to Vale and Campanella's recommendation, and seeks to address the powerful questions they pose:

> Who sets the priorities for the recovering communities? How are the needs of low-income residents valued in relation to the pressing claims of disrupted businesses? Who decides what will be rebuilt where, and which voices carry forth the dominant narratives that interpret what transpires? Who gets displaced when new facilities are constructed in the name of recovery? What roles to nonlocal agencies, national disaster-assistance policies, and international relief organizations have in setting guidelines for reconstruction? How can urban leaders overcome the lingering stigma inflicted by their city's victimization? What place is there for visionary architecture and long-range planning? (Vale and Campanella, 2006: 12-13)

It is hoped that the COAM framework can somehow contribute to not only a more participatory process of construction, but also one that is more equitable, responsive and constructive, and above all, supportive of a sustainable, local recovery.

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Appendix: Survey questions to practitioners

A. INFORMATION ON RESPONDENT

Name:
Address (optional):
Tel:
Fax:
Email:
Discipline:
The project:
Location:
Name of the employing agency:
Starting date:
Length of programme:
Target population:

B. THE PROBLEM, NEEDS ASSESSMENT, MONITORING AND EVALUATION

1. What was the nature of the disaster?
2. What were the causes of the disaster?
3. What kind of background information did you receive from the agency employing you before starting to work on the project?
4. Was this background information enough to prepare you for the work? Yes ( ) No ( )
5. Do you think your work could have been more efficient if you had given information that is more detailed? Yes ( ) No ( )
6. What were the tasks you carried out in the project?
7. What was the work your team carried out?
8. What expertise was in your team?
9. Did you have local or international technical back up?
10. What were the goals of the project?
11. Who set the goals?
12. Were there additional gaols set by your agency?
13. Who funded the project?
14. Were there restrictions imposed by donor?
15. Were these goals set by your agency met? Yes ( ) No ( )
16. How was success measured?
    ( ) Time
    ( ) Number of beneficiaries
    ( ) Number of buildings and infrastructure provided
    ( ) Number of job opportunities created among the local people
    ( ) Other (please specify):
17. To whom were you reporting?
    ( ) To donors
    ( ) To beneficiaries
    ( ) Within organisation

C. THE IMPLEMENTATION

1. Were there enough materials supplied to meet disaster-affected people in order to build their homes and other utilities?
2. What was the extent of the damage? Low ( ) Moderate ( ) High ( )
3. What were the technical solutions, innovations and adaptation used on the projects?
4. Were the constructions activities you were involved in for refugee displaced or local community (victims)?
5. If only for refugees/ displaced people please evaluate the relationship between refugees/ displaced people and local host community?
6. Did this inform the way you tackled the issues surrounding construction activities?
7. Did you receive any participation from the community during planning/ implementation of the project? Yes ( ) No ( )
   If Yes, at what stage did this contribution happen and how?
   ( ) Planning
   ( ) Implementation
   ( ) Maintenance
8. If you were not? What were the main obstacles to the achievement of a good level of participation?
9. What could have been done to improve participation?
10. Was the construction project you worked for involved with any recycling, waste management, using energy renewable integrated projects? Yes ( ) No ( )
    If yes, please specify:
11. Were there the advantages of this involvement at an early stage? If so, what were they?
12. What is your personal opinion about the involvement of those projects in post-disaster areas?

D. ORGANISATIONAL ASPECTS

1. Were there any management / coordination problems on the ground?
2. Were there any governmental organisations involved in the area?
3. Do you think your organisation was aware of its capacities and weaknesses before taking on this project?
4. How did your organisation come to be involved in those projects?
5. Were your organisation capacities adequate to meet the need? Yes ( ) No ( )
6. Were there other organisations working in the same areas? Yes ( ) No ( )
7. If yes, were your efforts coordinated with those other organisations?
8. What would you suggest to improve cooperation among organisations (NGOs) or between organisations (NGOs) and governmental organisation?

E. SUSTAINABILITY

1. Did this project contribute to the development of the area in anyway? Yes ( ) No ( )
   If Yes, how?
2. During the implementation of the project how many people were directly employed and for how long?
3. Do you think there were some positive effects of this employment, e.g. for easing tensions among people? For economic spin-off?
4. If there were effects, were these: Short term ( ) Long term ( ) or Both ( )
5. Did you use local human and natural resources for the implementation of this project? Yes ( ) No ( )

6. What were these resources?
7. Were there problems with the provision of these resources? Yes ( ) No ( )
8. What did you do to overcome these obstacles?
9. Can you identify the main effects of your project on the client community? Are these effects Temporary or Long term?
10. In general terms has the project had a beneficial or detrimental effect on
    The client community: Beneficial or detrimental
    The host community: Beneficial or detrimental
11. What do you think of using local human and natural resources for the implementation of the projects during the reconstruction period?
12. Please, comment on the relative importance of using indigenous human and natural resources rather than imported resources during and the following periods of the disaster?

F. IDEAS, COMMENTS

1. Please identify any other key issues regarding the construction activities in post-disaster areas, which you think have not been covered by this questionnaire?

G. KEY RESOURCES

1. Can you suggest resources such as references, guidelines, checklists, manuals, and computer programmes individual and agencies with expertise in construction in post-disaster areas, which you think, would be significantly useful for the development of this research?
2. Would you object to part of the text of your answers being quoted and referenced in my PhD thesis? Yes ( ) No ( )