Third World Quarterly, Vol 21, No 3, pp 425–439, 2000

After the Marmara earthquake: lessons for avoiding short cuts to disasters

ALPASLAN ÖZERDEM & SULTAN BARAKAT

ABSTRACT *This paper aims to explore a number of lessons learned from the disaster management experience in Turkey in response to the Marmara earthquake in August 1999. It discusses the shortcomings of disaster mitigation and preparedness measures in Turkey in the context of a disaster and development relationship, including a number of issues such as legislation and training, public awareness, insurance, urban planning and management, and disaster response strategies. It explains why this earthquake produced such a large impact and suggests why, unlike previous earthquakes, the public reaction to the shortcomings in disaster mitigation and preparedness for the earthquake may promote important changes within Turkish society. Through the investigation of disaster management practice in the light of lessons learned from the Marmara earthquake experience, the paper outlines possible responses to these shortcomings.*

On 17th August 1999, at 03:02 local time, a large area of some 41 000 square kilometres between Bolu and Istanbul was struck by an earthquake registering 7.4 on the Richter Scale for about 45 seconds. This is the most densely populated part of Turkey, home to 23% of the country's population and with the highest concentration of economic and industrial activities, accounting for 34.7% of GNP. The epicentre was located in Golcuk—the country's most important naval base, in the province of Kocaeli, 90 kilometres east of Istanbul. According to the Government Crisis Centre, as of 19 October 1999 the official death toll was 17 127 and the number of hospitalised injuries 43 953. The State Department for Planning (Devlet Planlama Teskilati—DPT) (1999) estimates the monetary losses inflicted by the earthquake at between US$9 and $13 billion, with industrial facilities accounting for $2 billion buildings $5 billion, infrastructure $1.4 billion and economic losses almost as high as physical ones because it has taken months for factories and industrial facilities to return to their pre-disaster production levels. The disaster will mean a decrease of 1% in the GNP growth of the country. The estimates made by the DPT show that the cost of the earthquake to the state is around $6.2 billion, $3.5 billion of which will be caused by the cost of building temporary and permanent housing. The high level of damage inflicted

Alpaslan Özerdem is at the Post-war Reconstruction & Development Unit (PRDU) at the University of York, the King's Manor, York YO1 2EP, UK.

ISSN 0143-6597 print; 1360-2241 online/00/030425-15

TABLE 1
The ongoing final damage assessment by Government Crisis Center (October 1999)
(*Source:* Government Crisis Center, 1999)

	Building damage situation					
	Heavy to collapsed		*Medium*		*Light*	
	Households	Commercial	Households	Commercial	Households	Commercial
Total	66 441	10 901	67 242	9927	80 160	9712

on the housing stock and commercial buildings of the area can clearly be seen in Table 1.

Although the damage inflicted by the Marmara earthquake does not have any precedence, it is not the first time that the country has been shaken by the tremors of this type of natural hazard. Turkey is one of the world's most earthquake-prone countries, as it is located in an active seismic zone on the Alpine–Himalayan fault line. Ninety-two percent of the population, 90% of cities, 755 industrial complexes and 40% of dams in Turkey are in active earthquake zones (Atac 1995). Fifty five earthquakes in the twentieth century alone have produced a toll of 70 000 deaths, while 122 000 people have been injured and 420 000 buildings destroyed. Even the period of the last 10 years saw three urban earthquakes—at Erzincan (6.8 on the Richter scale) in 1992, Dinar (6.0) in 1995 and Adana-Ceyhan (6.3) in 1998—killing and injuring thousands, and inflicting tremendous physical destruction. However, as can be seen from the comparative evaluation of these earthquakes in Table 2, the Marmara earthquake was the strongest to affect Turkey in recent years.

In the aftermath of the Marmara earthquake, the immediate blame was directed at construction contractors because of structural failures. However, it is evident that all those who have a role in the building process, from contractors and civil engineers to council inspectors and clients, played their part in making a disaster out of a natural hazard. It is because of the overall characteristics of economic, political and social structures in the country that the population in Turkey has become particularly vulnerable to earthquakes. The fast economic growth of the 1980s has further increased the trend of migration from rural to

TABLE 2
Comparative evaluation of the Marmara earthquake with other major earthquakes in Turkey over the last 10 years
(*Source*: Isikara, 1999)

Place	*Date*	*Time*	*Mag (Ms)*	*Number of deaths*	*Number of collapsed and damaged buildings*
Erzincan	13.03.1992	19:18	6.8	653	2189
Dinar	01.10.1995	17:57	6.0	95	201
Adana	27.06.1998	16:55	6.3	145	10 401
Marmara	17.08.1999	03:02	7.4	15 250	75 000

urban areas, putting extra demands on the provision of housing. Therefore it is almost impossible (and also unethical) to identify or generalise about any one group of professionals as guilty.

The earthquake disaster in Marmara should be perceived as the manifestation of unresolved development challenges. Although the current debate on this disaster tends to focus on issues such as corrupt building contractors and the ineffective disaster response mechanisms of the country, it is crucial that lessons from the disaster be learnt, and subsequent strategies in response to shortcomings adopted by recognising Turkey's development realities. This is an important imperative because of the close interaction between disasters and development. Therefore, a review of the causes and consequences of the Marmara earthquake, undertaken to identify mitigation strategies for avoiding the creation of another major disaster, should be carried out with the relationship between disasters and development in mind.

Disasters and development

It might seem obvious that, whether natural or man-made, disasters have serious long-term negative impacts on the development of a community. However, the interaction between vulnerability to disaster and socioeconomic development is not a well understood concept. UNDP and DHA (1994) suggest that there are two main aspects to this relationship: a positive one and a negative one. According to this analysis, which is also supported by Sirleaf (1993), the relationship between community development and vulnerability to disasters can be summarised under four headings (see Figure 1).

The first aspect of the positive realm of this relationship claims that sustainable development can reduce vulnerability by acknowledging the interactive relationship between disasters and socioeconomic development. Experience shows that this can only be achieved by addressing the root causes of disasters, such as poverty and the lack of access to economic and political tools, etc. On the other hand, and ironically, post-disaster environments are often considered too turbulent for the implement often of developmental programmes, when donor and implementing agencies, as well as governments, decide to alleviate suffering through their relief and rehabilitation programmes.

The second aspect of the positive realm is formed by the claim that disasters can provide opportunities for sustainable development which are otherwise overlooked. The process of utilising these opportunities is two-fold. First comes identification of opportunities through the exposure of the multifaceted relationship between disasters and development, then the design of reconstruction programmes in such a way that these opportunities can be utilised in order to respond to shortcomings which have contributed towards the creation of the disaster (Barakat, 1993; Sirleaf, 1993). Supporting this view, UNDRO (1992:19) states that:

> Disasters often create a political and economic atmosphere wherein extensive changes can be made more rapidly than under normal circumstances ... The collective will to take action is an advantage that should not be wasted.

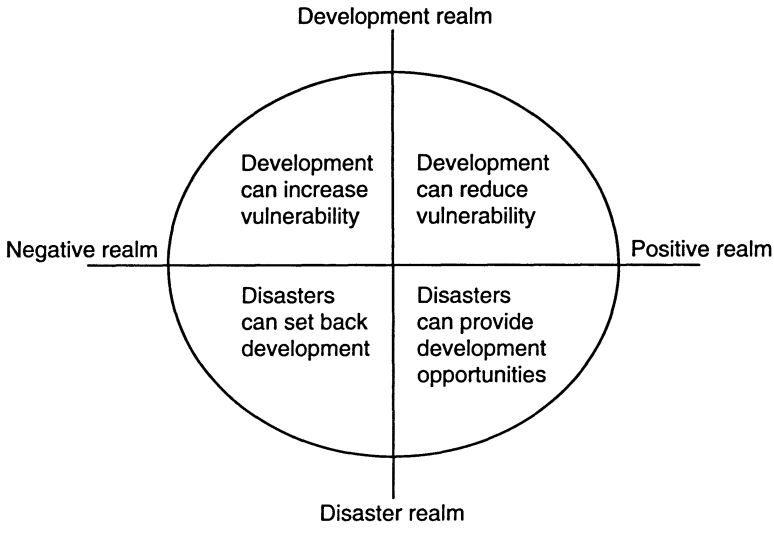

FIGURE 1
The relationship between development and unrealibility to disasters.

On the other hand, the negative realm presents the argument that first, disasters can set back development initiatives in several ways, such as loss of resources, interruption of programmes, impact on investment climate, impact on the informal sector, and political destabilisation (UNDRO, 1992:16). Some of these setbacks and the subsequent approaches taken as a response are explained by Boutros-Ghali (1995: 34):

> Natural disasters can have an enormous and dramatic impact on development efforts. Because natural disasters can quickly devour hard-won achievements, planning must focus on ways to cushion the inevitable shocks, so that social structures will not be irreparably damaged, economic initiatives will not be forever set back, and natural disaster victims will not be condemned to perpetual dependence on external assistance.

The second aspect of the negative realm is that poorly planned development programmes increase vulnerability. If development efforts are not appropriate to existing environmental factors and their impacts on the environment have not been properly assessed, they might increase vulnerability. It is within this interaction that the context of the close-woven relationship between disasters and a society's social, economic, political and physical vulnerabilities has been explored by a number of researchers and academics. Quarantelli (1978), Davis (1978, 1986), Anderson & Woodrow (1989) and Blaikie *et al* (1994) all explained that a disaster occurs when its two main components, hazard and vulnerability, coincide in time and place. According to this discourse, until they are met by vulnerabilities such as an unsafe environment, fragile socioeconomic structures, or lack of disaster preparedness, hazards would remain only as natural phenomena. For example, when a volcano erupts in an uninhabited place, this is only a natural hazard not a disaster. When settlements in Japan are affected by

frequent earthquakes, they do not usually experience these as major disasters because of the country's preparedness and mitigation measures.

Based on this argument Blaikie *et al* (1994) proposed the concept of a pressure and release model for disasters, which presents the progression of vulnerability from root causes to unsafe conditions. Although the main concept of a hazard triggering a disaster only in a vulnerable environment remained the same, this model connected the disaster to 'the processes that are sometimes quite remote and lie in the economic and political sphere' which are called 'root causes'. The limited access to power, structures and resources of some populations and political and economic ideologies, which are grouped under root causes in the framework of this model, create 'dynamic pressures' such as rapid population growth, rapid urbanisation, foreign debt, war, lack of ethical standards in public life and environmental degradation. A consequence of these pressures is that populations are exposed to 'unsafe conditions' in which a fragile physical environment and local economy unite with the overall shortcomings of a vulnerable society to produce a lack of disaster mitigation and preparedness.

In conjunction with the preceding argument, Barakat and Davis (1997: 293) recommend the implementation of 'risk spreading' method through the adoption of a number of mitigation strategies in parallel, in order to ensure urban safety against disaster. In their mitigation strategy, the main elements proposed, with measures to be taken under each heading, are as follows:

- *Legislation*: in addition to building, land-use and earthquake-safety regulations, the establishment of national, provincial and local preparedness planning with legal provision to designate officials with decision-making and procurement powers also forms an important aspect of the legislation element.
- *Education and training*: includes a number of measures such as public awareness programmes, inclusion of relevant safety elements in the curriculum of key professions (architecture, civil engineering, planners, etc), regular training programmes for decision makers at governmental and non-governmental levels, and encouraging the media to raise awareness.
- *Insurance*: incorporates the process from inspecting and approving constructions to their insurance.
- *Urban management tools*: setting examples of safe practice in the manner public buildings and infrastructure are built by government and local authorities can be a very effective policy, which would in turn provide a wide range of earthquake-resistant key lifeline buildings (hospitals, airports, ports, schools, police stations, etc) and infrastructural lifelines (water, electricity, communications, roads, etc) within the urban fabric.
- *Planning tools*: utilised during a six-stage sequence of actions for disaster planning (1–inception of disaster management, 2 = risk assessment, 3 = defining levels of acceptable risk, 4 = preparedness and mitigation planning, 5 = testing the plan, and 6 = feedback from lessons learned). Some of main planning tools are environmental impact analysis, hazard impact analysis, off-site safety plans and on-site safety plans.

Having identified the preceding classification of mitigation strategies as a model,

the paper will now review the 'causes and consequences' context of the Marmara earthquake under the following headings, which in turn will highlight some lessons for disaster management practice in Turkey:

- legislation and training;
- increased public awareness;
- insurance;
- urban planning and management;
- disaster response strategies.

Legislation and training

The 1997 Turkish Earthquake Resistant Design Code for Buildings, which is an adaptation of the Uniform Building Code in California, is sophisticated and strict; consequently multistorey buildings such as those which collapsed in the Marmara earthquake should all be highly earthquake resistant. However, experience from recent urban earthquakes shows that they are not. The poor performance of buildings in the Dinar earthquake is one example, in which one-third of all dwellings were damaged at medium and heavy levels. According to the Earthquake Engineering Research Institute (EERI) (1998), the main reason for this poor performance was 'the prevalent unsupervised construction'. It was further explained that 'Professional liabilities are diffuse: material quality, workmanship and detailing are poorly inspected or cross checked, or never inspected at all'.

The EERI's assessment of the impacts of the Dinar earthquake in November 1995 pointed out that one of the reasons why the buildings performed so badly was soil conditions. It was the buildings erected mainly on soft ground material in the western part of the city, which is the lowest in terms of altitude, which were most damaged. This was explained in the FERI report (1995) as follows:

> In the higher parts of Dinar, where the foundations were on the bedrock, the effects of the earthquake on the buildings were small or non-existent. The damage starts gradually (fractures in chimneys, breaking off of top part of minarets, damage to buildings), as one proceeds towards the lower parts of the city. Damage reaches a peak in the [centre] of the city and then starts to decrease. The last phenomena occur on thick alluvial deposits.

Özerdem's observations during his field research in Dinar in December 1995 parallelled those made by the EERI. The assessment carried out by a committee from Istanbul Technical University (ITU) between 19 and 20 August 1999 also supports this observation in the context of the Marmara earthquake, as soft ground conditions in Adapazari, Golcuk and Yalova were one of the main reasons behind the high level of damage inflicted on buildings.[1] However, the question here should not be what was the role unsuitable soil conditions played in the creation of these disasters, but why was the development of housing and industries allowed directly on top of, or immediately adjacent to, these active fault traces? There are two possible answers to this question. First, there is the possibility that the national and local planning agencies were not fully aware of the probable consequences of locating housing and industrial development in

such areas. However, according to the report by the ITU research committee, based on historical earthquake records of the area and on geological surveys carried out by different academic and technical teams, the area affected by the Marmara earthquake was known to be at high risk from earthquakes. Therefore it was not something that was scientifically acknowledged, and its incorporation in the development of housing and industrial areas was 'neglected' by national and local planning authorities.

Meanwhile, the assessment results of the ITU's report (1999) on civil engineering aspects of the Marmara earthquake clearly emphasise that disregard of Turkey's strict building and earthquake safety regulations was the main reason why engineered buildings were badly affected by this earthquake. The main building defects assessed by the survey team were as follows:

- inadequate detailing and reinforcements of column-beam connections;
- insufficient or lack of sheer reinforcement, anchorages and inadequate spacing of ties, or inadequate bonding of round bars;
- irregular building plans;
- poor quality concrete because of the questionable quality and quantity of materials used, eg sea sand and substandard cement in concrete mixes;
- creation of short-columns because of infill walls or offsets in design;
- defects in design such as a soft first storey, the result of later design changes so that first storeys could be used as shops.

Supporting this conclusion, after carrying out a technical survey in the area affected by the Marmara earthquake, EQE International (1999) points out that:

> Most of the buildings did not meet the design requirements of the code and included details that are not earthquake resistant ... Many of the buildings were built with poor and inappropriate construction materials and utilized poor workmanship. Many buildings were knowingly allowed to be built on active faults and in areas of high liquefaction potential. Many buildings were not engineered, but built according to past experience.

In response to these civil engineering defects, which had a significant role in the creation of the disaster in Marmara, it is imperative to question the wisdom of burdening new graduates of civil engineering with the responsibility of preparation and endorsement of construction projects. In other words, civil engineering graduates should be considered as 'engineers' only after practising and taking further exams over a certain period of time, during which they would become more aware of building safety issues for earthquakes. This is particularly important, considering that it is almost impossible to expect civil engineering students to learn all aspects of such a wide discipline in a period of four years, and to have sufficient expertise to carry out the preparation and control of projects immediately after their graduation. However, the challenge is more complex than this. There are two main dimensions East Technical University's to the relationship between contractors and engineers. The first is described by the Middle East Technical University's (METU) Disaster Management Implementation and Research Center (1999) as follows:

> The practice of structural design itself is an area where many engineers compete for

> jobs handed out by the contractors. It is not uncommon to encounter cases of less than competent design done by engineers who see no immediate benefit in becoming more competent for the small fees they receive. There are only a few cases of good engineering practice in ordinary design jobs.

The second answer to why buildings were erected in such potentially unsafe locations is more concerned with professional ethics, as explained by EQE International (1999):

> Typically, the design structural engineer, who is an employee of the contractor, does not inspect the on-going construction to verify that the contractor has built the building according to the intent of the design drawings. This lack of construction oversight by the design engineer allowed for on-the-spot field design modifications and other measures to occur (ie no checks and balances), which compromised the earthquake resistance of the buildings.

Bearing in mind these observations, a critical aspect seems to be the inadequacies of the control mechanisms of local municipalities for checking the work of building contractors. It is common knowledge that some contractors in Turkey are corrupt, and 'economise' on cement and iron bars in order to increase their profit margin, although the margin on this extra profit cannot be more than 5% to 10%. Thus it is essential that local municipalities have the financial resources and trained personnel to be able to inspect the work of contractors. However, Turkey is not a high income country and municipal councils usually do not have the resources to employ adequate numbers of civil engineers as inspectors. Even if they do, those civil engineers are often poorly paid, so it is difficult for local municipalities to attract experienced engineers who can achieve more than a simple checking of the basic calculations of building projects, which is what young graduate civil engineers often do. Less experienced engineers might know the general requirements of building safety for earthquakes, but this is not the same as having competence in the details of earthquake engineering which is a speciality area and requires further training and experience in the field. In addition to this, it is difficult to see how to achieve proper building inspection given the possibility of corruption in obtaining building permission through bribes and political favours.

Increased public awareness

After each of the recent earthquakes the politicians went to the public asking for solidarity, patience and compassion. Each time, the Turkish public was prepared to offer as much as they could in order to alleviate the suffering caused. However, this time the establishment in Ankara might get a slightly different reaction, even though the Turkish public is known to have great patience and the ability to put up with shortcomings and injustices. The public is demanding to know why the 'act of God' became a disaster for them. In fact, after the earthquake in Adana, some people went to court to sue their building contractors, but these demands for justice were probably not strong and visible enough to affect the practice of 'business as usual' with building safety in Turkey. However, the future could bring some initiatives by the public and by the

Turkish media, which will have focused on the causes and consequences of the Marmara earthquake, at least in its immediate aftermath, since headlines in Turkey tend to change quickly in parallel with the contentious and complex social, political and economic challenges. The close proximity of the earthquake area to the media headquarters in Istanbul plays a major role here. As a consequence of public pressure the establishment could start to take the matter of earthquake safety and disaster management seriously and, as a result, incorporate the many lessons learned from the long list of Turkish earthquakes into preparedness and mitigation. But why it is more likely to happen after the Marmara earthquake, if it did not happen after many other earthquakes over the past 50 years?

There are two main reasons for this. First, the scale of the Marmara earthquake, measuring 7.4 on the Richter Scale, was much greater than any other recent earthquakes in Turkey. Second, because of the high number of urban areas affected, including such cities and towns as Istanbul, Izmit, Golcuk, Yalova and Adapazari, this is a disaster whose victims are mainly urban dwellers. The urban–rural dichotomy might this time have some positive consequences in Turkey, as the politicians, local municipality authorities, building contractors and civil engineers will not be able to get away with denying their role in the creation of the disaster.

In conjunction with the huge death and injury toll, and devastating physical and economic impacts of the Marmara earthquake, it appears that the Turkish public has reached a new level of awareness. For the first time that the public is showing a great deal of interest in the causes of earthquakes and the methods of protection against them. Demands for the enforcement of regulations concerning construction practices to minimize risk, quality control during new constructions, and retrofitting of buildings and houses at risk are now very visible. It seems that awareness and public opinion may play a significant role in more significant progress in disaster preparedness and mitigation. More importantly, the increased public awareness about earthquakes is coupled with social and economic changes which are taking place in Turkey. In other words, the Marmara earthquake seems to have shaken the state's institutional structures and its complacency. Ozyaprak (1999) argues that the earthquake in Marmara provided a positive consequence whereby Turkish society has 'discovered' its civil identity. He explains that the public has realised the importance of civil initiatives as a powerful tool in producing social and economic changes. Supporting this view, Incioglu (1999) claims that the Marmara earthquake has initiated the process of questioning the overall viability, effectiveness and organisational structure of the state, particularly the role of the army. The image of the state as a protective 'father' among the population in Turkey has totally collapsed. The public is fully aware that it is the overall political system and economic policies which led to the creation of this disaster, and they are now demanding a state system which has high organisational capacities and is effective and democratic.

Some may argue that increasing the penalties for those found guilty of negligence in building safety could have some positive results in the future. However, considering the rate of growth of housing in Turkey, it is a daunting

task to carry out proper building inspections, even if we assume that the necessary political and ethical will exists. Another approach would be to increase public awareness and, in effect, make potential house buyers an extensive group of 'inspectors'. This would be less costly and, at the same time, much more effective. In Turkey, where the population is business- and initiative-orientated, the existence of 'demand' has a significant role in the way socioeconomic and political structures inter-relate in society. In other words, if people show as much interest in the earthquake safety of their apartments as they show in the type of tiles, doors and taps used, it is more likely that building contractors will stick to the rules and regulations.

Insurance

The initiation of a general insurance scheme for buildings could also have a significant role in ensuring that they are built according to building safety regulations. It is likely that insurance companies would refuse to provide insurance for a building that is not earthquake-proof or would at least ask for high premiums. Experience in Turkey shows that, unless there is a financial incentive, regulations and rules are difficult to implement. It is imperative that the government make the necessary legal arrangements for the enforcement of building insurance for all new constructions. In the immediate aftermath of the Marmara earthquake the government claimed that appropriate amendments to the law would be made, while in return building insurance schemes could be realised. According to these arrangements, the proposed establishment of independent and chartered construction inspection firms was seen as a necessity, which would have been a radical shift, moving responsibility for inspections from local authorities to chartered firms. Through these institutional changes the aim was to avoid the possibility of corruption between construction contractors and local authorities. However, the legal changes are still to be carried out, and may never be realised given the overall complacency of the state mechanism in its approach to such urgent problems as improved disaster mitigation and management.

It is reported by Bil (1999) that insurance companies are not willing to take the full responsibility of ensuring the earthquake safety of buildings. Therefore it is crucial that a system of independent and chartered monitoring and control mechanisms, from the planning stage to obtaining building permission, should be instigated, and this checking mechanism should continue throughout the construction. Local authorities should be equipped with the power to stop constructions if they are found to be defective. Overall, the encouragement of building insurance seems to be an effective, inexpensive and sustainable tool for ensuring building safety. For example, the cost of insuring an apartment with a value of TL10 billion (£13 300) is estimated at around TL40 million (£53) a year. However, this should be done in parallel with the establishment of necessary monitoring and control firms as otherwise the mechanism would not prove to be efficient and effective.

Urban planning and management

Setting examples of earthquake-proof constructions by government and local authorities was suggested by Barakat and Davis (1997) as an effective urban management tool. However, experience in Turkey shows that the state is far from setting any kind of example in the construction of public buildings and infrastructure. It was the 1992 earthquake in Erzincan that drew public attention for the first time to the low earthquake-safety of public buildings, as a high percentage were either heavily damaged or completely destroyed. According to Isikara (1999), in addition to 35 destroyed public buildings, several schools, a major hospital, residential buildings for judges and attorneys, and two big hotels collapsed in Erzincan. The situation with public buildings in the Dinar earthquake was even worse as 25 out of 55 collapsed, raising further questions over corruption in the civil service. After the Marmara earthquake, similar experiences with public buildings were repeated, as 43 schools in the earthquake-affected area collapsed, while 377 were damaged (DPT, 1999). With regard to health facilities the Izmit Coordination Centre of the Association of Turkish Doctors (Turk Tabipler Birligi—TTB) reported that, as of 4 September 1999, only 45% of 51 health clinics which were visited by the TTB team in Izmit Centre, Derince and Korfez remained intact.

The Marmara earthquake has also inflicted tremendous damage on the area's industrial production capacity, as large losses in buildings, machinery and equipment, stock and qualified personnel have resulted. According to the DPT (1999), the loss to industry in the area in monetary terms is estimated at $600–700 million, which equals a decrease of 1.6% in the country's annual growth. It is also estimated that reconstruction, such as of the TUPRAS Refinery, TUVASAS, IGSAS, PETKIM and TZDK amounted to around $220 million. In addition to this, the production and market losses from these industries were estimated at around $630 million. The TUPRAS Refinery fire, which burned out of control for several days, required evacuation within a three-mile radius as the dens urban populations around it were in imminent danger of possible explosions. The situation was particularly dangerous as the refinery was close to other heavy industries, such gas filling stations and fertiliser production plants. The over-concentration of public and private heavy industries like petrochemical plants, paper mills, car manufacturers, pharmaceutical firms and cement plants in an earthquake-prone area, and near densely populated urban areas, underlines an important reality in Turkey, which is the phenomenon of unplanned regional and urban development.

According to the METU's Disaster Management Centre (1999): 'The urban planning process is divorced from disasters. The Development Law deals with the narrowly described building stage only, and omits other steps of the urban space creation process'. It is further explained that 'The Disaster Law is obsolete in many ways, and contributes to the myth of the omnipotent state that will intervene in the event of any disaster, rebuild a dwelling for every citizen who loses one, plus a workshop for heads of households if they held a deed to one before'. It was claimed that the explanation for this type of complacency can be found in the overall psychosocial characteristics of Turkish society:

> It is not surprising that in a culturally fatalistic society, this makes consumers blasé with regard to the structural quality of buildings in which they entrust their own lives and their families to divine intervention.

Balamir (1999) implies the concept of a 'culturally fatalistic society' in his disaster management framework, in which fatalistic and autarkic approaches form the two opposing sides of the spectrum. He points out that the main reason why Turkey has experienced shortcomings with its disaster management strategies is this overall fatalistic approach. He claims that it couples with a relief strategy, while the autarkic approach looks for preventive measures. With the former approach the main focus is on what to do after disasters while the latter strategy advocates the implementation of various mitigation and preparedness measures. Balamir's view of the need for a progression from the negative side of the spectrum towards the positive also implies that to remain as a culturally fatalistic society is in fact not something fatalistic itself. In other words, a change or revision of construction processes is possible, and this should be the main aim of activities in the aftermath of the Marmara earthquake.

Disaster response strategies

Finally, the aftermath of the Marmara earthquake once again demonstrated the extremely limited capabilities of the General Directorate of Civil Defence of Turkey to provide a quick and effective response to the needs of disaster-stricken people. In a country like Turkey, where earthquakes are a part of life, it is beyond belief that the state cannot organise an effective civil defence system. In contrast to the state institutions' poor response to this earthquake, the involvement of civil society organisations in the provision of emergency aid and services was particularly effective. For example, there was major participation of the different non-governmental organisations in rescue work among those trapped under collapsed buildings. In conjunction with this phenomenon, the public in Turkey has started to question the state and its institutions' response to the needs of earthquake-affected people, while civil society organisations' popularity with the public has reached a peak. Among others, Arama Kurtarma Dernegi (AKUT) (Search and Rescue Team) was the most popular rescue organisation, and it was an AKUT team, rather than a Turkish Civil Defence team, which was sent to Athens by the government after an earthquake hit the Greek capital on 7 September 1999. Meanwhile, Kemal Demir, Director of Turkish Red Crescent, which was criticised for being incompetent in its response to the disaster, had to bow to public pressure and resign from his post on 7 October 1999. Bearing in mind the current public reaction, as a top priority the government in Ankara should immediately start to think of ways of improving the Civil Defence organisation's structure and capacities. The Directorate currently has three main units in Ankara, Istanbul and Erzurum, and the total number of its personnel, both administrative and technical, is only 100. Despite this, the Directorate claims that 'Urgent Rescue and Relief Teams' were formed in each province, consisting of 50 to 150 personnel (there are 80 provinces in Turkey). However, experience in the immediate aftermath of the Marmara

earthquake showed that those provincial rescue teams were only visible on paper; as most of them had no training at all, there were no plans for their mobilisation, and no allocation of equipment for those who reached the earthquake-affected area. Subsequently, the Directorate of Civil Defence, with 100 personnel, could not have faced the task of rescuing thousands of people from more than 80 000 damaged and collapsed buildings if international and Turkish civil society rescue teams had not helped in this daunting task. It is perhaps in this context that the international community can have a significant role. The transfer of knowledge in rapid rescue methods, and the designing of effective disaster preparedness plans are areas where the international community can provide Turkey with the necessary resources for capacity strengthening. This would certainly be a better investment than those provided in this catastrophe.

Conclusions

The causes and consequences of the Marmara earthquake have been evaluated in this paper within a framework of disaster mitigation strategies. It highlights a series of challenges in terms of responses to disaster management needs, but also to the existence of a number of opportunities which have emerged or been exposed by the disaster itself. Considering that earthquakes are part of everyday life in Turkey, there is an urgent need to incorporate those lessons learned from the Marmara earthquake into the country's disaster management strategies by utilising the special characteristics of the post-disaster social, institutional and political environment as an opportunity. A number of considerations highlighted by the preceding review are presented below:

- The existence of a set of sophisticated and strict regulations for earthquake-resistant design on its own does not ensure the end result of earthquake-proof buildings.
- Experience shows that earthquake proofing cannot be ensured only by the implementation of civil engineering measures, as soil condition also plays a major role in ensuring buildings earthquake resistance.
- A wide spectrum of civil engineering defects observed at the Marmara earthquake underlines an unfortunate fact that a large proportion of the existing housing stock in Turkey is not resistant to earthquakes.
- There is an urgent need for the civil engineering sector in Turkey to review its role in the creation of this disaster. Although solutions can never be singled out easily because of the relationship between economic, social and institutional factors, the convening of a Forum for Civil Engineering professionals could address the challenges faced by bringing together academics, researchers, practitioners and representatives of local authorities and should be considered.
- The whole construction process needs to be restructured in an integrated and holistic manner. The availability of highly qualified professionals and distinguished academics in Turkey forms a large pool of talent which has yet to be tapped in a possible government-led process to review disaster mitigation and management strategies in the country.

- It seems that, as a result of increased public awareness on earthquake safety coupled with media focus on the issue, the establishment in Turkey is likely to take earthquake disaster management more seriously. However, academic and other civil society pressure groups should follow up the initiatives to be taken, as state complacency is often difficult to overcome.
- As a result of the fact that the people affected by the Marmara earthquake were mainly urban dwellers, the urban–rural dichotomy in Turkey can produce some positive results in the context of this disaster.
- The Marmara earthquake also served as a trigger for the Turkish public to rediscover the scope and power of civil society.
- Although the Marmara earthquake had a significant role in the creation of a more aware society, this does not mean that this represents an adequately informed society on earthquake safety issues. To expand the scope of this awareness nation-wide would require further public awareness programmes.
- The 'demand-driven' characteristic of society should be utilised in order to make potential house buyers a large pressure group for the provision of earthquake resistant buildings.
- A comprehensive building insurance scheme, incorporating the establishment of chartered construction inspection firms should be seen as a priority.
- Initiatives in the aftermath of the Marmara earthquake show that the insurance sector would be in a position to take up this role as long as the system was supported with other necessary institutional structures. However, the main issue here is the political will to carry out required legal and regulatory procedures for this framework.
- Government and local authorities do not set good examples in the construction of earthquake resistant buildings. Lack of control mechanisms, corruption, political favouritism and the complacency of state institutions are a few of the complex root causes behind this fact.
- Urban planning law, disaster management law and regulation of construction need to be restructured in order to make them more inter-connected and coordinated in their overall roles in disaster preparedness and management.
- The reality of living between two earthquakes should be understood by all layers of the society. In conjunction with this the institutional frameworks for responding to earthquake disasters should be restructured and equipped with adequate financial and institutional resources.
- The utilisation of the army as a pool of physical and human resources for disaster response should be reconsidered in order to increase their contribution to the overall aims of public awareness and emergency response.
- The realisation of financial, institutional and legal assistance to civil society organisations working in disaster response is imperative in order to encourage the creation of a wider disaster response network.

Note

[1] The survey committee from Istanbul Technical University was led by Prof Dr Gulsun Saglamer, who is also Rector of the University.

References

Anderson, M & Woodrow, P (1989) *Rising from Ashes: Development Strategies in Times of Disaster* (Paris UNESCO).

Atac, S (1995) Quake begins to shake official complacency, *Turkish Daily News*, 7 October, p B1.

Balamir, M (1999) Afet Zararlarinin Azaltilmasi Amaciyla Planlama ve Yapilanma Sureclerinin Yeniden Orgutlenmesi ve ODTU Onerisi (Planning to reduce disaster damage and reorganisation of construction processes, and ODTU proposal), *Mimarlik*, 288, pp 12–16.

Barakat, S (1993) Reviving war damaged settlements: towards an international charter for reconstruction after war, unpublished D.Phil. thesis, IoAAS, University of York.

Barakat, S & Davis I (1997) Disaster preparedness for Palestine, in: A B Zahlan (ed), *The Reconstruction of Palestine: Issues, Options, Policies and Strategies* (London: Kagan Paul International).

Bil, F C (1999) 40 Milyon Liraya Yapi Sigortasi (Building insurance for TL40 million), Sabah's supplement: Insaatta Yeni Donem (New Era in Construction), *Sabah*, 28 September, p 11.

Blaikie, P, Cannon, T, Davis, I & Wisner, B (1994) *At Risk: Natural Hazards, People's Vulnerability and Disasters* (London: Routledge).

Boutros, B G (1995) *An Agenda for Development 1995* (New York United Nations).

Davis, I (1978) *Shelter After Disaster* (Oxford: Oxford Polytechnic Press).

Davis, I (1986) Lessons from reconstruction after natural disasters for cities recovering from bombing and civil strife, *Proceedings of an International Conference on Reconstruction of the War-damaged Areas*, University of Tehran March 1986, pp 44–51.

DPT (1999) depremin Ekonomik and Sosyal Etkileri: Muhtemel Finans Ihtiyaci (Economic and Social Impacts of the Earthquake: Possible Financial Needs), http://ekutup.dpt.gov.tr/deprem, Web Site visited on 19 October 1999.

FERI (1995) The Dinar, Turkey earthquake of October 1, 1995, EERI Special Earthquake Report, November 1995, hhtp:WWW.EERI.ORG/RECONN/DINAR98/DINAR.HTML. PAGE CONSULTED IN OCTOBER 1999.

EERI (1998) DINAR AFTERSHOCK TESTS RETROfiTTED BUILDINGS, eeri SPECIAL EARTHQUAKE REPORT, SEPTEMBER 1998, HHTP:www.eeri.org/Reconn/Dinar98/Dinar98.html. Page consulted in October 1999.

EOE (1999) Izmit, Turkey earthquake of August 17, 1999 (M7.4); an EOE briefing, http://www.eqe.com/revamp/izmitreport/index.html. Page consulted in October 1999.

Incioglu, N (1999) 'Devlet Baba' Imaji Coktu (The image of 'father' state's collapse), *Milliyet*, 31 August, p 18.

Istanbul Teknik Universitesi (1999) On Degerlendirme Raporu (pre-assessment report), unpublished, 24 August 1999.

Isikara, A M (1999) Depremle Yasamak Gercegi (The reality of living with earthquakes), *Sabah*, 30 September.

METU (1999) A simplified analysis of the earthquake vulnerability of the housing stock in Turkey, http://www.metu.edu.tr/home/wwwdmc/simp.html.

Ozyaprak, S (1999) Yapisal Degisim Zamani mi? (Is it time for structural changes?), *Financial Forum*, 11 September, p 9.

Sirleaf, E J (1993) From disaster to development in: K Cahill (ed), New York: Basic Books *A Framework for Survival: Health, Human Rights and Humanitarian Assistance in Conflicts and Disasters*, and The Council of Foreign Relations.

Quarantelli, E L (1978) *Disasters: Theory and Research* (Oxford: Sage).

UNDP-DHA (1994) *Disasters and Development*, prepared by RS, Stephenson Disaster Management Training Programme, UNDP.

UNDRO (1992) *An Overview of Disaster Management*, Disaster Management Training Programme, UNDRO.