12-17-2010

Pre-Disaster Risk Management in Post-Earthquake (1999) Turkey

Engin Ibrahim Erdem
Florida International University

Pre-Disaster Risk Management in Post-Earthquake (1999) Turkey

Engin I. Erdem

Disaster Risk Reduction Program
Florida International University

December 17, 2010

Abstract:

This paper assesses the status of pre-disaster risk management in the case of Turkey. By focusing on the period following the catastrophic August 17, 1999 earthquake, the study benefits from USAID's Disaster Risk Management Benchmarking Tool (DRMBT). In line with the benchmarking tool, the paper covers key developments in the four components of pre-disaster risk management, namely: risk identification, risk mitigation, risk transfer and disaster preparedness. In the end, it will present three major conclusions: (i) Although post-1999 Turkey has made some important progress in the pre-disaster phase of DRM, particularly with the enactment of obligatory earthquake insurance and tightened standards for building construction, the country is far away from substantial levels of success in DRM. (ii) In recent years, local governments have had been given more authority in the realm of DRM, however, Turkey's approach to DRM is still predominantly centralized at the expense of successful DRM practices at the local level. (iii) While the devastating 1999 earthquake has resulted in advances in the pre-disaster components of DRM; progress has been mostly in the realm of earthquakes. Turkey's other major disasters (landslides, floods, wild fires i.e.) also require similar attention by local and central authorities.

Submitted to:
Dr. Richard S. Olson
Dr. Juan Pablo Sarmiento
Dr. Gabriela Hoberman

Introduction

Turkey, which is located at the juncture of three continents, namely Europe, Asia, and Africa, has suffered from several disasters throughout its history. The North Anatolian Fault, one of the most vigorous seismic zones in the world, has resulted in two of the most devastating earthquakes in the country's history. In the 1939 Erzincan (Northwestern city) earthquake, more than thirty-two thousand people died, while the recent August 1999 earthquake in the Marmara region resulted in huge human and economic costs. More than seventeen thousand people lost their lives, around fifty thousand people were injured, and Turkey experienced economic losses of about five percent of its GDP. In addition to these two earthquakes, more than twenty thousand people died in other major earthquakes throughout the country from 1939 to 2010. Moreover, floods, landslides, and wild fires are other major disasters that habitually threaten the people of Turkey. From 1975 to 2010, more than six hundred people died due to floods.

The August 17, 1999 earthquake was an important test to assess Turkey's development in terms of Disaster Risk Management. A few years before the devastating event, experts from the U.S. Geological Survey and Turkish scholars declared the potential of a high magnitude earthquake in the Marmara region. Having missed these evaluations, the Turkish state and the people largely failed to act before the disaster or respond effectively during it, leading to a higher human and economic toll than perhaps would have occurred if the state had acted upon this knowledge. If Turkey had a better DRM framework, many experts argue, the devastation could have been much lower. The August 17 earthquake was particularly notable in demonstrating the serious deficiencies in the country's risk mitigation, risk transfer and disaster preparedness efforts.

This study attempts to assess the status of pre-disaster risk management in Turkey following the August 17, 1999 earthquake. To do so, it utilizes USAID's "Disaster Risk Management Benchmarking Tool". While this paper does not use the 276 questions employed in the benchmarking tool for the assessment of Turkey's DRM, it does incorporate an evaluation of four key areas (policy-legislation, local government, education-public awareness, and international support) of its pre-disaster risk management.

In what follows, a brief discussion of the August 17, 1999 earthquake will take place. In particular, the section will present the major lessons of the earthquake and their impact on Turkey's level of progress in the realm of DRM. Then, the paper will highlight USAID's Benchmarking Tool (DRMBT), its purpose, and the way it is used. In the following part, the status of pre-disaster risk management in Turkey will be examined utilizing aspects of the Benchmarking Tool. In doing so, the section will provide an overview of the key DRM related developments in the aftermath of the 1999 earthquake. Finally, the concluding section will not only be an overview of the paper but also proffer policy suggestions for the Turkish authorities.

The August 17, 1999 Earthquake

The August 17, 1999 Izmit/Marmara earthquake is one of the most disastrous seismic events in Turkey's recent history. Since the 1939 Erzincan earthquake, which resulted in more than thirty-two thousand deaths, the country has witnessed seven earthquakes with a Richter scale of 7 and above. (Table 1) The recent August 1999 earthquake comes only second to the 1939 earthquake in terms of the human toll, causing more than seventeen thousand deaths, and about fifty thousand more injuries. The earthquake also affected 120,000 housing units, resulting in heavy damages and collapses, In addition, leaving four to six hundred thousand people

homeless. On the economic side, Turkey faced a loss of about 8-30 billion dollars.[1] The earthquake hit the key industrial region of the country, substantially enhancing the level of economic losses.[2]

Table 1: Major Earthquakes in Turkey (1939-2010)

Earthquake (Date, City, Region)	Magnitude	Fatalities
1939 12 26, Erzincan, East	7.8	32,700
1942 12 20, Tokat, Central	7.6	4,000
1943 11 26, Samsun, North	7.6	4,000
1944 02 01, Bolu, Northwest	7.4	2,790
1953 03 18, Balikesir, West	7.3	1,073
1966 08 19, Mus, East	6.8	1,529
1970 03 28, Izmir, West	6.9	1,086
1975 09 06, Diyarbakir, Southeast	6.7	2000
1983 10 30, Erzurum, East	6.9	1,342
1999 08 17, Izmit, Northwest	7.4	17,118
1999 11 12, Duzce, Northwest	7.2	894
2003 05 01, Bingol, East	6.4	177
2010 03 08, Bingol, East	6.1	51

Source: U.S Geological Survey, "Historic World Earthquakes", Turkey
http://earthquake.usgs.gov/earthquakes/world/historical_country.php#turkey

Turkey's weak record of Disaster Risk Management was a major reason for the high human and economic losses related to the 1999 earthquake. In other words, Turkey could have avoided substantial losses if it had performed better in the various dimensions of pre-disaster risk management. In this regard, one should discuss Turkey's particular failures in risk mitigation and disaster preparedness. For example, the U.S. Geological Survey and Turkish scholars made a 12-20% prediction that the Marmara region could have an earthquake with a 6.5 or above magnitude on the Richter scale by 2025, two years before the event.[3] Nonetheless, the earthquake caught the

[1] "Event Report: Kocaeli, Turkey Earthquake", RMS Reconnaissance Team, Risk Management Solutions, Inc. (http://www.rms.com/Publications/Turkey_Event.pdf), Murat Saatcioglu et al 2001, "The August 17, 1999, Kocaeli (Turkey) earthquake — Damage to Structures", *Canadian Journal of Civil Engineering,* 28: 715-737
[2] The Izmit-Istanbul (Marmara) region, in which the earthquake hit most, generates forty percent of Turkey's annual industrial production with about 7 percent of GDP. ("Event Report: Kocaeli, Turkey Earthquake")
[3] "Event Report: Kocaeli, Turkey Earthquake"

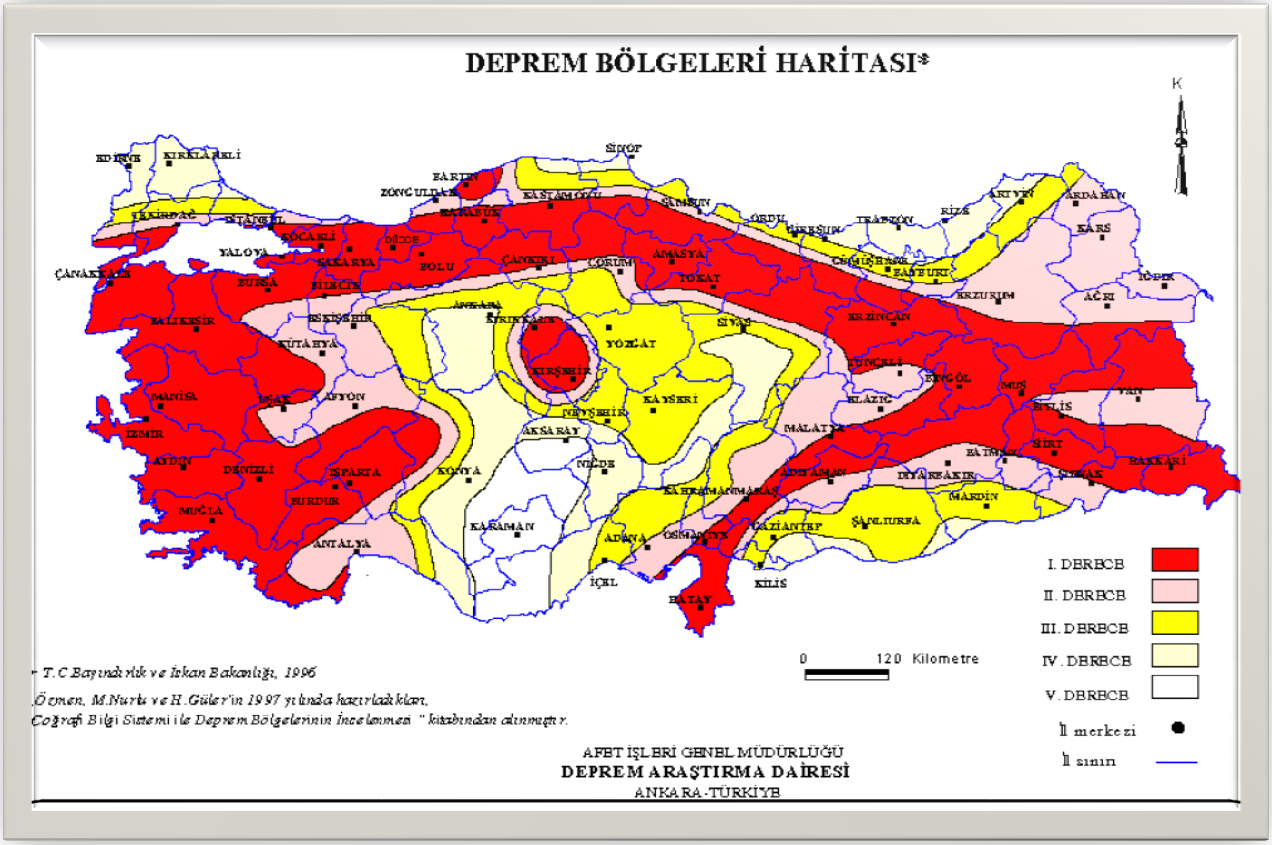
region unprepared. First of all, as the most industrialized and urbanized part of the country, the region had high rates of poorly designed and constructed buildings. A majority of residential buildings in the region were multi-story (4 to 8) apartments, many which failed to meet building codes. Though Turkey had a modern building code, to a great extent, it failed in its implementation and enforcement.[4] Particularly notable was the fact that the government allowed many buildings in the earthquake region to be built upon active faults. In the end, this level of incompetence weak enforcement made the August 17 earthquake a much more devastating natural disaster for the country than it might have been given stronger state action in this regard.

A major lesson from the 1999 earthquake is that Turkey cannot afford to continue living with weak DRM mechanisms. Many Turkish and international scientists believe that there is a 60 percent chance of another major earthquake along the North Anatolian Fault, which the metropolitan city of Istanbul essentially sits on, by 2030.[5] Such a massive earthquake is expected to result in hundreds of thousands of people dead and over a hundred billion dollars in economic losses.[6] Therefore, as a country located near the powerful North Anatolian Fault, the Turkish government and society should take DRM more seriously. (Figure 1) In Turkey, 43 percent of city centers are within the highest earthquake risk zone, while 27 percent are located in the second most risky zone. The third zone incorporates 16 percent of the country's city centers, the fourth zone includes 11 percent of Turkey's city centers, and while the lowest risk earthquake

[4] Turkey's 1975-year building code was adapted from the Uniform Building Code in California. "Izmit, Turkey Earthquake of August 17, 1999", EQE Briefing (Available online at: http://www.absconsulting.com/resources/Catastrophe_Reports/izmit-Turkey-1999.pdf)
[5] "Istanbul quake likely by 2030", BBC news, April 27, 2000 (http://news.bbc.co.uk/2/hi/science/nature/727966.stm)
[6] "Event Report: Kocaeli, Turkey Earthquake"

zone has only 3 percent of its city centers.[7] Therefore, improving the level of DRM performance should be a national priority for the earthquake prone Turkey.

Figure 1: Seismic Hazard Map of Turkey



Source: The Ministry of Public Works and Settlement, 1996. The map is taken from the website of the Disaster and Emergency Management Presidency, Office of the Prime Minister (Ankara, Turkey / http://www.deprem.gov.tr/sarbis/Shared/DepremHaritalari.aspx)

Note: The earthquake hazard map shows five levels of risk across the country. While the red areas involve the highest risk (Level 1) the white colored part of country is prone to the lowest risk (Level 5). The pink areas refer to the risk level II, the yellow areas have the risk level III, and the light yellow regions involve the risk level IV.

[7] Bulent Ozmen 2000, *17 Agustos 1999 Izmit Korfezi Depreminin Hasar Durumu- The Damage Condition of the August 17, 1999 Earthquake,* Turkish Earthquake Foundation, Ankara, Turkey
(It is available online at: http://www.deprem.gazi.edu.tr/upload/20071103143847.pdf)

USAID's Disaster Risk Management Benchmarking Tool

The Benchmarking Tool was prepared for the Caribbean Open Trade Support Program (COTS), funded by the United States Agency for International Development.[8] The central objective behind this study was 'to improve the ability of national governments, civil society organizations, and the private sector to proactively plan and implement effective and efficient actions that would reduce their vulnerability to natural disasters and create greater economic resilience when they do occur'.[9] Although the tool was prepared for Caribbean countries in particular, it was designed to be applicable to other countries more broadly. Having aimed at creating a comprehensive, non-technical, and simple-to-implement tool, the Benchmarking Tool is a comprehensive disaster management framework built on the basis of an extensive literature review. Thereafter, it addresses six components of DRM activities: risk identification, risk mitigation, risk transfer, disaster preparedness, emergency response, and recovery. While the first four components are part of the pre-disaster phase, the last two components deal with the post-disaster phase of risk management. In addition, each component is composed of four areas. The four components of the pre-disaster phase are seen in Table 2.

[8] *Disaster Risk Management Benchmarking Tool,* Prepared for USAID Caribbean Open Trade Support Program, 2006
[9] *The Benchmarking Tool*, p.9

Table 2: Pre-Disaster Components of Risk Management[10]

Risk Identification	Risk Mitigation	Risk Transfer	Disaster Preparedness
Hazard assessment	Physical and engineering mitigation works	Insurance and reinsurance of public infrastructure and private assets	Early warning and communication systems
Vulnerability Assessment	Land-use planning and building codes	Financial market instruments	Contingency planning
Risk assessment	Economic incentives for pro-mitigation behavior	Privatization of public services with safety regulation	Networks of emergency responders
Hazard monitoring and forecasting	Education, training and awareness about risks and prevention	Calamity Funds (national or local level)	Shelter facilities and evacuation plans

To assess the DRM status of a country, the Benchmarking Tool creates indexes for each of the six components of DRM. Then, it generates an overall Disaster Risk Management Index (DRMI). To do so, the Tool employs three hundred sixty six (366) assessment questions.[11] For each assessment question, three responses are provided: yes, no, and planned. The answers are then coded as 3, 0, and 1 respectively. After that, a separate index for the six components of DRM is created along with the DRMI-overall index.

Although each component of DRM involves specific assessment questions, one can notice important commonalities across these questions. In this regard, five key issues should be noted: presence/absence of DRM element (hazard maps i.e.), presence/absence of relevant

[10] The table is derived from "Table 1: Key Components of Risk Management", Inter-American Development Bank (2000) – Facing the Challenge of Natural Disasters in Latin America and the Carribean: an IDB Action Plan-, cited in "Disaster Risk Management Benchmarking Tool", USAID, p. 10

[11] The number of questions for each component of DRM is as follow: risk identification (99), risk mitigation (52), risk transfer (38), disaster preparedness (87), emergency response (51), rehabilitation and reconstruction (39). *DRM Benchmarking Tool*, p.12. For the list of assessment questions, see pages 14-30.

policy/legislation, local level involvement/local capacity, education-public awareness, and the level of international support. However, some components of DRM include assessment questions that are related to only a few of these five issues. For example, risk transfer assessment questions do not include anything about international support. Despite these variations across different DRM components, the five issues could be very helpful in providing a short-cut analysis of DRM status of a country. In the next section, the paper will assess the status of Turkey's pre-disaster phase of DRM through a particular focus on these five issues.

Pre-Disaster Risk Management in the post-1999 Turkey

Following the conceptualization of Disaster Risk Management in the Benchmarking Tool, this section will examine Turkey's pre-disaster risk management status by focusing on four components: risk identification, risk management, risk transfer and disaster preparedness. Each component also comes with four elements.

Risk Identification

The risk identification component of DRM involves four elements, namely *hazard assessment, vulnerability assessment, risk assessment, and hazard monitoring and forecasting.* Hazard assessment primarily deals with the preparation of hazard maps for all relevant hazard types. The maps need to be reliable and updated regularly. In addition, it is critically important that people are aware of these maps. At the policy level, whether or not certain legislation exists for the creation of up-to-date hazard maps is also significant. Vulnerability and risk assessment elements are built upon these hazard assessments, but they go further by elaborating on the potential physical, social, and economic implications of identified hazards. Finally, hazard

monitoring and forecasting not only keep hazard assessments up-to-date, but they also augment preparedness measures.

In terms of risk identification, post-1999 Turkey has taken several important steps. The August 17, 1999 earthquake was a major accelerating event in this area. While the seismic hazard map already existed (see figure 1), two important developments after the earthquake have improved Turkey's capacity in the areas of vulnerability and risk assessment. First, the Earthquake Master Plan for Istanbul (EMPI), prepared by Turkey's four leading universities for the Metropolitan Municipality of Istanbul, was a milestone event for the city.[12] The EMPI consists of a seismic assessment, urges rehabilitation of existing buildings on the basis of risk profiles, touches upon education and social issues, and develops a framework for disaster risk management. The Master Plan also calls for a three-part action plan: a (i) contingency plan, (ii) a local action plan, along with (iii) research and activity programs.

The second major development after 1999 in the area of risk assessment has been the creation of the Disaster and Emergency Management Presidency (AFAD) in June 2009. The establishment of AFAD has been quite useful in improving coordination within the DRM field. The AFAD has taken over the function of three institutions that were working in the field before June 2009. Particularly important, the new Presidency has incorporated key components of Disaster Risk Reduction into its institutional structure. It has departments related to earthquake risk management, planning and mitigation, recovery, civil defense and response.[13] Henceforth, its structural configuration had the potential to provide more effective and powerful mechanisms

[12] The full-text of the Master Plan is available at the website of the Istanbul Metropolitan Municipality. (Published in 2003; 569 pages:
http://www.ibb.gov.tr/tr-TR/SubSites/IstanbulVeDeprem/Calismalarimiz/Documents/IBB.IDMP.ENG.pdf)
[13] The English version of the AFAD's website is available at: http://www.afetacil.gov.tr/Ingilizce_Site/index.html

for different components of DRM. The two departments (earthquake, and planning and mitigation) focus on the pre-disaster phase of DRM.

The Disaster and Emergency Management Presidency has three boards for the execution of better DRM practices: the (i) Disaster and Emergency Management Higher Board (minimum two annual meetings), the (ii) Disaster and Emergency Management Coordination Board (minimum four annual meetings), and the (iii) Earthquake Advisory Board (minimum four annual meetings). In the last meeting of the Earthquake Advisory Board (October 25, 2010), the Board decided to finalize workings on the preparation of a 'National Earthquake Strategy' by the end of 2010. In addition, the board meeting reviewed the following DRR related issues: studies for the earthquake database, earthquake hazard maps, earthquake scenarios and risk analyses, education and public awareness, earthquake safe settlement and buildings, as well as legal and financial issues.[14]

In the Benchmarking Tool, assessment questions for risk identification involve issues in five major areas: the absence/presence of hazard maps for all relevant disasters, the existence of policy-legislation, local capacity/involvement, education/public awareness, and support from international actors. Although post-1999 Turkey has realized some important progress as discussed above, it has also failed in several important areas. First of all, though the August 17, 1999 earthquake resulted in the acceleration of risk assessment for earthquakes, Turkey continues to lack hazard maps for floods, landslides and wild fires. Floods are the second most disastrous hazard type in the country, killing 1,235 people, and destroying 61,000 houses in 1308 floods between 1955 and 2002.[15] (See tables 3 and 4 for more information on Turkey's flood statistics.) Despite the fact that floods continue to be one of the country's major disasters, Turkey

[14] The meeting reports (in Turkish) are available at the website of the Earthquake Advisory Board: http://www.deprem.gov.tr/sarbis/DDK/DDK_WEB.htm

[15] The Ministry of Public Works and Settlement

has yet to develop hazard maps for floods. Currently, the Ministry of Public Works and Settlement is working with the General Directorate of State Hydraulic Works and the Ministry of Agriculture and Rural Affairs to prepare a national hazard map for floods.[16] Nevertheless, Turkey remains without hazard maps for the other major hazards facing the population, landslides and wild fires.

Table 3: Major Floods in Turkey[17]

Date	Affected Area	# of Deaths
Sept 11,1957	Ankara	180
June 19, 1990	Trabzon	45
July 13, 1995	Isparta	75
Nov 4, 1995	Izmir	65
May 21, 1998	Zonguldak-Filyos	27
August 7, 1998	Trabzon-Beskoy	60
May 21-25, 1998	Western Black Sea Region	10
July 23, 2002	Rize	40
Oct 31, 2006	Diyarbakir	22
Sept 7, 2009	Istanbul	31
August 27, 2010	Rize	12

Table 4: 1975-2009 Floods[18]

Period	# of Floods	# of Deaths	Economic Damage $ US
1975-79	160	85	57 Million
1980-89	152	63	1.5 billion
1990-99	102	310	2 billion
2000-09	281	176	160 million

[16] "Turkiye'nin Sel Risk Haritasi Cikarilacak- Turkey's flood risk map to be launched", August 1, 2009 - http://www.netgazete.com/News/618653/turkiyenin_sel_riski_haritasi_cikarilacak.aspx

[17] The information is derived from the following sources: Mustafa Altundal, "The Economic Dimension of Floods", The Ministry of Environment and Forestry, March 2010 (http://www.dsi.gov.tr/duyuru/2.UlusalTaskinSemp/PANEL%20SUNULARI/Panel%205.%20Taskinlarin%20Sosyolojik,%20Psikolojik,%20Ekonomik%20Boyutu%20[PDF]/5.4.TASKINLARIN%20EKONOMIK%20BOYUTU%20[M.ALTUNDAL].pdf and Ceylan et al 2007, "Causes and Effects of Flood Hazards In Turkey" http://www.dsi.gov.tr/english/congress2007/chapter_4/105.pdf and EM-DAT, The International Disaster Database (http://www.emdat.be/database).

[18] Source: Mustafa Altundal, "The Economic Dimension of Floods", The Ministry of Environment and Forestry, March 2010 (http://www.dsi.gov.tr/duyuru/2.UlusalTaskinSemp/PANEL%20SUNULARI/Panel%205.%20Taskinlarin%20Sosyolojik,%20Psikolojik,%20Ekonomik%20Boyutu%20[PDF]/5.4.TASKINLARIN%20EKONOMIK%20BOYUTU%20[M.ALTUNDAL].pdf)

At the policy level, Turkey's 1959 Disasters Law (Law No: 7269) focuses on the post-disaster phase of DRM, particularly emergency aid, neglecting efforts that would contribute to risk reduction such as risk assessments. As discussed earlier, the creation of AFAD in 2009 has been an important step at the institutional level, but so far it has not generated hazard maps for non-earthquake hazards. That said, the current draft for the Law of Disaster, Emergency Aid, and Civil Defense incorporates pre-disaster dynamics of DRM with the inclusion of risk assessment, risk mitigation, and disaster preparedness provisions.[19] The draft also has articles concerning the preparation of hazard maps for all relevant hazard types.

The risk assessment component of DRM has also substantial deficiencies at the local level. Neither the AKOM (The Center for Studies on Disaster Preparedness of the Istanbul Metropolitan Municipality[20]) nor the AFAD's directorates in the cities have any capacity for risk assessment. In regard to the public awareness of hazard maps, Turkey fails to a great extent. Given the fact that the country does not have hazard maps (except earthquakes) for all relevant disasters, the lack of knowledge at the public level should not be surprising.

Finally, the role of international actors in Turkey's record on improving its risk assessment capacity has been very limited. Except for the cooperation between the Japan International Cooperation Agency (JICA) and the Istanbul Metropolitan Municipality in the area of earthquakes, Turkey has not received any support from the international DRR community in the preparation of hazard maps.

Overall, the risk assessment component of DRR in post-1999 Turkey needs further improvement at various levels: the preparation of hazard maps for all relevant disasters, the

[19] The full-text of the legislative draft (in Turkish) is available online at: http://www.afetacil.gov.tr/mevzuat/kanun/AFAD%20Kanun%20Tasarisi.pdf (31 pages)
[20] http://www.ibb.gov.tr/sites/akom/Documents/iletisim.html. For English: http://www.ibb.gov.tr/sites/akom/Documents/AKOM_STUDIES_ON_DISASTER_PREPAREDNESS.pdf

enactment and effective implementation of the new Disasters Law, which incorporates the pre-disaster phase of DRR, the enhancement of local capacity in the preparation of hazard maps and hazard monitoring, increasing public knowledge and consciousness about hazard maps, and greater support from the international DRR community.

Risk Mitigation

The Benchmarking Tool divides the risk mitigation component of DRM into four areas: (i) physical and engineering works (ii) land-use planning & building codes (iii) economic incentives for pro-mitigation behavior, and (iv) education, training, and awareness about risks and prevention. Turkey's performance in risk mitigation during the post-1999 period resembles its progress in the realm of risk identification. Despite some important and positive institutional and legislative developments, the country needs to take further steps forward, particularly in the enforcement of building codes and supervision of construction, building retrofitting, the implementation of urban regeneration projects, increasing the role of local governments in this process, and enhancement of top level political commitment to risk mitigation for all hazard types.

As pointed out in the earlier part of this paper, Turkey did have a building code, adapted from the Uniform Building Code in California, well before the devastating 1999 earthquake. However, poor implementation of the 1975 building code resulted in the serious human and economic toll of the 1999 quake. After the earthquake, the Turkish parliament adopted the Law of Construction Supervision (Law No: 4708, July 2001) to ensure the successful implementation of building code. For this purpose, the Law sanctioned private Building Inspection Firms to assess all construction projects and report to local authorities, which regulate the construction

and occupation of buildings.[21] In the beginning, the Law applied to only 19 of Turkey's 81 cities. But, the fact that 70 percent of the country's cities have first and second level risks for earthquakes, it has become essential to apply the Law more broadly.[22] Although the action was taken quite late, Decree 624 (July 2010) has made the Law of Construction Supervision enforceable in all cities.[23]

The massive human and economic toll of the August 17 earthquake has demonstrated that building retrofitting and urban regeneration projects should have priority in the city of Istanbul. The Earthquake Master Plan for Istanbul (2003) and the draft for the new Disasters Law (2010) have noted the significance of urban regeneration projects; however, only a few projects have been realized so far.[24] With regard to building retrofitting, the Turkish government has undertaken a joint project with the World Bank to mitigate seismic risks in Istanbul ('Istanbul Seismic Mitigation and Emergency Preparedness Project'). The project is composed of four components: (i) enhancing emergency preparedness, (ii) seismic risk mitigation for public facilities, (iii) enforcement of building codes, and (iv) project management.[25] In addition, the

[21] Gulcan Uluturk 2006, *Local Administrations and Disaster Risk Management in Turkey*, Unpublished M.S Thesis, Middle East Technical University, Ankara, p.105-6

[22] Ibid, Ozmen 2000, *17 Agustos 1999 Izmit Korfezi Depreminin Hasar Durumu- The Damage Condition of the August 17, 1999 Earthquake*

[23] For the text of the law 4708 and the decree 624 (in Turkish), see the following pages: http://www.yapidenetim.org.tr/mevzuat/kanun/4708_sayili_yapi_denetim_kanunu.php and http://www.alomaliye.com/2010/4708_sayili_yapi_denetimi.htm The decree will be entered force on January 1, 2011.

[24] For example, the Istanbul Metropolitan Municipality launched an urban regeneration project in the district of Zeytinburnu in 2008. The Municipality, which has plans for other projects, has also established a directorate for urban regeneration.
(http://www.ibb.gov.tr/tr-TR/Pages/Haber.aspx?NewsID=15984 and
http://www.ibb.gov.tr/tr-TR/Kurumsal/Birimler/KentselDonusumMd/Pages/AnaSayfa.aspx)

[25] Ibid, *Local Administrations and Disaster Risk Management in Turkey,* p.120-1

European Investment Bank decided to allocate 200 million Euros in October 2010 to help Turkey retrofit public buildings and schools.[26]

The establishment of a new Disasters Presidency (AFAD), along with the Earthquake Advisor Board, is definitely an important development in post-1999 Turkey. Particularly important, the AFAD and the draft for the new Disasters Law have incorporated pre-disaster components of DRM, including risk mitigation, into their operations. Considering that Turkey's old Disasters Law (1959) neglected important aspects of the pre-disaster phase of DRM, the AFAD and the draft law should be considered important steps for risk mitigation.[27] The AFAD has a directorate for risk mitigation issues, while the draft law includes a section for risk mitigation with a focus on hazard maps, urban regeneration, land-use planning, and supervision of construction.[28] Turkey, as a disaster prone country, should have incorporated such pre-disaster components of DRM earlier in order to avoid the serious damages it has suffered from past natural hazards such as the 1999 earthquake.

In addition to physical/engineering works and land-use planning/building codes, the Benchmarking Tool takes note of economic incentives for pro-mitigation behavior, along with education/training/awareness about risks and prevention. With regard to economic incentives for pro-mitigation behavior, post-1999 Turkey has not had any development. However, it has made some progress in the latter element of risk mitigation (education/training i.e.). The newly created AFAD and the ongoing draft of the New Disasters Law include elements to increase public awareness for risk mitigation. In addition, Turkey has received support from the international

[26] "Turkiye'ye 200 Milyon Deprem Fonu- 200 million Euros Funding of Earthquake for Turkey, October 23, 2010, CNNTurk, http://www.cnnturk.com/2010/ekonomi/genel/10/23/turkiyeye.200.milyon.euro.deprem.fonu/594075.0/index.html

[27] 'The Disasters Law' (1959); Law No: 7269. The text in Turkish is available online in the website of the Ministry of Public Works and Settlement: http://www.bayindirlik.gov.tr/turkce/html/kanun12.htm

[28] The Draft Law; section 2, articles 4-9: http://www.afetacil.gov.tr/mevzuat/kanun/AFAD%20Kanun%20Tasarisi.pdf

community. For example, the United Nations Development Program has undertaken a project for disaster prevention in cooperation with the Turkish government and universities[29] aimed at raising local capacity and public awareness of risk mitigation strategies. Moreover, the American Red Cross, the Turkish Red Crescent Society, and Bogazici University have executed a project for non-structural mitigation.[30] This project has attempted to develop a cadre of community instructors across Turkey who will eventually introduce non-structural mitigation programs into schools across the country. Incorporating education about risks and prevention into the school system are of central importance for risk mitigation. Thus, Turkish authorities are now planning to put training for hazards into school curricula. The ongoing study on the 'National Earthquake Strategy', which is being prepared by the Earthquake Advisory Board, will also deal with this issue.[31]

Overall, Turkey has made some progress in implementing the risk mitigation component of DRM in the period following the 1999 earthquake. A new law has been created for the supervision of construction. The current draft of the new Disasters Law has a vision incorporating pre-disaster components of DRM, including risk mitigation. The Istanbul Metropolitan Municipality has launched urban regeneration projects. And, the newly created Disasters Presidency (AFAD) has a directorate for risk mitigation. In spite of these positive steps, Turkey's current DRM profile, particularly its risk mitigation component, has fundamental deficiencies in terms of the enforcement of building codes across the country, building retrofitting, urban regeneration, as well as education/training about risk mitigation.

[29] See; http://www.undp.org/cpr/disred/documents/publications/corporatereport/europe/turkey1.pdf
[30] See; http://www.ifrc.org/Docs/pubs/disasters/resources/about-disasters/cs-turkey.pdf
[31] The Earthquake Advisory Board meeting on June 14, 2010.
(http://www.deprem.gov.tr/sarbis/DDK/DDK_WEB.htm)

Risk Transfer

The Benchmarking Tool focuses on four areas when analyzing the risk transfer component of Disaster Risk Management: the (i) insurance and reinsurance of public infrastructure and private assets, (ii) financial market instruments, (ii) privatization of public services with safety regulation, and (iv) calamity funds (national or local level). Turkey's record shows that it has had some success in the first and last policy areas, while the second and third risk transfer mechanisms are substantially deficient.

Until the August 17, 1999 earthquake, Turkey had a state-led insurance system for natural disasters. The country's 1959 Disasters Law made the state responsible for damages related to natural hazards. After the earthquake, an important change happened in the management of natural hazard insurance. The Turkish government, through Decree No: 587 (December 1999), established the Compulsory Earthquake Insurance system (CEI), eliminating the state obligation to cover disaster losses for residential buildings constructed after September 2000 within the boundaries of municipalities.[32] Public/official buildings, along with residential buildings in rural areas, have remained outside of the CEI, considered an important limitation.[33] To handle the CEI, the Turkish government established a Catastrophe Insurance Pool (TCIP).[34] The TCIP had 2,428.000 policies in 2001, 3,436.000 in 2009, and 3,156.000 in 2010 (as of December).[35] As of 2009, only 27 percent of residential buildings were under the coverage of the TCIP. Particularly notable is the substantial variation across the country in terms of compulsory earthquake insurance. (See the Table 5) Moreover, the CEI system covers only damages due to

[32] Full-text of the Decree 587 (in Turkish) is available online at: http://www.mevzuat.adalet.gov.tr/html/10073.html
[33] Ibid, *Local Administrations and Disaster Risk Management in Turkey,* p.103-5
[34] The website of the Turkish Catastrophe Insruance Pool is available in English at: http://www.tcip.gov.tr/ The following paper by Selamet Yazici who is the Head of TCIP Executive Board is also useful: "The Turkish Catastrophe Insurance Pool (TCIP) and the Compulsory Earthquake Insurance Scheme". (http://info.worldbank.org/etools/docs/library/114715/istanbul03/docs/istanbul03/11yazici3-n[1].pdf)
[35] For information about the TCIP statistics, see: http://www.tcip.gov.tr/istatistik1.html

earthquakes, while leaving out damages caused by other disasters, such as floods, the second most disastrous natural hazard in the country,[36] another significant limitation of the CEI.

Table 5: Earthquake Insurance, Penetration Rates by Regions (2009)

Region	Total Residence	Insured Residence	Penetration Rates %
Aegean / West	2, 045 662	540 124	26.40
Mediterranean / South	1, 663 126	307 607	18.50
Eastern Anatolia / East	597 554	82 064	13.73
Southeast Anatolia /Southeast	757 098	84 462	11.16
Marmara / Northwest	4, 416 073	1, 433 919	32.47
Central Anatolia / Central	2, 227 055	760 514	34.15
Black Sea / Northwest	1, 282 096	227 171	17.72
Turkey TOTAL	**12, 998 664**	**3, 435 861**	**26.45**

Source: Turkish Catastrophe Insurance Pool Compulsory Earthquake Insurance (DASK), Annual Report 2009 (http://www.dask.gov.tr/data/dask2009en.pdf)

As stated earlier, post-1999 Turkey has done nothing related to developing 'financial market instruments' to facilitate risk transfer or to 'privatize public services with safety regulations'. With regard to 'calamity funds', the record has been much better. Under the Office of Prime Minister, Turkey has a national catastrophe fund. However, the country does not have a catastrophe fund at the local level.

Disaster Preparedness

There are four areas in the Benchmarking Tool's assessment of the disaster preparedness component of DRM: (i) early warning and communication systems (ii) contingency planning (iii) networks of emergency responders, and (iv) shelter facilities and evacuation plans. In these areas, Turkey's record is far from satisfactory, and many important steps should be taken immediately to improve this situation.

[36] Ibid, *Local Administrations and Disaster Risk Management in Turkey,* p.160

While the Earthquake Master Plan for Istanbul (2003) notes the significance of establishing earthquake early warning systems to avoid fires, explosions, and other damages during earthquakes, and urgently calls for improving the existing systems (p. 60, 515), Turkey has not realized a considerable level of progress in this area since the 1999 earthquake. Recently, the draft text for the New Disasters Law (2010) makes the Disaster and Emergency Management Presidency responsible for the coordination of efforts to establish early warning systems at the national and local levels.[37] In addition, the Bogazici University Kandilli Observatory Center launched a project in 2010, in cooperation with the German Research Center for Geosciences, to establish an earthquake early warning system.[38] Although these efforts are positive developments, Turkey does not currently have an effective early warning system for earthquakes or other natural hazards.

In regards to 'contingency planning', developing 'networks of emergency responders', and establishing 'shelter facilities and evacuation plans', Turkey's performance has not been much different from its progress in improving its early warning and communication systems. The draft text for the New Disasters Law has several articles about contingency planning for disasters at the district, city, and national levels.[39] Currently, the Disaster and Emergency Management Presidency and municipal governments are responsible for preparing and applying contingency plans,[40] however; there are substantial deficiencies in practice.

[37] Ibid; article 5; http://www.afetacil.gov.tr/mevzuat/kanun/AFAD%20Kanun%20Tasarisi.pdf
[38] "Kablosuz Deprem Erken Uyari Sistemi-Wireless Earthquake Early Warning System": http://www.teknolojide.com/kablosuz-deprem-erken-uyari-sistemi_2805.aspx
[39] Ibid; article 10-15; http://www.afetacil.gov.tr/mevzuat/kanun/AFAD%20Kanun%20Tasarisi.pdf
[40] For the duties of municipalities regarding contingency planning, see Municipalities Law, 5393 (2005); article 53 (http://www.tbmm.gov.tr/kanunlar/k5393.html) and Provincial Special Administrations Law, 5302 (2005); article 69 (http://www.belgenet.com/yasa/k5302.html)

Conclusion

The August 17, 1999 earthquake was the second most devastating seismic activity in Turkey's history in the past hundred years. While causing huge human and economic losses, the earthquake has also resulted in changes in Turkey's Disaster Risk Management. This paper has attempted to examine the status of Turkey's pre-disaster risk management in the post-1999 period with the use of categorization and assessments by the USAID's Disaster Risk Management Benchmarking Tool (DRMBT). Overall, the paper concludes that Turkey has made some important progress in pre-disaster risk management, particularly with the enactment of obligatory earthquake insurance and the stricter supervision of construction. However, many elements of DRM are substantially deficient.

In the past ten years Turkish authorities and the disaster studies community have paid greater attention to Disaster Risk Management policy. The recent draft text for the New Disasters Law reflects the Turkish authorities' eagerness to follow best practices in DRM. For example, Mehmet Ersoy, head of the Disaster and Emergency Management Presidency, emphasized the Presidency's focus on risk management in his press release for World's Disaster Day in October 12, 2010, instead of the conventional focus on emergency aid.[41] The ongoing effort to change the 1959 Disasters Law, which totally neglects the pre-disaster phase of DRM, with a new one, is definitely an important and positive development.

Despite the existence of some positive changes in Turkey's conception and practice of pre-disaster components of DRM after the August 17 earthquake, the country is far away from establishing satisfactory DRM practices. As a result, the possibility of extraordinary human and economic losses due to earthquakes, floods, landslides and wildfires continues to exist.

[41] His statement is available (in Turkish) online at the website of the Disaster Presidency (AFAD) - http://www.afetacil.gov.tr/haber/haber_detay.asp?haberID=107

Particularly notable has been the high amount of attention given to earthquakes by Turkish authorities, while other hazards have been largely ignored. The lack of hazard maps for floods, landslides and wildfires is an obvious reflection of this neglect. Furthermore, institutional and legislative frameworks for DRM remain highly centralized in Turkey, providing local governments with neither the authority nor capacity to affectively manage and reduce risks. This centralization is one of the most significant problems facing comprehensive DRM throughout the country. Finally, Turkey also suffers from substantial deficiencies in education and training about natural hazard risks. The school curriculum does not cover risk mitigation and disaster preparedness. Developing a nation-wide culture focused on disaster risk reduction and preparedness should be an essential part of DRM activities. In this regard, the Turkish authorities and academic community have to allocate more resources for studies on DRM. Improving contact and cooperation with the international DRR community could be very helpful in enhancing Turkey's performance in the DRM field.

To conclude, post-1999 Turkey has taken some positive steps in the realm of Disaster Risk Management; nevertheless, it continues to have deficiencies in several areas. To address these deficiencies, political commitment is critical. While recent efforts to produce a new Disasters Law incorporating pre-disaster risk management components should be highlighted, only its successful enactment and implementation could tell us about the prospects for comprehensive DRM in Turkey's near future.