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# DISASTER RESILIENT URBAN SETTLEMENTS

## 1. INTRODUCTION

### 1.1. Hypothesis and Research Questions

Recently, natural disasters with devastating effects on human settlements have proliferated. In light of this fact, this study aims at searching for the possibility of designing a disaster resilience model for urban settlements. Since urban settlements are habitats of human beings where are densely populated and constructed (infrastructure and buildings), they have high natural disaster risks. Unless the new planning strategies integrated with disaster mitigation approaches are not applied into the urbanization process, urban settlements unfortunately will still have high natural disaster risks. There are some main principles, policies, strategies, and standards to guide disaster prone urban settlements to mitigate disasters. In sum, the following hypothesis is the main determinant of the scope of this study:

**HYPOTHESIS:** As urban settlements are particularly vulnerable to various types of disasters, new strategies and concepts are needed to enhance disaster resilience of urban settlements.

To clarify the above hypothesis, two issues, namely urban settlements and disaster resilience need to be explained shortly. The further explanations about urban settlements and disaster resilience are also available in the following parts and chapters (see also “1.2. Definitions and Concepts” & “4.1. Analysis of Existing Risks in urban Settlements”). The reasons of remarkable disaster vulnerability of urban settlements are (i) high population, (ii) dense construction in terms of super- and infra-structure, (iii) degradation of environmental quality due to their overpopulation and dense construction, (iv) economically and technologically high investments. Thus, urban settlements need to be disaster resilient which implies elasticity and flexibility in coping with the particular challenges of the various natural disasters (Vale, L. J., Campanella, T. J.; 2005).

To serve this hypothesis, the main objectives are synthesizing data from international studies such as project reports from the UN, World Bank, and EU as well as best country examples; determining strengths, weaknesses, opportunities, and threats for urban settlements prone to disasters; transferring lessons learned from the 1999 earthquakes in Turkey; structuring guidelines; and testing the proposed guidebook. The method towards such a disaster-resilience model consists of a theoretical and an empirical part. The theoretical part consists of literature reviews, desktop researches, institutional visits and documents, and project evaluations and lessons learned from various countries and international projects. The empirical part consists of a comparative case study on earthquakes. Although the scope of the study covers all types of natural disasters, it won't be practical to test the disaster-resilience model for each natural disaster case. Based on field experience of the author, earthquakes are chosen as a topic of comparative case study. Yalova as a Turkish city located on the south-eastern coastal part of the Marmara Sea (see also fig. 9) and Cologne as a Germany city lies on the River Rhine in the Federal State of North Rhine-Westphalia (see also fig. 10) are selected for the comparative earthquake

case study. While Yalova experienced a high intensity earthquake in 1999, Cologne has not yet experienced a devastating earthquake despite of its high seismic risk. This difference creates an opportunity to test the proposed disaster-resilience model which is designed based on lessons learned from the 1999 earthquakes in Turkey. The empirical part of the study also constitutes with additional relevant examples from personal experience in the Turkish Government in the field of urban planning and disaster mitigation, tests of the proposed model, and reflections of criticism received from international and scientific platforms.

In order to fulfill both theoretical and practical studies, the following research questions provide guidance:

#### RESEARCH QUESTIONS

- I. How can disaster risks for urban settlements be defined and categorized?
- II. What types of improvement should be proposed to develop disaster resilience of urban settlements (development of a resilience policy, a mitigation plan, an effective controlling process on construction and infrastructure quality, a comprehensive legislation, public awareness...)?
- III. How can general rules be formulated in light of different local conditions for disaster resilient urban settlements?
- IV. Is it possible to derive some principles, guidelines, strategies and standards from a review of international best practices?
- V. Is it possible to test those principles, guidelines, strategies and standards in a (comparative) case study?

#### **1.2. Definitions and Concepts**

Definitions and concepts are important issues because there is not (yet) existing commonly shared established disaster terminology. In this study, since the main concept is resilience, the terminology on disaster, damage, hazard, loss, risk, resilience, recovery, mitigation is studied intensively. The concepts used in this study are more physical than social. Thus the concepts like damage, loss, hazard, risk, resilience, etc. denote physical dimension of settlements.

On the other hand, natural disasters, especially earthquakes are the core of the study. That's why a few concepts such as adaptation and coping capacity are defined according to the natural disaster features.

In order to define the principal terms, a literature survey was carried out. The terminology of the UN, JICA, FEMA, EU, and Turkish literature (including scientific publications and the documents and files of the Ministry of Public Works & Settlement) were scanned. The report prepared by experts of the ARMONIA (=Applied Multi Risk Mapping of Natural Hazards for Impact Assessment) Project funded by the European Community was also be taken into account in

proposing a disaster terminology. Some key definitions related to the study are set out in the Annex III (see also Annex III). However the term “disaster resilience” is analyzed more than other terms due to its significance with respect to the topic of the study.

The concept of disaster resilience has been developed in the 21st century, in lieu of the previous concept of disaster resistance. Unlike the concept of disaster resistance, the concept of disaster resilience emphasizes elasticity and flexibility in coping with the particular challenges of the various natural disasters (Vale, L. J., Campanella, T. J.; 2005). Especially, with regard to the uncertainty of natural disasters, the term of resilience can provide a better guidance to produce effective disaster mitigation approaches in urban settlements. The disaster resilience concept is defined in terms of the adaptation capacity of a settlement system (built up and non-built up environment as well as community of life) potentially exposed to natural hazards with a view to maintaining or restoring an acceptable level of functioning and structure (Greiving et al.,2006). As already mentioned, this study focuses on physical resilience of urban settlements in the case of disasters.

In addition to developing a disaster terminology it is useful to clarify the concept of urban settlement. The definitions of urban settlement are varying country by country and/or institution by institution like disaster terms. Actually, the concept of urban does not denote a certain definition but a process. It is possible to describe this process as a scale proceeding from rural to urban. In this frame, all cities are urban settlements but not all urban settlements are cities. Although the concept of urban settlement differs country by country, it is generally identified in terms of size & function, threshold number of inhabitants, combination of criteria such as population density, political function, and predominant activity of the region (World Resources Institute, 1996-97).

In order to clarify the concept of urban settlements it is useful to review various planning approaches in terms of their criteria to form urban settlements during the urban history (Theory of Spatial Planning-Lecture Notes, 2009). As John Friedmann mentioned, a city is a place with all subjects concerning its functions, namely demographic, social, cultural, economic, technical-technological, physical, and administrative (Faludi, 1973: 212).

On the other hand, a rural settlement is also a place with similar functions such as demographic, social, cultural, economic, technical-technological, physical, and administrative. In this frame, criteria of the aforementioned functions are the key issues to clarify the differences between urban and rural settlements. For instance, in terms of demographic criteria, urban settlements has higher amount of population and density. In terms of social criteria, they have more heterogeneous and modern communities. The more, the urban social life is open to publicity. In terms of economic criteria, they have more economic developments, larger scale markets, various innovations in production, and different type of labour and labour organizations (Campbell & Fainstein, 2003). In terms of physical criteria, urban settlements have larger area

and various types of land-uses which are more controlled with respect to development, conservation, environmental protection as well as urban design values (Faludi, 1973).

After clarifying the concept of urban settlements, it is easier to explain why urban settlements are at the focus of the thesis. Since an urban settlement is a center of denser population, construction, infrastructure, it has a high risk potential for disasters. In other words, urban settlements are more vulnerable settlements than rural settlements.

With respect to vulnerability, the thesis focuses on physical assets of urban settlements rather than social, administrative or psychological issues. That is to say, the disaster resilience of an urban settlement is supported by the model which includes construction, infrastructure, planning standards, and technical services. This approach also satisfies the concept of risk determined in this study for urban settlements prone to natural disasters. According to the definition, risk is a combination of the probability (or frequency) of occurrence of a natural hazard and the extent of the impacts. It is a function of the exposure and potential impacts as perceived by a community or settlement (see also Annex III). Since this study aims at reducing the undesired physical effects of natural disasters on urban settlements, the resilience model is developed on normative aspects such as codes, standards, guiding rules. As also stated in the annual report of “German Advisory Council on Global Change”, when the effects of disasters are undesired, the concept of risk always implies a normative aspect (WBGU, 1998). On the other hand, when generating rules, methods, standards, and techniques to maintain physical resilience of urban settlements, it is difficult to separate the administrative, social, and economic issues from features of the urban physical structure. Thus, the administrative, social, and economic issues will also be evaluated in this study but the core of the study will focus on the physical/constructed part of urban settlements.

### **1.3. Objective and Purposes of the Thesis**

The thesis, on the basis of a review of the pertinent literature is envisaged to ascertain some broad guidelines for disaster mitigation, including standards, criteria, and building codes for disaster-prone urban settlements. These guidelines will be tested in the comparative case study. The guidelines that tested will provide the basis for formulating short-, medium-, and long-term policies and strategies for promoting disaster resilient urban settlements in Turkey, especially in earthquake-prone regions. These strategies and policies will finally be translated into planning principles for disaster resilient urban settlements in Turkey (1999 Marmara Earthquake Region). Then the city which has earthquake risks but not yet experienced a severe earthquake, namely Cologne will be tested by these determined policies, strategies, and criteria. Finally, pathfinder recommendations will be explored for disaster resilient urban settlements in worldwide.

The proposed thesis is envisaged to provide a contribution to disaster mitigation know-how developed under the lead of the EU, the World Bank, UNDP, and JICA. Such a contribution would be particularly useful for Turkey where non-compliance to building codes and negligence in

urban planning have significantly exacerbated the damages caused by (natural) disasters and where continued population agglomerations in some regions with high disaster propensity further increase the threads of future catastrophes.

The aforementioned organizations have played an important role towards improving disaster-prone settlements. They have also carried out projects for enhancing early warning systems, disaster preparedness, and public awareness. However, city planners in Turkey would obtain useful guidance from a synthesis of the lessons learnt in the various activities on disaster-resilient settlements. In this context, the author is benefiting from her involvement in the disaster mitigation of the 1999 earthquakes in Turkey (team leader of relevant World Bank Project, Department Head of newly established D.G. of Emergency Management). The 1999 earthquakes present a milestone in disaster mitigation experience in view of their magnitudes (7.4 / 7.2 Richter Scale) and extensive devastating effects on the densely populated heartland of Turkish industry (JICA, 2004). From the dynamics of disaster mitigation experienced in this case, tentative conclusions can be drawn for disaster mitigation at large.

**1.4. Scope of the Study** Recently, natural disasters with devastating effects on human settlements have proliferated. The top 50 countries of the world are ranked by International Strategy of Disaster Reduction on the basis of their financial losses suffered in the last decade due to natural disasters (see also fig.1). The propensity of disasters is increasing in the light of such trends as increasing rate of population in and around metropolitan areas, degrading environmental quality, global heating. By the year 2000, half the world's population will live in urban areas, crowded into 3% of the earth's surface (Domeisen & Palm, 1996). In addition to the density of population, urban settlements are especially prone to high risks of natural disasters due to the density of construction and accumulation of investments (see further "4.1. Analysis of Existing Risks in Urban Settlements").

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Especially in Turkey, since the 1999 Eastern Marmara Earthquakes, it is understood that urban settlements have higher risks than other settlements such as rural settlements and villages constructed in low density. In the 1999 Eastern Marmara Earthquakes of Turkey, five main cities were affected by the disaster, namely Istanbul, Kocaeli, Sakarya, Düzce, and Yalova. The magnitude of losses was due to high population and construction density in the region. Moreover, many industrial production facilities were located on fault lines. As a result, those cities were faced with some major technological disasters triggered by the earthquake such as the fire in TÜPRAS Gas Refinery and the spilling over of some dangerous and poisonous chemicals from the AKSA textile factory.

Thus, urban settlements are high disaster risk areas not only because they are densely constructed but also due to the vicinity of accident prone plants to residential areas.

Technological disasters may lead to a collapse of infrastructure and main technical services, such as electricity, water, and gas.

Another major difficulty has been experienced in, disaster response activities such as search and rescue, debris clearance, evacuation of people, provision of food and shelter, and provision of security in urban settlements in the course of disasters. Firstly, such activities include time consuming efforts and require an extensive organization of works. Secondly, disaster response activities in urban settlements have led to considerable interruptions and delays in daily routines of the country. Thirdly, they come at considerable financial expenses. For those reasons, it is useful to concentrate on disaster resilient urban settlements with a view of saving human life, economic resources, environmental sustainability as well as socio-cultural and historical assets.

In order to draw the guidelines for disaster resilience, this study starts from the 1999 Eastern Marmara Earthquakes in Turkey as a lesson learned example. As already mentioned, although the scope of the study covers all types of natural disasters, it won't be practical to test the disaster-resilience model for each natural disaster case. Based on field experience of the author, earthquakes are chosen as a theme for the process of the model building. In this process, some principles are derived with the aim of providing guidance for urban settlements on how to be disaster resilient. In the context of resilience, as already mentioned, the proposed model focuses on physical resilience (see also "1.2. Definitions and Concepts"). However, it should be emphasized that the term "resilience" does not covers only a spatial issues but also all other relevant processes affecting spatial development. Such endeavours as construction and infrastructure quality upgrading, proper site development, correct implementation of planning principles are not only related to spatial issues. In order to carry out those endeavours, proper legislation (laws, by-laws, building codes, and related standards) and implementing as well as controlling capacities are required. The study also explain the roles of the key actors, appropriate procedures, roles of stake holders, roles of policy makers, interactive process among all decision makers with a view to the dynamics of urban disaster resilient settlement.

The guidelines derived from the analysis of the 1999 Eastern Marmara Earthquakes in Turkey are compared with accumulated disaster mitigation experiences reported in international literature and project reports of international organizations on selected disasters. As a result of this comparison, it is expected to attain a synthesis of the 1999 Eastern Marmara Earthquake experiences with international experiences towards comparable features.

Since disaster boundaries do not necessarily coincide with political borders (e.g. A disaster occurred in a country can possibly affect several neighbour countries), this study encompasses geographical regions neighbouring Turkey. For instance, in the past several disasters that occurred in Turkey had sequential effects in European countries. In addition, there exist some geographical and geological sources of disaster risks that is common in Turkey and European

countries such as fault lines, mountains, and rivers. For these reasons, a comparative case study between a Turkish city (Yalova) and a European city (Cologne) is included in the study.

### **1.5. Methodology**

As already mentioned in “1.1.Hypothesis and Research Questions”, the method towards a disaster-resilience model consists of a theoretical and an empirical part. The theoretical part consists of literature reviews, desktop research, institutional visits and documents, and project evaluations and lessons learned from various countries and international projects. The empirical part consists of (i) a comparative case study on earthquakes as a basis of testing the proposed model, (ii) additional relevant examples from personal experience in the Turkish Government in the field of urban planning and disaster mitigation, and (iii) reflections of criticism received from international and scientific platforms.

To build a disaster resilience model for urban settlements, an integrated disaster mitigation approach is proposed in view of the multi-dimensional aspects of urban settlements. An integrated disaster mitigation approach does not only focus on urban space but also considers other aspects of urban settlements to maintain physical resilience. While the details of this approach are reflected in the proposed model subsequently, the following main components of this approach are listed below:

- ☒ Policy making process (supranational, international, interregional, national, local),
- ☒ Organizational procedures to address relevant actors/responsible bodies (at international, national, regional, local, citizens levels),
- ☒ Legislation and Control (laws, by-laws, building codes, standards, controlling mechanisms),
- ☒ Scientific research and technological integration,
- ☒ Coordination, organization, networking and harmonization.

The above method is developed in light of best international examples and lessons learned from 1999 earthquakes in Turkey. The relevant experience in Yalova served to further develop the model. As a result of the above studies, some main principles, policies, strategies, and standards are derived to provide guidance in form of a checklist for other disaster prone urban settlements with a view to disaster resilience. To illustrate the applicability of the model, the aforementioned checklist is tested with respect to Cologne. The results of this test provide two opportunities, namely assessing the physical resilience of Cologne to earthquakes and modifying the test according to dynamics of an urban settlement.

## **CHAPTER 2:**

### **2. MAIN DISASTER MITIGATION APPROACHES IN THE WORLD**



In this part it is aimed to draw a disaster mitigation profile upon a review of approaches worldwide. For that purpose disaster mitigation approaches of some countries and some organizations will be surveyed. These countries & organizations will be selected with a view to sampling the most developed legislation and organizational structures. The scope of these samples will be determined within the timing and financial parameters of the thesis.

At the end of this chapter, the comparative analysis of the following selected examples with respect to their disaster mitigation activities is presented in a table (see also table 5). This analysis can provide guidance to design a rough draft of disaster resilience model.

## **2.5. United Nations Organizations**

The following United Nations organizations have issued documents that reflect multi-country experiences on disaster prevention and mitigation: International Strategy for Disaster Reduction(=ISDR), Office for Coordination of Humanitarian Affairs(=OCHA), The Office of the United Nations Disaster Relief Co-ordinator (=UNDRO), United Nations Development Program(=UNDP), The United Nations Disaster Assessment and Coordination (UNDAC) team, International Search and Rescue Advisory Group (=INSARAG), Field Coordination Support Section (FCSS), Virtual Operations Coordination Centre (VOSOCC), UN Volunteers(=UNV), Relief Web,...

Especially for this study, documents and activities of ISDR are helpful. Because “the ISDR aims at building disaster resilient communities by promoting increased awareness of the importance of disaster reduction as an integral component of sustainable development, with the goal of reducing human, social, economic and environmental losses due to natural hazards and related technological and environmental disasters.”

([http://www.unisdr.org/eng/about\\_isdr/isdr-mission-objectives-eng.htm](http://www.unisdr.org/eng/about_isdr/isdr-mission-objectives-eng.htm))

### **International Strategy for Disaster Reduction (=ISDR)**

Actually ISDR is an successor program of the International Decade for Natural Disaster Reduction (=IDNDR). On 11 of December 1987, the General Assembly of the United Nations designed a program to decrease the loss in disasters in the period of 1990-2000. According to the UN assessment at the end of the IDNDR period, there are some achievements especially in facilitating the common efforts of political, scientific, and technological groups on disasters. IDNDR had also efficient publications called “Stop Disasters” that are also useful for disaster researches e.g. many volumes of that periodical were used in this study. (IDNDR:1994) Due to these remarkable success, the United Nations designed a new program after IDNDR as a new body of coordinated action programs which is called International Strategy for Disasters (=ISDR). (ISDR:2007)

As it is mentioned before, ISDR is designed by the UN Assembly as a successor program of IDNDR. It aims disaster reduction by increasing of disaster awareness as an integral part of sustainable

development. ISDR tries to satisfy that aim to build an integral approach of social, economic, and environmental dimension of communities on the basis of disaster resilience. ISDR generated 4 main objectives to achieve that aim as follows:

1. Increase public awareness to understand risk, vulnerability and disaster reduction globally
2. Obtain commitment from public authorities to implement disaster reduction policies and actions
3. Stimulate interdisciplinary and inter-sectoral partnership, including the expansion of risk reduction networks
4. Improve scientific knowledge about disaster reduction

The central office of ISDR is in Geneva/Switzerland and regional units are in Costa Rica and Kenya. ISDR is also focal point in the UN System to coordinate and support all disaster related efforts such as disaster reduction activities, disaster policy integration, disaster awareness campaigns, disaster related publications, and information. ISDR works in a cooperation with the Inter-Agency Task Force on Disaster Reduction (=IATF/DR) and the Inter-Agency Secretariat of the ISDR to achieve efficiency in disaster reduction. (ISDR Mission and Objectives:2007 )

One of the main recent initiatives of ISDR is guiding to establish/support National Platforms for Disaster Risk Reduction. This initiative was organized after the December 2004 Indian Ocean tsunami disaster. Various countries who have national platforms for disaster risk reduction and who have some plan to establish national platforms for that purpose, entrusted the UN/ISDR secretariat to their national data and documents to reorganized as a new reference document. The concept of disaster reduction consists of many fields or denoted various mechanisms such as political and legal issues and frames, public awareness, science and technology, planning and standards, organization & coordination, early warning systems, response mechanisms, and effective disaster preparedness. This concept also denotes multi-stakeholder national mechanisms such as various government sectors, NGOs, academic institutions, private sectors, and the media. The countries which prepared their data and documents according to this main frame are China, France, Germany; Iran; Italy, Japan, Madagascar, Nigeria, Norway, Panama, Peru, Senegal, South Africa, and Uganda.

In the World Conference of Disaster Reduction 2005, 168 governments adopted the Hyogo Framework Action for the period of 2005-2015 to build disaster resilient nations and communities. The main objectives of the Hyogo Framework Action are establishing and strengthening multi-disciplinary national platforms for disaster risk reduction and coordinating the all national platforms via UN/ISDR secretariat to facilitate integrating them in the case of disaster. (International Strategy for Disaster Reduction; 2007)

**The Office of the United Nations Disaster Relief Co-ordinator (=UNDRO):**

The UNDRO has published a seven-volume-study on Disaster Prevention and Mitigation including a methodology for evaluating economic effects of natural disasters. It suggests that economic effects of natural disasters be grouped into three categories:

- ☐ Direct effects on the property and income of the persons, business enterprises and communities affected by the disasters
- ☐ Indirect effects which result from the reduction in family income and the decline in the production of other business enterprises, in a chain reaction
- ☐ Secondary effects which may appear some time after the disaster such as epidemics, inflation, increase in income disparities, isolation of farming areas.

The first group includes the loss and damage to properties such as buildings and equipment. In this context, properties may be related to some main sectors such as agriculture, industry, infrastructure, housing, commerce, and services. These sectors are typically concentrated in urban settlements. Due to such concentration, the vulnerability of urban settlements to natural disasters such as earthquakes, floods, landslides, avalanches, volcanic eruptions, cyclones tend to be higher than in other regions.

The features and dynamics of urban settlements vary according to levels of development and other particularities. Importantly, urban settlements in developing countries tend to be more vulnerable to natural disasters than those in developed countries. This proposition is supported by the following characteristics of conurbations in developing countries:

- ☐ Special difficulties in disaster response and mitigation due to rapid urbanization and population agglomeration
- ☐ Lack of resources for the disaster improvement works while investment programs in other regions run
- ☐ Problem of enforcing building codes and planning standards despite highly populated and rapidly growing conurbations
- ☐ The higher economic loss in urban settlements resulting from local concentration of facilities due to high population

Against this background, UNDRO has developed some proposals on approaches toward improving disaster resilience of disaster prone urban settlements. One of its proposals is to carry out simulation studies with a view to obtaining a better assessment of the vulnerability of urban settlements which are particularly prone to natural disasters. Such studies, it is further proposed, could provide the basis for designing a global prevention policy comprising measures towards

more effective protection of the population and the reflection of disaster resilience objectives in urban planning regulations.

UNDRO furthermore proposed to assess urban settlement policies in light of actual disaster experiences by means of Cost-Benefit Analysis. From the economic point of view cost-benefit analyses at first sight appear as an appropriate tool for such assessment. However cost-benefit analyses depend on various types of direct and indirect costs and benefits of assessed policies and their implementations. Since the planning is a multi-dimensional discipline, multiple criteria should be used to make such assessment meaningful. UNDRO recognizes this difficulty and tries to develop a model towards an integrated planning methodology. It includes analytical steps backwards where results appear to be inadequate. For instance, alternative urban projects are developed for disaster mitigation. If the criteria under one approach do not sustain a desired result towards disaster resilient settlements, it is possible to go back to test an alternative approach to reach that result.

As a result of cost-benefit analyses through integrated planning methodology exercises, it is possible to determine some principles of efficient planning for disaster resilient urban settlements. The main principle to serve this objective is to integrate vulnerability analysis into physical planning policy. An action program to satisfy this main principle may be drawn up into the following stages:

- ☐ To prepare checklists of risk for each type of natural disaster
- ☐ To prepare checklists of risk-relevant urban features (building stocks, open spaces, quality of infrastructure and services, population and immigration statistics)
- ☐ To re-model urban centers to make them safer for each type of natural disaster
- ☐ To synthesize outputs of different re-models
- ☐ To make zoning in light of risk propensity and urban planning constraints
- ☐ To draw effective policies with a view to minimizing the vulnerability of each zone

According to UNDRO such action program is not sufficient for disaster mitigation in the cases of earthquake and cyclones that are effective on a country-wide. For such cases, risk analyses must be carried out at the regional or even national scale planning into account such factors as seismicity indicators on the basis of geological formations and the sites of previous epicenters together with historical records which vary both in scale and type.

UNDRO concludes that in order to be fully effective in disaster mitigation, the analyses should be carefully adapted to the institutional structures and procedures generally used in the planning process and in the prevention of disasters. In the prevention and mitigation of natural disasters,

proper socio-economic studies are inevitable. In this context, effective means of improving the coordination of the activities of responsible authorities (ministries, public bodies, and local communities), research centers and other competent organizations play an important role. (The United Nations Disaster Relief Co-ordinator Office, 1979)

**The UN-SPIDER:**

The UN-SPIDER is a quite new program of the United Nations Office for Outer Space Affairs (UNOOSA). It is an information provider program for space-based information for Disaster Management and Emergency Response. In other words, UN-SPIDER has a larger definition in UNOOSA Website as in the following:

“In its resolution 61/110 of 14 December 2006 the United Nations General Assembly agreed to establish the “United Nations Platform for Space-based Information for Disaster Management and Emergency Response – UN-SPIDER”, as a new programme of the United Nations Office for Outer Space Affairs, to provide universal access to all countries and all relevant international and regional organizations to all types of space-based information and services relevant to disaster management to support the full disaster management cycle by being a gateway to space information for disaster management support, serving as a bridge to connect the disaster management and space communities and being a facilitator of capacity-building and institutional strengthening, in particular for developing countries.” (The United Nations Office for Outer Space Affairs; 2007)

The UN-SPIDER is a voluntary program based on voluntary contribution of member states. So far, voluntary contribution countries are Germany, Switzerland, and China. China has well-established office in Beijing, Germany has in Bonn, and Germany & Switzerland have a liaison office in Geneva. It is likely that voluntary contributions will increase over time (see also Annex I.1 ).

Despite it is newly organized program, UN-SPIDER already organized a workshop to promote the access and use of space-based technologies and solutions for disaster management and emergency response within the relevant communities in 29–31 October 2007 in Bonn/GERMANY. The workshop participants are decision-makers and senior experts of various responsible national and regional institutions for providing disaster management support, capacity building in and promoting the use of space-based technologies; UN SPIDER Regional Support Offices and national focal points; UN agencies and NGOs involved in disaster management mitigation and relief; space agencies; academic and research institutions; geospatial information management and IT companies.

Major topics on the basis of UN-SPIDER objectives to be discussed at the workshop were as follows:

-Identification of relevant space-based information for Disaster Management Support and Emergency Response including on-going and planned initiatives, case studies and best practices, archived data for disaster studies and capacity building opportunities.

-Definition of a Knowledge Portal to ensure that relevant information is easily accessible and disseminated to all interested end-users including the design of an appropriate information database system

-Identification of existing and planned Communities of Practice that contribute to bringing together the space-based technology and disaster management communities

-Discussion and definition of a knowledge management and transfer framework and implementation of specific activities that will contribute to the transfer of knowledge.

-GEOSS Capacity Building Task CB-07-02 - Knowledge Sharing for Improved Disaster Management and Emergency Response

-Harmonisation of the various existing initiatives that are contributing to helping developing countries access and use space-based technologies for disaster management and risk reduction (The United Nations Office for Outer Space Affairs; 2007)

While UN-Spider has still organized meetings, conference, and workshops on disasters, it regularly informed to various interest groups about those activities.

## (جای های لایت)

**GERMANY** Before examining spatial planning system in Germany, it will be useful to review Germany's underlying administrative structure (see also fig.3). This structure sets on five hierarchical level namely, Federation (=Bund), sixteen federal states (=Länder), sub-districts (=Regierungsbezirken), counties (=Kreisen), and municipalities. The federal states have their own state authority and their own legislation. Thus authorities and responsibilities of administrative units vary from one state to another (Greiving et al., Eds. 2006).

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As any other EU Member Country, Germany has spatial planning policies and the legislation initiated from the EU level. Despite the fact that there is no common Spatial Planning Act in the EU level, various frame laws and legislations have lead to member countries in their spatial planning studies, e.g., EU Strategic Environmental Impact Assessment Directive(SEA, 2001/42/EC; European Parliament & European Council, 2001). The more, there are such EU programs leading to spatial policy making issues as "European Inter-regional Cooperation" (=INTERREG IV) and as its subprogram "European Spatial Development Perspective" (=ESDP), "European Spatial Planning Observation Network" (=ESPON). Studies and projects of all these programs have been managed and organized by the Federal Ministry of Transportation, Building and Urban

Development in Germany (The Federal Office for Building and Regional Planning of Germany,2008). Some other EU programs and perspectives have also some indirect effects on designing spatial planning policies of member countries. For instance, spatial planning policies and macro scale decisions in Germany are prepared in the lights of the Lisbon Strategy which aims at supporting inter-regional competitiveness and the European Union Territorial Agenda which aims at building efficient connections among cities and regions (Federal Ministry of Transport, Building and Urban Development of Germany, Eds.2006).

In country level spatial planning issues, in line with the federal state structure of Germany, spatial planning and land-use planning take place at the federal level (Bund), federal state level (Länder), and municipality level (Städte). On the federal level, macro goals and principles are defined and broad procedures are set out by (framework) legislation. On the federal state level, according to the Federal Regional Planning Act (Raumordnungsgesetz) the federal states are responsible for managing land-use policies by the “Regional Plan for the Territory of the State” (Raumordnungsplan fuer das Landesgebiet) and “Regional Plans for parts of the States” (Regionalplan). These plans include many aspects as energy, security, telecommunication networks, protection of nature, transportation, and economic development. On the municipal level, preparation of land-use plans are determined and executed. (Federal Ministry of Economics of Germany Twinning-Project in cooperation with the Turkish Treasury; 2005) In the preparation of land-use plans, the Federal Building Code (Baugesetzbuch) lays down similar objectives, instruments, and procedures for all municipalities. The land-use planning consists of two levels namely, preparatory land-use plan (Flaechennutzungsplan) and detailed land-use plan (Bebauungsplan). The preparatory land-use plan determines the main features of the different types of land-uses for the whole area of the municipality. The detailed land-use plan determines the legally binding designations for small areas as a basis for building permissions (Greiving et al., Eds.2006). The following table provides an overview of the responsibilities of the various planning institutions:

جدول جدول

The Federal Office for Building & Regional Planning has a remarkable function in planning process as it provides technical support and views on issues of spatial planning, urban development, and settlement to the Federal Government and other related authorities. It is a research institution affiliated with the Federal Ministry of Transport, Building & Urban Development. It was founded in 1998 assuming the functions of the previous Federal Public Works Directorate and the Research Institution of Regional Planning. According to the Federal Regional Planning Act, the Federal Office for Building & Regional Planning prepares periodic “Spatial Planning Reports” for submission to the Parliament through the Federal Ministry of Transportation, Building & Urban Development. The reports address spatial planning and development as well as sectoral planning issues in a detailed way. The reports suggest future spatial development trends in light of emerging dynamics. In preparing the reports, the office relies on the data of the Spatial Information System. Thus, the Federal Office plays a significant role in providing coordination and integration in the planning process in Germany. It collects all spatial data, processes, assesses and writes reports, and informs related institution including the Federal Parliament to achieve a consistency of overall central policies and planning policies.

In Germany, the main objectives in spatial planning and spatial planning policies are achieving a balance between advantageous and disadvantageous features of the development, reducing regional disparities, and creating conditions for ensuring equivalent living conditions in all regions. At this respect equivalence and sustainability are two key concepts in spatial planning studies. Equivalence does not mean to create identical living conditions in each settlement but equality of chances and ensuring certain minimum standards with respect to accessibility and availability of public services and other living standards. Sustainable spatial development is a concept also takes place in the Federal Regional Planning Act. It implies that the social and economic demands on space are to be harmonized with its ecological functions. (Federal Ministry of Transport, Building and Urban Development of Germany/Federal Office for Building and Regional Planning of Germany;2006)

The planning process in Germany is furthermore characterized by horizontal and vertical coordination among planning institutions. Vertical coordination refers to the coordination of activities among at different levels of the State (central-federal states-municipal). Horizontal coordination refers to the coordination of activities among authorities at the same level of the State; the concept also extends to the consultation process among public and private stake holders in the planning process. Planning in Germany is moreover governed by the principle of “reverse flow”. This principle implies a decision making process which starts from the bottom and develops to the top. That is to say, a certain decision is generated based on the data of municipalities, developed and controlled in districts, federal states and federation levels. The following table compiles the planning tools used in Germany (Kayikci, 2003):

جدول- 2 صفحہ

After examining the whole planning system starting from the larger scale down to the smaller scale, it is useful to have a short look at the building control system as an integral part of the spatial planning field. The building control system is closely related to land-use planning and a prerequisite of disaster mitigation. The responsible body for construction control in Germany is “The Directorate of High Planning & Building” affiliated to the federate states. The Directorate is responsible for controlling the design, static, and electricity projects; calculations of sound and thermo isolation projects; precautions against earthquakes and fires through control engineers. Control engineers (=Prüfingenieure) and insurance systems are also pillars of the building control system in Germany. On the other hand, building works for private properties are controlled by Building Directorates which are part of district administrations (municipal level). Building Directorates control each construction at three levels namely, project controlling (static, sound and thermo isolation, precautions against earthquakes and fires), implementation project controlling, building controlling. (METU Group of Professors in Fac. of Arch & Civ. Eng.;1999)



After the review of the planning system in Germany, the disaster plans and programs of ad hoc authorities will be examined as an integral part of the planning system. In Germany, the Federal Government has only framework competences in the field of disaster risk assessment and management. In this frame, it provides disaster-related guidance to the Federal States in the exercise of its spatial planning competences. It mostly deals with observations on various planning issues such as demography, urbanization, transport, environment, etc. While the Federal Government deals with questions related to disaster risk assessment and management, it has no framework for disaster hazards and vulnerability analysis.

According to the existing natural disaster profile of Germany, the major sources of disaster hazards can be ranked as winter storms, thunder storms, hail storms, river floods, flash floods, forest fires, avalanches, land slides, and earthquakes. All these natural disasters certainly vary from region to region in Germany. The federal states set their disaster plans and programs as part of their regional plans. The table below provides an overview of the plans and/programs on disaster mitigation (Greiving et al., Eds. 2006):

جدول صفحه 54

As the above table shows, the major and most frequent natural hazards in Germany are river floods and flash floods. Floods are the main natural disasters in Germany. The main risky rivers of Germany are Elbe and Rhine which cross many large cities.

As it was mentioned before, regional and/or spatial planning responsibilities lie with the federal states. The spatial plans of the federal states include many sectors such as energy, water, security, telecommunication networks, protection of nature, transportation, and economic development. Each planning authorities take the responsibility for the planning and implementation of related projects specified with sectoral aspects according to the adhoc sectoral planning act. At the level of the Federal law the "Water Management Act" provides some basic legal framework for flood protection. On the basis of "Water Management Act", the federate states are dealing with flood protection. In addition to the national scale programs and projects there are several international commissions and projects for transboundary rivers such as Rhine, Elbe, Odra, and Danube.

As a secondary level natural hazard, landslides and avalanches usually occur in Germany in the Federal State of Bavaria. While there is no federal legislation on landslides and avalanches, there are some plans and programs prepared by the federal states, notably the Federal State of Bavaria. It is possible to group the plans and programs of the Federal State of Bavaria for landslides and avalanches such as risk assessment and management.

As a mitigation method for forest fires, the forest plans in Germany are implemented at the regional level. While the legal frame for forest management is provided by the Federal Forest

Act, planning authorities aim at developing and protecting the environmental and economic functions of forests through Forest Framework Plans. These Plans focused more on the threat of landslides, avalanches and river floods than on forest fires. The main areas prone to forest fires in Germany are in the north part of the country between Lower Saxony and Brandenburg (near Polish Border). The Federal Agency for Agriculture and Food (Bundesanstalt für Landwirtschaft und Ernährung) prepares forest fire statistics and publishes annual reports. However, all statistics are on the hazard component, not on the vulnerability.

Storms are another type of natural disasters in Germany affecting mostly coastal areas. For many centuries therefore, storms are addressed as a part of coastal protection activities. Areas prone to storms are along the North Sea Coast in Germany. Activities towards disaster mitigation for storms are hence specially found in the federal states of Lower Saxony, Schleswig-Holstein, Mecklenburg-Pomerania, Bremen and Hamburg. The disaster mitigation for storms is directly included in federal state coastal protection legislation and indirectly addressed in the Water Management Act, because coastal protection is a part of the water management. Under German Basic Law, there is a joint responsibility for coastal protection between of the Federation and federal states. While previously the coastal areas in Germany were protected by the Federal State's the Water Management Act and federal states' related legislation, Germany is introduced "Integrated Coastal Zone Management" (ICZM) as a new concept of the European Union. ICZM provides for a coastal protection policy with a view to the multidimensional use and functions of coastal areas. Some federal states recently revised their implementation processes and procedures according to the principles of ICZM. In this context, methods of risk estimation, assessment of hazard potentials, vulnerability analysis, and risk management have been integrated into the coastal protection programs.

Earthquakes are not considered as especially significant disasters in Germany as the earthquake zones map below shows (see also fig.4). Thus the threats of earthquakes are usually not taken into consideration in spatial planning although geological surveys of the 16 federal states provide information about earthquake (seismic) hazards. As for other natural disasters, federal states are in charge of preparing earthquake plans. Some federal states, such as North Rhine-Westphalia and Bavaria, deal with earthquake issues and provide guidance to the municipalities. Institutional awareness on earthquake threat focuses only on building standards and permits.

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There exists a joint agency of the Federation and federal states, called Deutsches Institut für Bautechnik (German Institute for Structural Engineering). The main task of this institute is to define common technical building standards to be intended in the building legislation of the federal states. The institute designed a bundle of technical building standards (DIN 4149) for areas prone to earthquake risks. These standards were updated in 2002 due to EU standardization. As mentioned above under the heading of "European Union", Eurocode 8 (EC 8)

“Design provision for earthquake resistance of structures” was prepared by the European Committee for Standardization (CEN) on behalf of the EU. Since Eurocode 8 provides a frame code rather than detailed bundle of standards, each Member States will prepare its own detailed legislation. Germany as a country less frequently threatened by earthquakes, prepared its own standards with a view to different earthquake risk zones. In the past, two significant earthquake events have occurred in Germany; one in Albstadt (1978) and the other in Roermond (1992) at the German-Dutch border. In those events, buildings were damaged that had failed to comply with DIN 4149.

Recent researches show that some parts of Germany geologically are exposed to earthquake risks. Germany has now been divided into one alert zone (see also fig.4-Zone 0) and three hazard zones (see also fig.4-Zones 1,2,3), based on new probabilistic assessment methods, which lead to a serious extension of the hazard zones. In each hazard zone, special technical standards imposed by municipalities as a condition of obtaining construction permits. These standards vary from zone to zone, e.g., while four-storey-buildings are permitted in Zone 1, only two-storey-buildings are permitted in Zone 3 (Greiving et al., Eds. 2006).

## Conclusion

As already mentioned (see also “1.1. Hypothesis & Research Questions” and “1.3. Objectives & Purposes of the Thesis”) that a city at high seismic risk in Germany (Cologne) is chosen for comparative case study in the thesis, it is useful to examine the spatial planning and building system of Germany as a framework of disaster mitigation. It is easily understood that the planning system is effectively structured in Germany through to vertical and horizontal organization and coordination. Especially, the method for coordination between spatial planning policy and overall federal policies is noteworthy (This coordination is supported by the Federal Office for Public Works & Regional Planning through periodic “Spatial Planning Reports” to the Federal Parliament.). In Turkey, there is still a big gap between technical policies and General Government policies. Due to this gap, there are many shortcomings in the implementation of spatial planning and disaster legislation.

Since the effectiveness and efficiency in planning and building system can be assumed as a prerequisite step of disaster mitigation, Germany is rather well organized for disaster mitigation with respect to spatial planning standards and building codes. Nevertheless, the whole spatial planning and building process and procedures should be updated in the light of new disaster mitigation policies.

While the German disaster mitigation system appears to be well structured, various weaknesses should be noted with a view to future disaster threats. According to existing studies and programs for all expected types of disasters in Germany, it is clearly understood that most of the efforts of the central and local authorities focus on disaster prevention and response. The

planning standards, building codes, and existing insurance system are put into the core of disaster mitigation. Furthermore, the existing legislation and standards were developed in light of former disaster experiences. Most of the institutional capacities and scientific studies concentrate on floods because of the high frequency of flood events in Germany. However, new disaster trends are emerging. For instance, the earthquake risks in the beginning of 20th century and present earthquake risks in Germany are not same. Hence, Germany needs newly developed, multidimensional tools in the legislation and implementation process to build especially disaster resilient urban settlements. The existing legislation and implementation process needs to be updated under changing environmental conditions and various threats of disasters such as recent effects of climatic changes and some high risk disasters like earthquakes. By taking into account this issue, the Federal Government of Germany adopted a new strategy on 17.12.2008. The new strategy, namely "The German Adaptation Strategy" provides a framework of adaptation to impacts of climate change. It has an integral approach on risk assessment and mitigation activities with a view to sustainable development of Germany (The German Adaptation Strategy; 2008).

It will now be beneficial to develop further strategies with regard to other types of disasters like earthquakes. In this context, it must be noted that new risks may well activate old disaster potentials. For instance, earthquakes have a quite big potential to trigger floods in Germany. **The newly developed strategies and multidimensional tools advocated in this study should be reflected in regional and local level implementation plans.**

## **UNITED KINGDOM (UK)**

In the United Kingdom, local authorities are the authorities who are primarily responsible for disaster response. However, the central government has some responsibilities as may be required. For instance, local authorities can ask for the help of the central government in some special cases like nuclear accidents or satellite accidents. There are also Regional Emergency Committees to support the local authorities.

In emergency cases, a principal responsible unit is determined for disaster response and coordination of different institutions. During the improvement and recovery period, responsibilities are assumed by different institutions. (METU Group of Professors in Fac. of Arch & Civ. Eng.; 1999)

Floods and landslides mainly determine the natural disaster profile of the United Kingdom. Accordingly the UK's spatial planning policy concentrates on floods and landslides. Nevertheless, there are some monitoring studies on other type of natural disasters such as earthquakes.

The planning system of the United Kingdom (UK) consists of two levels, namely regional planning strategies for each English regions and local development frameworks. The English regions

denote that England, Northern Ireland, Scotland, and Wales as they take place in the United Kingdom Parliament. The Regional Spatial Strategies for each English region provide guidance to the development plan and carry the weight of laws. The policies in a development plan must be in conformity with the Regional Spatial Strategies. The planning permits for all proposed developments are issued by local authorities. Within the overall planning system in the UK there are some variances region by region.

In the UK, a few authorities at both central and local levels deal with floods. The Environment Agency is responsible for flood warnings and flood management. Also, Drainage Boards and local authorities are active in flood management and prevention. Several institutions are involved in the flood emergency response process such as the police, local authorities, and emergency services. In the wake of climatic change, an increasing amount of rainfall causes floods and coastal degradations. In response, the Environment Agency recently became involved in floods and coastal erosion; and developed an integrated management framework with long term plans. This new integrated management framework is linked to spatial plans and planning policies which vary region by region in the UK.

There is no established planning policy guidance with respect to landslides which are another major natural disaster in UK. The efficient planning policy guidance called PPG14 and land-use plans apply to England and Wales. PPG14 assesses landslides with a wider perspective in conjunction with various events such as land instability arising from past mining or from coastal erosion, unstable slopes, and other type of landslides. While local authorities often adopt their own local strategies to deal with landslides, the Environment Agency and maritime local authorities cooperate in the Shoreline Management Plan preparation process.

As already noted, the UK primarily focuses on the disaster management of floods. In order to maintain efficient disaster management on floods, the responsible authorities try to improve existing approaches especially by taking into consideration the implications of future climate change. Rivers and coastal areas are evaluated in an integrated risk management framework with a view to the threat of heavy rainfalls causing floods and coastal degradation. Thus, existing Shoreline Management Plans and Catchment Flood Management Plans are upgraded from engineering documents to spatial documents including social, economic, and environmental considerations. The recent efforts of the UK with respect to floods are parallel to similar approaches in the EU. Especially the “Integrated Coastal Zone Management” and “Flood Risk Assessment and Management” approaches of the EU provide planning authorities with more detailed, long-term risk assessment techniques and policy frameworks than previously (Greiving et al., 2006).

## **FRANCE**

Since her territory covers various types of geographical regions (coastal areas, big rivers, big mountain systems), France is prone to most of the existing natural hazards, notably floods, windstorms, droughts, avalanches and other slides, forest fires, earthquakes and volcanoes. In France, the Directorate of Civil Defense under the Ministry of Interior is responsible for disaster management and response. The Directorate of Civil Defense carries out two main plans, namely general aid and emergency aid. The Directorate operates in 9 regions of the country. In each region, there is a vertical organizational structure from the regional level to village level. In addition, all ministries have some responsibilities for disaster mitigation and risk mitigation. (METU Group of Professors in Fac. of Arch & Civ. Eng.; 1999)

The major natural disasters in France are river floods and winter storms according to data covering the period 1909-2005. Land slides, wild fires, and extreme temperatures come after those two major natural disasters in the natural disaster profile of France. France has a quite systematic approach in dealing with natural hazards responsive to interrelations among natural hazards with respect to risk assessment, risk management, and planning.

Because of the increasing number of natural hazards since 1970s, the Government of France in 1982 developed a prevention system for natural hazards. The government also adopted a ten-year programme for the prevention of major natural risks in response to many serious flood events in the early 1990s. (Programme décennal de prévention des risques naturels majeurs of 24 January 1994). This programme consists of cartography, risk prevention and development control in areas prone to flood risk.

France has quite a long experience in preparing risk and hazard maps, as well as in managing natural disaster risks. All risk information plans and disaster mitigation approaches are developed in the central level while risk prevention plans are prepared at the local levels. Natural risk prevention plans include risk zoning regulations which in term include compensation rules. Natural risk prevention plans provide detailed information about the area at risk and relevant building authorizations. Natural risk prevention plans exist only for some natural disasters, namely river floods, landslides, avalanches, forest fires, earthquakes, and volcanic eruptions.

The French Government has published a general guidebook and specialized handbooks on flood risks, seismic risks, forest fire risks, and coastal risks for developing risk prevention plans. There are also informative hazard zoning approaches at the central level for each type of natural hazards. In consonance with the hierarchical structure of the French administration, regional information about major risks is under the responsibility of governors while local information and technical mapping are under the responsibility of municipalities.

France has recorded success in coordinating natural disaster mitigation and planning activities. For example, the integration of risk prevention plans into the local plans is a significant achievement in linking risk management with spatial development. Another successful feature of

the French disaster mitigation system is the hierarchical process in developing pertinent policies from the central government (ministries) to local authorities such as governorates and municipalities. There are possibly some weaknesses and/or problems in disaster mitigation system in France such as conflicts between policy makers at different levels. Nevertheless, the French disaster mitigation system can be evaluated as well structured, especially owing to its integration into the spatial planning system (Greiving et al., 2006).

#### **2.4. Japan**

The organization and coordination for natural disasters are established by the “Basic Law of Disaster Prevention” of 1961 as amended 1997. The Law prescribes disaster responsibilities, management of disaster preparedness, emergency response, and recovery activities, establishment of a comprehensive and objective administrative system for disaster management process, and declaration of state of emergency (International Emergency Management Symposium, 2002).

According to that law, there are two types of organizations, i.e., a permanent organization and an ad hoc organization. The disaster coordination authority in Japan is the National Land Agency; it belongs to the Office of the Prime Minister like its Turkish counterpart (General Directorate of Emergency Management of Turkey). In the permanent organization, there is an emergency center called “Headquarter for Major Disaster Control and Emergency Disaster Control”. This headquarter is managed by the Prime Minister in the case of large scale disasters. In the case of smaller scale disasters, it is managed by the State Minister in charge of the National Land Agency Works. The ad hoc organization operates at three levels, namely national, provincial, and municipal (METU Group of Professors in Fac. of Arch & Civ. Eng.,1999).

In the frame of disaster management, efficient emergency operations and recovery activities are organized according to the Basic Plan for Disaster Management based on the Basic Law of Disaster Prevention. The Basic Plan for Disaster Management is prepared in national level conducted by the Prime Minister. The plan presents the main governmental policy on disaster management, the organization and program of the national disaster management system, methods serves fast and efficient ways in recovery and reconstruction activities, the support of scientific and technological researches. The plan is updated after significant disasters.

The National Land Agency plays a significant role in the context of integration of land use plans and disaster mitigation issues. The National Land Agency prepares the national land use plans as a part of National Development Plans. In the process of land use plan preparations, the Office of Earthquakes belongs to the National Land Agency reflects its recommendations and precautions in the respect of earthquake loss mitigation (The Turkish Ministry of Public Works & Settlement, 2006).

To pay attention in coordination in disaster management, Japanese central and local institutions yearly come together to make comprehensive disaster management training. For that purpose 1st of September is designated as “Disaster Prevention Day” in Japan (International Emergency Management Symposium, 2002).

The disaster management system in Japan has also close contact with UN International Strategy for Disaster Reduction (see also “2.1.United Nations Organizations”). The International Disaster Reduction Liaison Council is established by the participation of heads of related departments from various ministries and institutions.

The Japan International Cooperation Agency (=JICA) also has responsibilities in the field of disasters. JICA focuses on advancing international cooperation through the sharing of knowledge and experience. In this context, JICA has prepared many reports and studies; and it has carried out many projects and training programs related to disasters. In fact, JICA was founded to provide technical cooperation to developing countries in 1954. While in the beginning, the scope of JICA’s programs is technical cooperation, development of investments and financing, emigration service, and training of personnel, JICA expanded its programs such as “Promotion of Implementing Grant Aid Project”, “Youth Invitation”, and “Disaster Relief” (Overview of JICA, 2008). Due to the fact that Japan and Turkey are two earthquake prone countries, JICA provided assistance to Turkey in strengthening disaster prevention system and disaster recovery activities. The Government of Japan established JICA Turkey Office in June 1995 with a view to enable more appropriate response to emerging assistance needs in the country. JICA Turkey Office also focuses on ongoing activities and projects, monitoring and evaluation of the activities and strengthening further cooperation between two countries (JICA, 2004).

## **2.5. International Seminars & Conventions**

It is also useful to examine the disaster-related seminars and conventions such as Hyogo Framework for Action 2005-2015, the Yokohama Strategy, the Stability Pact, etc. Every year many seminars are held in the field of disasters, offering remarkable scientific presentations and papers. Thus, outcomes of those international seminars and conventions provide an opportunity to understand the degree of disaster resilience of human settlements.

## **THE YOKOHAMA STRATEGY & PLAN OF ACTION**

The Yokohama Strategy is one of the significant UN initiatives in prevention, preparedness, and mitigation of natural disasters at the international level. The member states of the United Nations and other states met in the World Conference on Natural Disaster Reduction in Yokohama/JAPAN from 23 to 27 May 1994. In this global conference, the profile of participants varied from central government authorities to NGOs, international organizations, scientific communities, business, industry, and media group. The main objective of the conference was expressing global concern and attention on devastating effects of natural disasters on human life



and environment. On this basis, the Yokohama Strategy and Plan of Action was adopted. All participants of the conference agreed on the following topics:

-Devastating effects of natural disasters on human lives and countries' economies have been increasing.

-All nations should incorporate disaster prevention, preparedness, mitigation, and response activities to ensure sustainable development policies.

-Since natural disasters are not limited by political borders, all countries should act in a spirit of partnership to build a safer world, and enhance various regional & international cooperation in disasters.

-The optimum provision of information, knowledge, and technology is necessary to reduce the effects of natural disasters.

-Community involvement and their active participation in disaster phases (preparedness, prevention, mitigation, and response) should be encouraged.

-The Yokohama Strategy for a Safer World should be perceived as a call to action by all participant countries. While each country has strengthened its natural disaster coping capacity, developing sub-regional, regional, and international cooperation, and paying primary attention to developing countries, least developing countries, land-locked countries, and small island developing countries.

On the basis of common topics, the participants drew a series of principles, strategies, and a plan of action. The principles were adopted on the following concepts:

-Importance of risk assessment

-Primary intention on disaster prevention and preparedness

-Integration of disaster mitigation approaches into development policies

-Development of disaster coping capacity and support follow-up activities

-Strengthening of early warning systems and mechanisms provided by telecommunications measures as key factors to successful disaster prevention and preparedness

-Supporting multi-level participation in disaster studies from the local community to the international level

-Reducing the vulnerability by enhancing public awareness and community training

-Building technological cooperation among the international communities to prevent, reduce, and mitigate natural disasters

-Considering environmental protection as a component of sustainable development in the prevention and mitigation of natural disasters

-Prior intention on developing and least developed countries

By taking the principles above into consideration, the Yokohama Strategy was stipulated as follows:

-In order to reduce devastating effects of natural disasters, countries should strengthen the traditional disaster mitigation methods and explore new ways to live with such risks.

-Vulnerable groups should receive primary attention. In this context, developing countries, least developed countries, small island developing countries, and land-locked countries are the most vulnerable countries. The poor and socially disadvantaged groups in all countries are other vulnerable groups.

-The primary aim in effective disaster management is to reduce casualties and physical losses.

-The efforts and capacities should be directed more on disaster prevention and mitigation than response.

In the light of principles and strategies above, the Conference adopted a plan of action for the future comprising series of actions at the community and national levels, sub-regional and regional levels, and the international level. At the community and national levels, all countries agreed up on enhancing national capacities to review related legislation, policy decisions, participation programs for various levels; to mobilize domestic resources (money, equipment, human resources, information, knowledge, technology,...); to develop infrastructure and services; and to strengthen national committees for the promotion and the coordination of the disaster reduction activities. At the regional and sub-regional; and regional levels, the countries decided to build sub-regional and regional centers for disaster reduction; to design common training programs, technical information exchange systems, and early warning mechanisms; to establish joint projects & mutual assistance agreements; and to give importance of vulnerable groups (countries and communities). At the international level, the countries agreed to set up a disaster fund supported by voluntary contribution from governments, international organizations, private sectors, etc. In addition to this financial initiative, they all agreed to organize various development projects financed by multilateral financial institutions, to promote all regional and sub-regional level activities to the international level, and to hold of a review conference on natural disaster reduction at the end of the decade in order to draw a new strategy for natural disasters in the course of 21st century.

At the end of the conference, all outcomes of the conference and reports prepared by participants were all organized by the Secretariat of United Nations. In the case of necessity, national committees, non-governmental organizations, scientific and technical associations, private sectors, etc. could easily reach those outcomes to implement in their further plans. That type of approach can provide an opportunity to design effective disaster mitigation approaches in the future. (Yokohama Strategy and Plan of Action for a Safer World; 2007)

## **THE EUR-OPA MAJOR HAZARDS AGREEMENT**

As another international initiative, the “EUR-OPA Major Hazards Agreement” established an intergovernmental platform for co-operation on prevention and mitigation of major natural and technological disasters among Eastern European, Western European, and Southern countries. This agreement encompasses myriad aspects of natural and technological disasters such as knowledge generation, prevention, risk management, post-crisis analysis and rehabilitation. (The Eur-opa Major Hazards Agreement, 2007)

In 1987, the Committee of Ministers of the Council of Europe opened for signature the EUR-OPA Major Hazards Agreement. It was also called “Open Partial Agreement” because Non-Member States of the Council of Europe were invited to accede in addition to Member States. To date, the Agreement has 25 Member States namely, Albania, Algeria, Armenia, Azerbaijan, Belgium, Bulgaria, Cyprus, Croatia, France, Georgia, Greece, Lebanon, Luxembourg, Malta, Moldova, Monaco, Morocco, Portugal, San Marino, Romania, Russia, Spain, “the Republic of Macedonia”, Turkey, Ukraine.

In addition to states, European Commission, UNESCO, The World Health Organisation (WHO), the International Strategy for Disaster Reduction (ISDR) of the United Nations, the Office for Co-ordination of Humanitarian Affairs of the United Nations (OCHA) and the United Nations Institute for Training and Research (UNITAR) cooperate in the implementation of the Agreement.

The Agreement provides a framework for co-operation of Member States and participating organizations in a multidisciplinary context with a view to empowering risk management with respect to major natural and technological disasters. The EUR-OPA Major Hazards Agreement acknowledged two following facts:

- o Societies are increasingly vulnerable to natural and other related technological and environmental hazards, whose impact is made more acute by the consequences of demographic, economic and social changes including urbanization and development processes
- o Disaster reduction is one central element of sustainable development and the associated integrated disaster risk management is a primary responsibility of governments

In the frame of the Agreement, significant European programmes have been launched since 1987 through a network of 26 specialized European Centers, especially in research, training, and dissemination of information and expertise related to disaster management. The network comprises the following centers:

- CRSTRA - Euro-Mediterranean Center on research in arid zones (Biskra, Algeria)
- ECTR - European Interregional Educational Centre for Training Rescuers (Yerevan, Armenia)
- ECMHT - European Centre on Training and Information of Local and Regional Authorities and Population in the Field of Natural and Technological Disasters (Baku, Azerbaijan)

- ISPU - Higher Institute of Emergency Planning (Florival, Belgium)
- ECRP - European Centre for Risk Prevention (Sofia, Bulgaria)
- BE-SAFE-NET - European Centre for Disaster awareness with the use of the Internet (Nicosia, Cyprus.)
- EMSC - European Mediterranean Seismological Centre (Bruyères-le-Châtel, France)
- EMORIM – Euro-Mediterranean Observatory on Risk Management (Montpellier, France)
- CERG - European Centre for Seismic and Geomorphological Hazards (Strasbourg, France)
- CETICA - Euro-Mediterranean Centre for Technologies of information and Communications Applied to Risk Management (Draguignan, France)
  
- EMORIM – Euro-Mediterranean Observatory on Risk Management (Montpellier, France)
- GHHD - European Centre on Geodynamical Risks of High Dams (Tbilisi, Georgia)
  
- ECPFE - European Centre on Prevention and Forecasting of Earthquakes (Athènes, Greece)
- ECFF - European Centre on Forest Fires (Athens, Greece)
- CUEBC - European University for the Cultural Heritage (Ravello, Italy)
- ECGS - European Centre for Geodynamics and Seismology (Walferdange, Luxemburg)
- ICoD - Euro-Mediterranean Centre on Insular Coastal Dynamics (Valletta, Malta)
- ECILS - European Centre on the Vulnerability of Industrial and Lifeline Systems (Skopje, Former Yugoslav Republic of Macedonia)
- ECMNR - European Centre for Mitigation of Natural Risks (Kishinev, Moldova)
- CEPRIS - Euro-Mediterranean Centre for Evaluation and Prevention of Seismic Risk (Rabat, Morocco)
- CERU - European Centre on Urban Risk (Lisbon, Portugal)
- ECBR - European Centre for Rehabilitation of Buildings (Bucharest, Romania)
- ECNTRM - European Centre of New Technologies for the Management of Natural and Technological Major Hazards (Moscow, Russian Federation)
  
- CEMEC - European Centre for Disaster Medicine (San Marino)
- CEISE - Centro Europeo de Investigación Social de Situaciones de Emergencia (Madrid, Spain)
- TESEC - European Centre of Technological Safety (Kiev, Ukraine)

- **AFEM - European Natural Disasters Training Centre (Ankara, Turkey)**

As noted before EUR-OPA Major Hazards Agreement provides an elaborate framework for regional co-operation among northern and southern Mediterranean countries and South Eastern Europe by furthering inter-sectoral and multidisciplinary cooperation by active institutions in regional/spatial planning, environmental and civil protection by offering platform for multinational and trans-frontier co-operation on prevention, protection and awareness-raising policies, and by fostering the coordination of initiatives between member countries.

The signatory countries of the EUR-OPA Major Hazards Agreement are guided by objectives and strategies set out in the United Nations International Strategy for Disaster Reduction. With parallel to the ISDR principles, the EUR-OPA Major Hazards Agreement has some plans in making expertise as well as training and research capacities of the 26 Euro-Mediterranean Centers to the

international community in particular with a view to supporting initiatives for assistance to Asia. (DRAGONI, 2005) Besides, in co-operation with the relevant EUR-OPA Major Hazards Agreement Centre from the region, took the initiative to organize the adequate working groups in the Caucasus region (Regional Co-operation in the Field of Risk Mitigation and Emergency Management, 2004).

After 26th of December 2004, a tsunami of unprecedented violence hit the coastlines of fifteen South-East Asian countries by an earthquake of extraordinary magnitude; the EUR-OPA Major Hazards Agreement has paid much attention on the importance of earthquake and tsunami hazards and early warning systems. Especially, the EUR-OPA Major Hazards Agreement has set up a number of centers specializing in this field. The 2004 catastrophe highlights the urgency of the objectives pursued by the Agreement that is to define a new framework for hazard management on an unprecedented scale. Thus the EUR-OPA Major Hazards Agreement developed a plan to focus on two themes, namely “risk prevention and management” and “contribution of the EUR-OPA Major Hazards Agreement”.

The “sectoral policy” on disaster prevention must be closely coordinated with the Commission of the European Union, especially the latter’s “ECHO-DIPECHO” disaster preparedness program and other pertinent programs notably those of the European Commission’s. More systematic interaction of the Agreement’s European centers and international institutions should be sought in such fields as public information and education, legislation and decision-making assistance.

The expertise accumulated by all the Agreement’s European centers might be pooled for that purpose. (Le Clei, 2005) So far, the EUR-OPA Major Hazards Agreement has also organized various meeting, workshops, and ministerial meetings to enhance regional co-operation in the field of risk mitigation and risk management. (AFEM; 2006)

### **NORTH ATLANTIC TREATY ORGANIZATION (=NATO)**

The North Atlantic Treaty Organization (=NATO) is an alliance of 26 countries from North America and Europe committed to safeguard the freedom and security, common values of democracy of themselves. The organization was found by signing the North Atlantic Treaty on 4 April 1949. In addition to its major peacekeeping activities, NATO has been dealing with civil emergency planning (=CEP) in disaster relief. While the member states have been dealing with the preparation of civil emergency planning and disaster relief in national level, NATO CEP has been assisting nations in planning and preparing and to facilitate effective international response in cases where a given nation is not able to handle a disaster by itself. The coordination of these efforts is managed by the Euro-Atlantic Disaster Response Coordination Center (=EADRCC). (NATO Activities; 2007)

Since 1950s, NATO has been involved with coordinating assistance in response to disasters when a major disaster strikes in a member or partner country. In 1998, it established the Euro-Atlantic Disaster Relief Coordination Centre (EADRCC) to coordinate the responses of NATO member and partner countries to disasters occurring in the Euro-Atlantic region. The EADRCC serves as a focal point for information-sharing, ensuring that all respondents had accurate and timely overviews of the events. The centre, which is located at NATO Headquarter in Brussels, is operational 24 hours, ready to respond quickly when needed.

The Euro-Atlantic Disaster Relief Unit (EADRU) is another organ of NATO. It is comprised of multinational mix of national civil and military assets and resources such as qualified, search and rescue personnel, medical supplies and equipment, strategic airlift capabilities, temporary housing, and water sanitation equipment that countries are prepared to make available at short notice in the case of a disaster's strike. That is to say it is a non-standing unit. The composition and size of this multinational unit is determined by the requirements of disasters.

According to NATO principles, when a NATO country is stricken by a major natural or man-made disaster, the assistance provided by other countries should comply with the requirements of a disaster stricken country. The assistance should also be delivered as quick as possible to the area designated by the disaster stricken country. The procedures of EADRU are organized into 5 phases namely, Preparedness Phase, Emergency Phase, Deployment, Withdrawal, After Withdrawal. (EADRCC; 2008)

## **STABILITY PACT**

Despite the mission of the Stability Pact is long-term conflict prevention strategy in the South Eastern Europe, it has also an initiative for disaster preparedness and prevention. The Stability Pact is an EU initiative which was adopted on 10 June 1999 in Cologne/GERMANY. The Stability Pact aims to foster peace, democracy, respect for human rights, and economic prosperity in order to achieve stability in the South Eastern Europe. In the summit meeting in Sarajevo on 30 July 1999, the Pact was reaffirmed by more than 40 countries and organizations. The Stability Pact partners are:

-The Countries in the Region: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Moldova, Montenegro, Romania, Serbia, and Republic of Macedonia

-The European Union Member States and the European Commission

-Other Countries: Canada, Japan, Norway, Russia, Switzerland, Turkey, USA

-International Organizations: United Nations(=UN), Organization for Security and Co-operation in Europe(=OSCE), Council of Europe, United Nations Commission on Human Rights (=UNCHR), North Atlantic Treaty Organization(=NATO), Organization for Economic Co-operation and Development(=OECD)

-International Financial Institutions: World Bank, International Monetary Fund(=IMF), European Bank for Reconstruction and Development(=EBRD), European Investment Bank(=EIB), Council of Europe Development Bank(=CEB)

-Regional Initiatives: Black Sea Economic Cooperation(=BSEC), Central European Initiative(=CEI), South East European Co-operative Initiative (=SECI), and South East Europe Co-operation Process(=SEECOP)

(About the Stability Pact; 2007)

On the March 16, 2000, the Stability Pact has an attempt for disaster preparedness and prevention initiative for South Eastern Europe, in Brussels/BELGIUM. The objective of this initiative was to join the international and local efforts in disasters (natural & man-made) to encourage the full participation and mutual support of all regional countries. The initiative also brings together donor countries and international governmental and non-governmental organizations to coordinate ongoing and future activities in order to improve the efficiency of national disaster management systems within the regional cooperation framework. The structure of DPPI constitutes the decision making and governing body which defines goals and objectives for DPPI SEE activities, based on actual needs and potentials and in line with the overall policy of the Stability Pact for South Eastern Europe. The DPPI SEE Secretariat consists of Head of the Secretariat and Administration/Finance Assistant and function as the administrative and supporting structure to the DPPI SEE Regional Meeting. The DPPI SEE Secretariat enhances regional cooperation by being the guardian of responsible for monitoring and implementation of the decisions reached by the DPPI SEE Regional Meeting. The 13 member countries meet bi-annually in Disaster Preparedness and Prevention Initiative for South Eastern Europe (=DPPI SEE) Regional Meetings hosted by one regional country.

The first operational step of DPPI was organizing an operational team which led an assessment of the needs and capacities related to the disaster preparedness of 12 countries in the region. The operational team was constituted by the participation of experts from Bulgaria, Croatia, Italy, Sweden, Turkey, USA, the International Federation of Red Cross and Red Crescent Societies(=IFRC), NATO, and the United Nations Development Programme(=UNDP). The team assessed disaster preparedness and prevention necessities and capabilities; examined natural and technological disaster risks; studied on existing disaster management and preparedness plans; and identified ongoing emergency response projects and coordination procedures. At the end of the area visits and the study, the operational team prepared a "The Regional Report" that was discussed at the Geneva Workshop on 16-17 June 2001(Regional Report of the DPPI Operational Team; 2001). On the following workshop of DPPI in Banja Luka, from 10-12 October 2001, regional countries brought several project proposals on disasters. Follow-up and prioritization of the projects was done on DPPI working meeting in Budapest/HUNGARY, from 11-13 March 2002. On 5 June 2002, the Declaration on Cooperation in Disaster Preparedness and

Prevention in South Eastern Europe was signed by 11 countries and International Federation for Red Cross and Red Crescent Societies. in Bucharest/ROMANIA. At the DPPI Regional Meeting in Sofia/BULGARIA, 16-18 September 2002, a new Disaster Preparedness and Prevention Initiative for South Eastern Europe (=DPPI SEE) structure was adopted and the DPPI SEE Action Plan with Terms of Reference for Advisory Board was determined by participants.

From 2002 to 2006, the remarkable activity of DPPI was “Disaster Management Training Program 2002 – 2006”. During this period more than 700 participants participated to 53 training events. The DPPI has organized 2007-2008 training program in the light of previous training experiences. In addition to these disaster management training program DPPI has “Joint Fire Fighting Unit Project” that has been concluded with the Joint Fire-fighting Exercise, held in May 2004 in Budva/MONTENEGRO. Another disaster project of DPPI is “The Harmonization of Seismic Risk Hazard Maps”. The project has been supported by the NATO Science for Peace Program and the implementation of the project by Moldova, Bulgaria, Romania and Turkey started in late 2004. The objective of the Project is to determine the new seismic hazard maps of the region designed by new technologies. Maps should ensure harmonization of seismic hazard within the broader region in the sense of applied methodology, as well as to overcome the problem of present differences of seismic hazard in border regions. Maps will also satisfy the formats of seismic zoning drawn by European Standards namely, Eurocode 8.

In the case of floods in the South Eastern European Region, the DPPI Secretariat and Hungary developed a “Project Proposal for the Establishment of Joint Emergency Response Units” to improve the conditions for flood protection. The overall objective of the JERU Project is to improve regional preparedness and response capacity in case of floods regardless of the national borders by equipping and jointly training 8 emergency response units in 8 countries of the SEE region. The training for the JERU Operation Officers/Team Leaders was conducted in November 13-17, 2006; and with the First/Main and Final Planning Conference to be concluded with the Joint Emergency Response Unit Exercise, are tentatively scheduled for 2008/9 respectively (DPPI; 2008).

As a recent development, the Stability Pact for South Eastern Europe came to an end and the Pact's Secretariat was officially closed on 30.06.2008. But the Regional Cooperation Council (RCC) was officially launched on 27 February 2008, as the successor of the Stability Pact for South Eastern Europe. The Regional Co-operation Council and its Secretariat in Sarajevo/BOSNIA AND HERZEGOVINA formally intended to sustain responsibility for promoting regional co-operation processes as well as the DPPI activities in South Eastern Europe through a regionally owned and led framework that also supports European and Euro-Atlantic integration (RCC, 2009).

## **GENEVA CONVENTIONS**



The Geneva Conventions has pretty different status among other international organizations and seminars above in the field of disasters. Despite the Geneva Conventions aim protection of victims of international armed conflicts, it has recently some arrangements for disasters.

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1. First Geneva Convention was adopted in 1864 and revised in 1949. (For the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field)
2. Second Geneva Convention was adopted in 1949. (For the Amelioration of the Condition of the Wounded, Sick and Shipwrecked Members of Armed Forces at Sea)
3. Third Geneva Convention was adopted in 1929 and revised in 1949. (Relative to the Treatment of Prisoners of War)
4. Fourth Geneva Convention was adopted in 1949. (Relative to the Protection of Civilian Persons in Time of War)

In addition to the conventions above there are three more protocols namely, Protocol of Protection of Victims of International Armed Conflicts, Protocol of Victims of Non-International Armed Conflicts, and Protocol of Adoption of an Additional Distinctive Emblem. In sum the Geneva Conventions are completely non-disaster topic legislative documents. (Geneva Conventions; 2008)

While the Geneva Conventions are mainly concern with the protection of humans in various types of armed conflicts, in the last decade of 20th century, initiatives were taken with a view to inserting disaster issues into additional protocols. The following statement formulated in the in 22-24 June 1988 Hague International Conference on Humanitarian Assistance in Armed Conflict is a significant indicator of increasing attention paid by various relief organizations to natural disasters, even their original missions are in different fields:

“Each National Society must prepare itself to assume the responsibility devolving on it in the case of disaster. It must establish its own plan of action, adapt its organization accordingly, recruit, instruct and train the necessary personnel, and ensure the availability of the reserves in cash and kind which it might need in the emergency phase of a relief operation.” (Kvelalshoven; 1988)

These instruments start to provide guidance to member states in shaping disaster response and relief actions as well as relevant bi- and multilateral cooperation activities.

## CHAPTER 3:

### 3. DISASTER MITIGATION APPROACHES AND LESSONS LEARNED IN TURKEY

It is useful to start with writing up the story of 1999 Earthquakes in Turkey. This also clarifies the reason why 1999 Earthquakes lessons learned are chosen as an initiative of the thesis. However, before drawing the profile of the 1999 earthquakes, it is useful to give brief information about the hierarchic administrative system in Turkey. Turkey is a centralized state comprising 81 provinces. At the top of the provincial administrations are governors as appointed by the central government. Governors delegate some of their authorities to district governors who manage some administrative issues in districts of provinces. According to the administrative structure in Turkey governorates and district governorates mostly have administrative responsibilities as local agencies of the central government. In addition to this administrative hierarchy, mayors (mayors of provinces and district mayors) take place in administrative system of provinces. While mayors are locally elected for 5-year-period governors are appointed by the Ministry of Interior (SPO, 2006).

Since Turkey is a country which frequently subjects to natural disaster, mainly earthquakes, a destructive earthquake occurs within 1.5 year- period or shorter than it. According to the statistical data on natural disasters within last 60 years, earthquakes cause 62% of the natural hazards in Turkey. Another significant issue for Turkey is the majority of total population and a great proportion of the economic activities have been subjected to the high earthquake risks.

“In the last century, 58 damaging earthquakes occurred in Turkey caused almost 100 000 casualties and more than 500 000 seriously damaged and collapsed housing units. Erzincan (1939), Gediz (1970), Erzurum-Kars (1983), Erzincan (1992) and the recent Earthquakes are the most severe disasters. However, the Eastern Marmara Earthquakes have exceeded by far the other earthquake experiences in Turkey so far.” (Ministerial Meeting on Regional Cooperation and Coordination in Crisis Management, 2000; p.1)

The following map which is prepared by the Turkish Ministry of Public Works & Settlement/General Directorate of Disaster Affairs shows earthquake hazard zones in Turkey (see also fig.5). According to this map Turkey is divided into 5 different earthquake hazard zones. The red zone represents high earthquake zone areas and the white zone represents earthquake safe areas.

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In 1999, two terrible earthquakes dated on 17th of August and 12th of November occurred in the most industrialized and highly populated region of Turkey. The first Eastern Marmara earthquake struck at 03.02 (local time) on 17 August 1999 with a magnitude of 7.4 and the second one struck at 18.57 (local time) with a magnitude of 7.2. The first earthquake has two epicenters such as İzmit Bay and Adapazarı (city center of Sakarya) while the second one's epicenter is Düzce. The

earthquakes affected a region covering 9 provinces that are located on the North Anatolian Fault Zone, namely, Istanbul, Yalova, Kocaeli, Sakarya, Bolu, Düzce, Eskişehir, Bursa, and Zonguldak. In those earthquakes, there were 18 373 casualties and 48 901 injured people in addition to severe damage in 317 493 dwelling units and 47 412 offices. Some regional technical infrastructure networks and transportation routes were affected heavily such as some severe damages in the Ankara-Istanbul highway due to the fault ruptures and liquefactions and high damages (more than 50%) in the drinking water and sewerage systems in the region.

Those earthquakes gave crucial damage to the Turkish economy. Firstly, the earthquakes hit major industrial zone of Turkey. Secondly, when the earthquakes occurred, Turkey had a critical economic period. In mid-1999 Turkish Government had launched an extensive economic reform program to control high inflation and build sustainable economic growth. The total financial loss is estimated as more than 10 billion US\$ according to the 2000 economic figures. That amount of the financial loss refers 5% of Turkey's Gross National Product (GNP) in 2000. The per capita GNP in 2001 decreased by 26.7 percent, dropping to 2,123 US\$ due to the economic recession and the decrease in the value of the Turkish Lira (JICA, 2004;pp. 6-7).

The following figures are denoting regional dispersion of physical damages and losses clearly:

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Many factors caused those catastrophes, namely, magnitude and range of the earthquakes; disaster occurrence times; demographic & economic conditions of the disaster areas; public awareness & institutional technical care for constructions; limited existing economic conditions of the country; and existence of rapid and distorted urbanization & industrialization in disaster areas. Those factors became the items of lessons learned of Turkey. In addition to these items Turkey gained some experiences in disaster response process. That is to say some problems such as lack of coordination and organization showed the weakness of the country disaster response capacity. In sum, Turkey has some lessons learned stemming from disaster response, recovery, and preparedness processes of 1999 Eastern Marmara Earthquakes. Thus, it could be beneficial to start this study based on Turkey's lessons learned from 1999 Eastern Marmara Earthquakes to share previous experiences in the scientific era as an efficient initiation for strengthening technical capacity of other disaster prone countries.

### **3.5. Review in Turkish Disaster Legislation**

In Turkey, the whole body of legislation related to disaster issues can be elaborated into three groups such as disaster legislation, planning legislation, and the building legislation. The current disaster legislation consists of various laws, decree laws, regulations, directions and circulars. The major laws on disasters can be summarized as follows:

(a) The Law on Civil Defense No. 7126 of 13 June, 1958: Some amendments were made in due course in parallel with the changing requirements. The Ministry of Interior is responsible for implementing the law. The law aims at minimizing the losses of lives and properties due to reasons or armed conflicts, foreign attacks, natural disasters and big fires; protecting the substantial plants and ensuring the continuity of public services. The law also sets out the organization, tasks and responsibilities of the national defence authorities.

(b) The Law on Precautions and Aids for Disasters Influenced the Common Daily Life, No. 7269 of 25 May, 1959: According to the Law, the Ministry of Public Works and Settlement is in charge of responsibilities in the case of the natural disasters. After some disaster experiences such as earthquakes and floods, the law was needed to be enlarged. Hence, some substantial amendments were made by the Law No. 1051 of 1968 and latter amendments were made by Laws No.4123 and 4133. The Law with its amendments aims to serve disaster response, emergency aid, and recovery activities. To fulfill this aim, the Law determines the procedures, principles, and responsibilities of authorities in the case of disaster hazards such as earthquakes, fires, floods, landslides and avalanches.

(c) The Prime Ministry /Turkey Atomic Energy Institution is in charge of responsibilities of nuclear security by the Law on Turkish Atomic Energy No. 2690 of 9 July, 1982: The purpose of the law is to determine the organization, responsibilities and tasks of the Turkey Atomic Energy Institution with respect to planning and supervision of usage of nuclear energy, security of radiation, and protection of nuclear plants, and prevention of nuclear accidents in Turkey.

(d) The Regulation on Constructions in Disaster Areas: The regulation is issued in the official gazette of 13 May, 1996, no. 22635 (second print) provides that constructions in disaster prone areas must comply with the "Turkish Standards and the General Technical Contract of the Ministry of Public Works and Settlement".

(e) The Regulation on Principles of City and Town Plans and of Significant Buildings and Establishments in terms of Civil Defence, Decree No. 4/11715 of 6 July, 1959: This regulation sets out standards and procedures of settlement areas and construction plans of cities and towns in sensitive areas as a matter of civil defence.

(f) The Regulation No. 88/12777 on "Emergency Relief Organization and Planning Principles on Disasters" which is legally based on the Law on Precautions and Aids for Disasters Influenced the Common Daily Life (Law No. 7269) is issued in the official gazette of 8.5.1988, no. 19808. The regulation determines principles for organizing central and local emergency management institutions and designing an emergency management plan.

(g) The Prime Ministry Crisis Management Center Decree No. 96/8716 of 9 January, 1997: The aim of the regulation is to determine the organization, tasks, working procedures, and responsibilities of the Prime Ministry Crisis Management Center. The regulation was updated due

to the reasons of establishment of the General Directorate of Turkish Emergency Management and building efficient organization and coordination in disasters in 4.7.2002 by the decision of the Cabinet no. 2002/4518.

(h) The Decree Law No. 99/583 (issued in the official gazette of 22.12.1999, no: 23884) and Decree Law No. 600 (issued in the official gazette of 14.7.2000, no: 24079) on the establishment of Turkey Emergency Management. These decree laws aim at ensuring the countrywide effectiveness of emergency management in the event of natural and technological disasters. The implementing principles and procedures are to be determined by subsequent regulation (Alarslan; 2001).

The planning legislation is mainly constituted with the Public Works Law (Law No.3194) and its related regulations and circulars. The existing Public Works Law that came into force in 1985 designates principles, processes, procedures and responsible institutions in all planning and public works in Turkey. In addition to planning issues, there are construction issues such as standards and procedures, building and residence permits, technical responsibilities, quality controls, qualification of contractors, and construction penalties in the Public Works Law. The law also consists of procedures of disaster plans. In its 9th article, 2nd paragraph, the law assigns the preparation and modification of plans in disaster prone areas to the Ministry of Public Works and Settlement. 39th article of the Law serves to purpose of disaster mitigation indirectly with the explanation on technical procedures of insecure buildings (The Turkish Ministry of Public Works & Settlement-General Directorate of Disaster Affairs; 2006). After 1999 earthquake experience, the Ministry of Public Works and Settlement had many updates on this law and related regulations. In 2004, the Ministry prepared a draft law (Draft Law of Public Works and Urbanization) to serve more modern and safer settlements and built environments. Nevertheless, that draft law is still in evaluation process.

In addition to the Public Works Law, there are a few complementary regulations which are indirectly related to the disaster legislation. These are:

- The Regulation on Tasks and Responsibilities of Technicians Except Engineers, Architects, and City Planners (issued in the official gazette of 2.11.1985, no. 18916 (second print))
- The Regulation on Tasks and Responsibilities of Electrical Technicians(issued in the official gazette of 11.11.1989, no. 20339)
- The Regulation on Qualifications of Map Preparation Contractors (issued in the official gazette of 11.10.1993, no.21725)
- The Regulation on Qualifications of Plan Preparation Contractors(issued in the official gazette of 7.1.2005, no. 26046)
- The Regulation on Principles of Plan Preparation(issued in the official gazette of 2.11.1985, no. 18916 (second print))

-The Regulation on Development of Non-Planned Areas (issued in the official gazette of 2.9.1999, no.23804)

The regulations above denote that the planning legislation in Turkey does not only cover the principles of planning but also sets out principles of technical qualifications of planners and technicians in the sector, criteria of building and residence permits, and standards of buildings. It is still discussed that whether all building regulations and/or standards should be gathered under the building act. In addition to these regulations, many circulars related planning, disaster, and building issues cause confusion in the implementation frequently. On the other hand, the planning legislation itself is very complicated in Turkey due to the fact that there are many ministries, local authorities, and institutions took part in spatial planning (Duyguluer, 2007).

The building legislation in Turkey is not well organized. It consists of the technical specifications, related regulations, circulars, standards of building materials, the Public Procurement Law (Law No. 4734) (issued in the official gazette of 22.01.2002, no.24648) and its regulations came into force by the Ministry of Public Works and Settlement, the Building Inspection Law (Law No.4708) (issued in the official gazette of 13.07.2001, no.24461) and the Building Insurance. The more, as it is already mentioned that there are legal provisions related with buildings in the Public Works Law. The building related regulations can be listed as follows:

-The Standard Regulation for Development of Non-Metropolitan Municipalities(issued in the official gazette of 2.11.1985, no.18916)

-The Additional Regulation for Bunkers (issued in the official gazette of 25.8.1988, no. 19910)

-The Regulation for Development of Metropolitan Municipalities (Each Metropolitan Municipalities has its own original regulation)

-The Regulation for High Rise Buildings in Metropolitan Municipalities(Each Metropolitan Municipalities has its own original regulation)

-The Regulation for Installation for Metropolitan Municipalities(Each Metropolitan Municipalities has its own original regulation)

-The Regulation of Thermal Isolation (issued in the official gazette of 8.5.2000, no. 24043)

-The Regulation of Buildings in Earthquake Prone Areas (issued in the official gazette of 6.3.2007, no.26454)

-The Regulation of Building Materials(issued in the official gazette of 1.12.2006, no. 26363)

-The Regulation of Elevator(issued in the official gazette of 15.2.2003, no. 25021)

-The Regulation of Fire(issued in the official gazette of 26.7.2002, no. 24822)

The main technical specifications are on the principles on ground survey and soil analysis, preparation of architectural and engineering projects, architectural and engineering works in buildings.

After 1999 Marmara Earthquake and some successor earthquakes in Turkey, it was decided to build a building inspection system due to the fact that main earthquake hazards stems from non-controlled constructions. In 2001, the Building Inspection Law (Law No.4708) came into force. The law also brought some new concepts and processes to the construction field in Turkey such as building inspection institutions. All types of buildings and constructions defined in the Public Works Law are subject to the building inspection. Building inspection institutions certified by the Ministry of Public Works and Settlement are in charge of building inspection in Turkey. They are responsible for;

- i. examining the ground survey and soil analysis of the building lot and all types of building plans and projects such as architectural, static, electric,
- ii. assenting to projects for the building permit application
- iii. inspecting the building process and building materials
- iv. controlling occupational safety and health in the construction site
- v. informing to building and residence permit authorities in respect to the construction quality.

Another initiative after 1999 Marmara Earthquake is “Earthquake Insurance”. Due to the reason that the Disaster Fund belonged to the Disaster Law did not surmount on all earthquake hazards, the necessity of earthquake insurance arose. The Decree Law on Compulsory Earthquake Insurance (Decree Law No. 587) came into force in 1999 established the earthquake insurance system in Turkey (issued in the official gazette of 27.12.1999, no. 23919 (second print)). The Decree Law assigned a “Natural Disaster Insurance Institution” reported to the Undersecretary of Turkish Treasury. The earthquake insurance system in Turkey aims to compensate the losses of dwelling units due to the earthquake hazards while facilitates the responsibilities of central government. Besides it ensures sharing earthquake risks in the country while transfers some of the risks to the international market via reinsurance. The system insures losses of dwelling units due to earthquakes and fires, explosions, and land slides triggered by earthquakes. The earthquake insurance system covers all registered/legal dwelling units and all commercial and administrative units located in residential buildings. Hence public buildings, non-residential buildings, and buildings in villages are not subject to the earthquake insurance system (The Turkish Ministry of Public Works & Settlement; 2004).The earthquake insurance is compulsory where the Natural Disaster Insurance Institution declared. Failure to comply with the insurance requirement results in for feature of public assistance in ability to register property title, and denial of access to drinking water and natural gas, electricity, telephone, cable TV, and other utilities (Gençosmanoğlu; 2005).

### **3.6. Institutions Involved in the Disaster Mitigation Process**

Before introducing the institutions with responsibilities in the disaster mitigation process, it is useful to draw a profile of Turkish disaster institutions from a historical perspective. The existing geography of Turkey has witnessed many disasters especially earthquakes since ancient times. According to one of the oldest Ottoman documents, earthquake recovery activities had mostly focused around Istanbul (JICA; 2004). From the foundation of Turkish Republic up to now, some milestones can be highlighted in building disaster-related institutions and disaster management system.

Between last decade of the Ottoman Empire and the foundation of the new Turkish Republic (1914-1930) the most active institution was the Turkish Red Crescent Society. It provided emergency relief to the people in both disaster and war cases. In the period of 1930-1944, various laws were enacted to enlarge the responsibilities of municipalities and the Ministry of Public Works and Settlement for the improvement and reconstruction of settlements. Those responsibilities may be characterized as disaster recovery activities. In this period, because of extensive loss of lives and properties due to flash floods and earthquakes, some important legislative and institutional arrangements were adopted. Thus, in 1943, the Directorate of State Hydraulic Works was founded by the Law of Precautions and Preventions of Floods and Underground Waters. In 1944, the responsibility of the Ministry of Public Works and Settlement was enlarged by a law on "Measures to Be Put into Effect Prior and Subsequent to Ground Tremors" (Law No. 4623). The Ministry of Public Works and Settlement prepared the first earthquake hazard map of Turkey and adopted a regulation on compulsory technical building requirements in cooperation with universities and other related governmental institutions. This law also charged the municipalities with the task of implementing technical building requirements. In the period of 1944-1958, there were many revisions of the earthquake hazard map and the regulation on compulsory technical building requirements. After 1950, the rapid increase in population and urbanization and industrialization caused a gradual diminishing importance of those obligations (JICA; 2004). According to Ergunay, due to the fact that there was no major earthquake during 1950-1960, some political repercussions arose and the implementations based on the Law No. 4623 lost their effectiveness (Management of Natural Disasters in the Eastern Mediterranean Region, 1998). With the rapid increase in population, construction and planning activities rose tremendously. In response to these developments, the Ministry of Public Works and Settlement was reorganized (assuring tasks of physical planning, land-use, disaster affairs, and hydraulic works) by a new law of 1956 (Law No. 6785). In 1958, another new institution, the General Directorate of Civil Defence was founded to conduct search and rescue operations in disasters. The legal base of the General Directorate of Civil Defence was the Civil Defence Law (Law No. 7126). In 1959, the Ministry of Public Works and Settlement assumed further responsibilities in natural disasters such as earthquakes, floods, landslides, rock falls and fires by Law No. 7269 on "Precautions and Aids for Disasters Influenced the Common Daily Life" which is still in force as of today . In line with this new disaster law, the General



Directorate of Disaster Affairs which reported to the Ministry of Public Works and Settlement was established in 1965. Another new feature of the Law is the establishment of a “Disaster Fund” to finance necessary disaster activities without depending on the central budget. In 1971, the Earthquake Research Institute (currently Earthquake Research Department) was established in the General Directorate of Disaster Affairs. The Institute was responsible for earthquake research activities in cooperation with universities and other scientific institutions. In 1972, a special “Earthquake Fund” was created by Law No. 1571. In the period of 1970-2000, while the General Directorate of Disaster Affairs developed its organization, technology, and personnel profile, several disaster research centers were established in universities, e.g. the “Earthquake Engineering Research Center” in the Middle East Technical University/Ankara, the “Turkish National Committee on Earthquake Engineering” in the Istanbul Technical University. In this period, the Ministry of Public Works and Settlement also developed some public awareness and training projects and programs (JICA; 2004). The European Disaster Training Center (=AFEM) was established under the Ministry on the basis of the Council of Europe’s Open Partial Agreement of 1988(The Turkish Ministry of Public Works & Settlement, 2007) (see also “International Seminars & Conventions”-AFEM). In the period of 1990-2000, the International Decade for Natural Disaster Reduction (=IDNDR) (see also “International Seminars & Conventions”-IDNDR) organized a center under the chair of the Deputy Undersecretary of the Ministry of Public Works and Settlement. This center and its activities provided an opportunity to criticize the disaster management system and mitigation activities of Turkey. The center prepared a National Plan of Turkey for the IDNDR period and distributed it to all pertinent institutions and decision making authorities (JICA; 2004).

The Eastern Marmara Earthquakes in 1999 became a milestone for the history of disaster legislation and institution building in Turkey. The responsible institutions started to criticize the disaster management system and its features such as organization, funds, and legislation. In contrast to these positive initiatives, the economic crisis after the earthquakes caused some adverse effects such as the transfer of earthquake and all other special funds to the central budget. In the period of 1999-2004, the Turkish Government promulgated many decrees, regulations, decree laws and laws in conjunction with the creation of some new institutions, such as the Natural Disaster Insurance Institution, the General Directorate of Turkish Emergency Management (JICA; 2004).

The creation of the ad hoc Turkish National Earthquake Council is another initiative in the wake of the 1999 Eastern Marmara Earthquakes. The Turkish National Earthquake Council aimed at making scientific assessments of earthquake predictions and informing the public, identifying the priority of researches on earthquake mitigation, policy development, and strategy building, and proposing necessary actions and programs. The Council comprised twenty independent scientists; it was established by circular of the Prime Ministry dated 21.3.2000. These scientists came from various universities and scientific research institutions, and they included 8 earth scientists, 8 structural and earthquake engineers, an architect, a city planner, a social

psychologist, and an environmental engineer. The Council determined its own working principles, made numerous public announcements, organized many researches and studies, and published a booklet called "The National Earthquake Mitigation Strategy" as a result of its studies. This booklet was published in 2002 and distributed extensively to universities, central and local authorities, members of the Parliament, etc. (JICA; 2004). The outcomes of the National Mitigation Strategy document were also taken into consideration of latter "Earthquake Council" organized by the Ministry of Public Works and Settlement (The Turkish Ministry of Public Works & Settlement; 2004). The Council was abolished by circular of the Prime Ministry dated 6.1.2007.

In September 29-October 1, 2004, the Ministry of Public Works and Settlement, organized an event called "Earthquake Council" with the participation of universities, public institutions and other pertinent authorities, NGOs and interest groups. This event aimed at evaluating future proposals on earthquake-related precautions and regulations; it had been prepared by seven ad hoc committees that had worked for approximately 3 months on the following topics: Institutional Building, Legislation, Disaster Information System, Examination of Existing Building Stock & Building Inspection, Building Materials, Funding & Disaster Insurance, Disaster Training (The Turkish Ministry of Public Works & Settlement; 2004).

Currently, the following institutions are involved in disaster management and mitigation system in Turkey:

Tasks of the Prime Ministry/General Directorate of Turkish Emergency Management (Responsibilities and authorities as per decrees law nos. 583 and 600)

- a) To ensure that the public institutions involved in disaster field form emergency management centers with the aim of efficient emergency management and co-ordination in accordance with sound working procedures
- b) To evaluate the precautionary measures taken by institutions in order to prevent disasters and/or to minimize the damages, including the preparation of short- and medium-term plans and the establishment of information banks
- c) To maintain coordination services for the employment of rescue and aid equipment, land, sea and air vehicles belonging to public and private sectors in cases of emergency
- d) To prepare regulations encouraging the voluntary aid institutions to coordinate in the deliverance, protection and transference of aid equipment

Tasks of the Ministry of Public Works & Settlement/General Directorate of Disaster Affairs

- a) To implement and coordinate emergency aid in cases of disasters

b) To ensure that the short- and medium-term measures are taken in disaster stricken areas in order to provide temporary settlement, to distribute services to these areas to maintain cooperation and coordination among public institutions involved.

c) To identify disaster prone areas and to take due measures towards preventing disasters,

d) To determine and implement measures and principles aiming at minimizing the death toll and loss of property in disaster areas in cooperation with relevant ministries and public institutions.

#### Tasks and Brief Introduction of the European Natural Disasters Training Centre (AFEM)

The European Natural Disasters Training Centre (AFEM) is a non-profit organization which provides training on hazard reduction techniques. AFEM was established within the EUR-OPA framework in 1988 and affiliated to the Ministry of Public Works and Settlement. Its institutional structure and operational procedures are governed rules and establishment principles have been determined by Turkish legislation. AFEM focuses on providing training for technicians and executives who with responsibilities for management of natural disasters. Bodies of AFEM are of the Council, the Scientific Committee and the Training Centre. The Council makes decisions on the annual programs and budget of the Centre. It in particular sets priorities for topics, target groups, policies and strategies of AFEM. The members of the Council are appointed by the Member States of the Eur-Opa Major Hazard Agreement. Budget of AFEM is in equal parts provided from the budgets of the European Open Partial Agreement (OPA) and the Turkish Government. Additional contributions come from international organizations, and special projects are financed by much organizations, such as DIFD-of U.K., The World Bank, etc. (The Turkish Ministry of Public Works & Settlement, 2007)

More specifically, AFEM carries out three types of activities:

-training of technicians and governmental officers

-preparation of visual and written training materials for citizens in all age and occupation categories

-organization of seminars for specialized target groups

In addition to these three tasks above, AFEM has been searching on development of training programs.

#### Tasks of the Ministry of Interior/General Directorate of Civil Defence

a) To ensure the security of people and property at the time of war, to rescue lives and property in the event of disasters and to encourage the civil society to support defence activities case of war

b) To organize civil defence services across the country, to maintain and supervise the preparation, implementation and coordination of these services at public and private institutions

c) To plan and implement armless, protective and rescue precautions, emergency rescue and first aid activities, to determine measures against fires and standards for fire brigades, to educate, supervise and coordinate the personnel, to keep civil defence search and rescue teams ready and to entrust them when necessary

The General Directorate of Civil Defence in co-operation with the Ministry of Finance discharges these functions through Civil Defence Expertise in public and private institutions and Civil Defence Directorates in cities and provinces (Alarслан, 2001).

Tasks of the General Directorate of Red Crescent

a) Provides services such as distribution of tents, blankets, food and clothing for the disaster stricken areas

b) Provides urgent shelter for disaster stricken people in cooperation with the relevant institutions as per decisions of its own committee and provides food at common shelters.

c) Collects foreign or local aid equipment and distributes it to the shelter areas determined by the committee.

d) Provides medical equipment and services such as health teams, blood and blood products in cooperation with the Ministry of Health and relevant institutions, if necessary.

The Undersecretary of Treasury/ the Natural Disaster Insurance Institution (=DASK)

The Decree Law on Compulsory Earthquake Insurance (Decree Law No. 587) came into force in 1999 established the earthquake insurance system in Turkey (issued in the official gazette of 27.12.1999, no. 23919 (second print)). The Decree Law assigned a “Natural Disaster Insurance Institution” reported to the Undersecretary of Turkish Treasury. The Natural Disaster Insurance Institution is responsible for insurance and designation of insurance obligators. The Institution performs its duties on hazard assessment, marketing, and administrative procedures for earthquake insurance and reinsurance via service procurements. It is a public and non-profit institution. It is managed by a steering committee constituted by seven members including the chief executive. Other committee members are executive officers from various fields (4 of them), private sector representatives (2 of them), and an academic staff (The Turkish Ministry of Public Works & Settlement; 2004).

In addition to aforementioned organizations, the organization and co-ordination of Turkish institutions in disaster field –in emergency cases- is provided by the Regulation No. 88/12777 on “Emergency Relief Organization and Planning Principles on Disasters” (issued in the official gazette of 8.5.1988, no. 19808) for both of central and provincial levels:

(1) Central Organization: There are three pieces of legislation on the central organization of disaster management. The boundaries among these legislations are as yet indefinite. Thereunder, the following bodies are envisaged:

(a) “Central Coordination Council on Disasters” is a disaster management center which shall be established in case a disaster affects common life and exceeds the city boundaries. Its competencies are set out in Regulation No. 88/12777 of the Ministry of Public Works and Settlement.

The council is chaired by the Undersecretary of the Ministry of Public Works and Settlement, and it consists of the following undersecretaries. The participant authorities of the council are responsible for maintain accurate information about their own technical, financial, and personnel resources for efficient coordination.

- \*The Ministry of National Defence
- \* The Ministry of Foreign Affairs
- \* The Ministry of Finance
- \* The Ministry of Justice
- \*The Ministry of National Education
- \* The Ministry of Health
- \* The Ministry of Transportation
- \* The Ministry of Energy and Natural Resources
- \* The Ministry of Agriculture and Rural Affairs
- \* The Ministry of Environment and Forestry
- \* The Ministry of Labour and Social Security
- \* The Ministry of Industry and Commerce

(b) “Turkish Emergency Management Department” was established by the Decree Law No. 583 of 15 November, 1999 and No. 600 of 14 June, 2000. The department is charged with taking necessary precautions for the efficient functioning of emergency management in events of the earthquakes, landslides, fires, accidents, meteorological disasters, nuclear and chemical accidents and immigration movements affecting the safety of the country. The department also tasked with coordinating institutions implementing studies on precautionary measures taken to prevent or mitigate disasters, on search and rescue activities and on the improvement facilities after disasters.

(c) “Prime Ministry Crisis Management Center” (BKYM) shall be organized at the central level in case of a crisis (including disasters) as stipulated by the Regulation No. 96/8716 of the Prime Ministry. The Center is to operate under the authority of the General Directorate of Turkish Emergency Management.

The aim of the regulation is to determine the organization, working procedures, mission statement and responsibilities of BKYM and to ensure that

- preparations and activities are performed correctly in accordance with the national interests to prevent or end a crisis, and
- a crisis causes minimum damage and interests are preserved by maintaining coordination and cooperation among General Staff, relevant ministries and other institutions.

The mission statements, responsibilities and working procedures of these three centers are generally similar.

(2) Organization of Provinces: Civil defence services established by the Ministry of Internal Affairs under the Law No. 7126 are organized in a way to provide services during and after wars. They are not envisaged for disasters.

To fill this legislative gap, the Ministry of Internal Affairs has interpreted the term “movable teams” under its enabling legislation and established Civil Defence Unions in Ankara (35 staff), Istanbul and Erzurum (20 staff). These new bodies were employed successfully in local disasters. However the fact that they were inadequately staffed during the last local disasters (and subjective press statements) led to the underestimation of their activities and to criticisms.

The Ministry of Public Works and Settlement (General Directorate of Disaster Affairs) established “Central Coordination Council for Disasters” for the fight against disasters and disaster management and “Emergency Aid Service Groups for Disasters” in cities and provinces.

#### Emergency Aid Provincial Organization for Disasters in Cities and Districts

In cities and city districts “City Rescue and Aid Committees” are created under the chairmanship of the governor or deputy governor; these consist of:

- \*Municipality representatives
- \*City Gendarme Regiment Commandership
- \*Chief of Police
- \*Chief of Civil Defence
- \* Directorate of National Education Youth and Sports
- \*Directorate of Public Works and Settlement
- \*Directorate of Agriculture
- \*Directorate of Forestry
- \*Representative of Turkish Red Crescent

\*Garrison commander or highest ranked military officer of the area.

## **Tasks**

The Committee

1. ensures that the emergency aid plans are developed and implemented
2. evaluates the provincial plans and submits them to the governor for ratification
3. establishes service groups in accordance with the plans and determines arrangements for staffing, educating, and making such groups ready for service
4. determines the principles of relief management and satisfaction of needs
5. determines the operational principles of the service groups, coordinates follow up the activities
6. maintains cooperation and coordination among institutions responsible for the implementation of emergency aid services
7. evaluates the disaster relief activities and their results
8. coordinates the provision of personnel and equipment for service groups.
9. returns back to the central fund account funds allocated for emergency aid activities but not spent
10. makes relief proposals such as postponement of debts and opening of new credits for the disaster-stricken people.

These following service groups may be credited in cities and provinces to perform emergency aid activities:

- \*Transportation Service Groups
- \*Communication Service Groups
- \*Rescue and Debris Removal Groups
- \*Preliminary Damage Determination and Temporary Settlement Service Groups
- \*Security Service Groups
- \*Purchasing, Renting, Detention and Distribution Service Groups
- \*Agriculture Service Groups
- \*Electricity, Water and Sewerage Service Groups

### **3.7. Criticism on Existing Disaster Mitigation System and Process in Turkey**

The problems and shortcomings resulting from deficient legislation, procedures, and implementing practices, have been documented in many written or oral evaluations after the 1999 Eastern Marmara Earthquake in Turkey. In response, many laws, regulations, and directives were issued to resolve observed problems and conflicts. These attempts at modernizing disaster legislation, however, failed to achieve expected results. Thus far many efforts in Turkey have been made as reactions to disaster experience; yet even the recent legislation fails to set out an effective system of precautionary measures aimed preventing disaster-related damages.

**The lack of a general policy and/or master plan for disasters in Turkey is widely criticized. Although Turkey is one of the high risk disaster countries, she has no country scale disaster policy as a tool for disaster mitigation.** In the Turkish Five Year Development Plans, a first attempt for disaster awareness can be found in the 4th Five Year Development Plan for the period of 1973-1979 which stated:

“In natural disaster sensitive areas, special standards and by-laws shall be applied for the structures to be built, and renewal and retrofitting works will be carried out for existing buildings.” However, this statement was misused as a basis for obtaining the government cooperation in legalizing unsafe and irregular constructions in urban settlements.

In the 5th Five Year Development Plan (1985-1989), the following statement was made under the heading of Principles and Policies: “The villages located in disaster zones will have first priority with respect to improving activities for residential buildings by supporting training, application and encouragement and developing village type dwelling units.”

While the above principle was developed, Public Works Law numbered 3194 was newly became into force in 1984. Regrettably, the Law failed to set out an approach for taking into account natural disasters in the planning process. Approaches on disaster risk mitigation were first laid down in the 6th Year Development Plan (1990-1994). The Erzincan Earthquake in 1992 also prompted some initiatives for disaster emergency management and improvement of building stocks in disaster areas.

The 7th (1995-2000) and 8th (2000-2005) Five Year Development Plans provided more concrete approaches such as the preparation of country scale earthquake zoning maps and the insertion of local earthquake hazard zones into the physical plans. The Public Works Law and related planning legislation were updated in those periods in accordance with the main policies set out in the Development Plans. Especially in the period of 8th Five Year Development Plan with the experience of 1999 Earthquake in Turkey, many modern approaches were initiated such as the preparation of country scale disaster maps, designing an integral planning process together with a building quality control system, and establishing a national scale disaster information system. (The Turkish Ministry of Public Works & Settlement (General Directorate of Disaster Affairs), 2006)



The recent adoption of the Ninth Seven-Year Development Plan (2007 – 2013) provided an opportunity of remedying the main policy deficit and/or sustainability, but again it was missed. Although the Seven-Year Development Plan sets out a comprehensive medium-term master plan for economic, social, and regional development in Turkey, it does not include policies and strategies on disasters. It is believed that the criticism of Seven-Year Development Plan (2007–2013) would be an efficient initiation to examine the disaster implementations in Turkey.

The Ninth Seven-Year Development Plan (2007 – 2013) was prepared by the State Planning Organization (SPO) and adopted by the National Assembly. The SPO is the undersecretariat of the Prime Minister in charge of overall economic and development planning. The multi-year development plans are the main instruments of medium- and long-term economic policy planning and coordination. They set out a comprehensive vision for development and outline in broad terms strategic action plans towards this vision. Since the 1990s, international field disaster mitigation is considered as an important element for achieving sustainable development. In this frame, development plans could make a significant contribution to disaster mitigation by including this topic into Turkey's macro-economic policy framework (BALAMİR, 2006).

**However, the Ninth Seven-Year Development Plan addresses urbanization and urban settlements issues only in a socio-economic context and entirely ignores the spatial planning and disaster prevention challenges.** Although Turkey is one of the high disaster risk countries, such topics as urban risk assessment, disaster threats for urban settlement, disaster mitigation to achieve sustainable urban settlements are not mentioned at all in the Development Plan. While special ad hoc-committees had been convened in the preparation of the Development Plan on myriad policy areas (see table below), the issues of disasters or risk mitigation in urban areas were not studied in this frame at all (The Prime Ministry/SPO, 2006).

Disaster prevention and management are addressed in the Development Plan only in the context of “Rationalizing the Authority and Responsibilities among Different Institutions” and “Provision of Development in Rural Areas”. Under the first heading, questions of administrative competencies and responsibilities among various state authorities involved in disaster prevention and management are discussed; and under the second heading, disaster mitigation is recognized as a planning priority for high risk rural areas (The Prime Ministry/SPO, 2006).

Particularly after the 1999 earthquakes in Turkey, it is understood that Turkey urgently needs a macro policy and a master plan on disaster prevention and management. To serve as an effective policy instrument towards this objective, the Ninth Seven-Year Development Plan would have to set out basic principles and main actions on disaster mitigation. These would have to focus on urban areas where disaster risks are demonstrably higher than in the rural areas of Turkey.

After the criticism of Seven-Year Development Plan as a macro political tool for the country, various implementations in Turkey will be examined such as directives on decision-making

mechanisms, plans, programs, controlling mechanisms. The existing process and procedures of various working committees set up by the Ministry of Public Works and Settlement in 2004 with respect to an "Earthquake Council" will be reviewed. Seven ad hoc committees worked on the topics of institution- building, legislation, disaster information system, examination of existing building stock and building inspection, building materials, funding and disaster insurance, and disaster training (The Turkish Ministry of Public Works & Settlement; 2004) (see also "3.2. Responsible Institutions in the Disaster Field").

Before reviewing existing process and procedures of the various working committees, a profile of difficulties in the emergency management of the 1999 earthquakes will be drawn. A task paper prepared by an official worked in the Prime Ministry Crisis Management Center pointed out the following shortcomings (Göktürk & Yilmaz, 2005):

- o Shortcomings in Personnel: The staff of the Emergency Management Center of the Prime Ministry lacked proper professional orientation, work discipline, as well as foreign language skills to communicate with foreign assistance programs.

- o Shortcomings in Transportation and Organization: The staffs of the Emergency Management Center and urgently needed services were not quickly transported to disaster prone areas. For instance, satellite based communication systems were transported via highways rather than by air, even though highways to disaster prone areas were blocked by earthquakes for several days. Work shifts in the Emergency Management Center as well as distribution of urgent goods and services to disaster prone areas also functioned suboptimally.

- o Shortcomings in Coordination: Inefficient coordination problem between the Prime Ministry Emergency Management Center and regional emergency management centers in disaster prone areas often created chaotic conditions during the crisis time.

- o Problems with Media: The Prime Ministry Emergency Management Center experienced difficulties in securing the release of accurate information to the media, i.e. the dissemination of wrong or biased information created misjudgments or adverse reactions of the public.

- o Inefficiencies in Emergency Management: The competition among government executives slowed down decisions on necessary emergency measures.

- o Pressures from Private Firms of Pre-fabricated Housing: The decision making on numbers and site of temporary housing units was hampered by attempts of firms of pre-fabricated housing at influencing decisions of Prime Ministry Emergency Management Center on building temporary houses.

**It is an interesting point of experiences in 1999 earthquakes that while governmental institutions revealed major shortcomings, non-governmental organizations and volunteer groups played a remarkably active and efficient role in responding to the 1999 earthquakes, arising as a new sector in the disaster response system of Turkey.**

**The Institution-Building Committee** aimed at analyzing the existing situation of the disaster management system in Turkey, pointing out problematic fields, and designating compulsory measures and precautions. The following main problems of the Turkish disaster management system can be identified in light of the findings of the Committee:

MAIN CONCERN: Although Turkey is prone to many types of natural and man-made disasters, the main concern relates to the natural disasters and mostly earthquakes. Accordingly, the legislation and institutional structure of disaster management chiefly focus on earthquakes (see also 3.1. Review in Turkish Disaster Legislation and 3.2. Institutions Involved in the Disaster Mitigation Process).

**Moreover, existing institutional organization and legislation mostly concentrate on disaster response and recovery activities. Precautions and measures for disaster preparedness are inadequately developed.** Even legislative and institution-building initiatives in the wake of the 1999 earthquakes are mainly concerned with improving recovery activities or disaster response organization. Notably, the activities of public training, disaster recognition and awareness in relation to disaster preparedness have not been properly organized in Turkey, as yet. Another significant shortcoming in the disaster preparedness process relates quality control and construction standards. A study of the Union of Turkish Contractors proposes the vocation of a new quality control and insurance mechanism in Turkey and a mechanism should be introduced by legislation and rely on the cooperation of and contribution from local authorities, private sector and other interest groups (Karaesmen, 1996).

COORDINATION & ORGANIZATION: All disaster mitigation plans and programs need to be prepared before actual disasters occur, and they need to be coordinated under one single authority. Although there are many institutions with disaster-related responsibilities, including coordination functions in Turkey, **a single coordination authority is still outstanding.** As noted before, the “General Directorate of Turkey Emergency Management” founded by the decrees with the force of law nos. 99/583 and 600 is charged with coordinating the institutions involved in the preparation, response, and recovery process of earthquakes, land slides, falling rocks, fires, accidents, meteorological disasters, nuclear and chemical accidents, and people movements affecting the security of the country. Yet, this General Directorate thus far fails to operate effectively due to staff and budget constraints. A draft law on “Tasks and Organization of the Directory of Disaster and Emergency Management” was introduced on 18.03.2008 to the Parliament where it is still pending. The draft law aims at regulating conflicts among various Turkish institutions with similar roles in disaster mitigation such as the General Directorate of Disaster Affairs, General Directorate of Civil Defence, and General Directorate of Turkish Emergency Management. The proposed Directory of Disaster and Emergency Management will report to the Prime Ministry. Discussions are still proceeding on the abolishment of existing

institutions envisaged in the draft law. If adopted, the law will accomplish a remarkable reform of the more than fifty year old framework of disaster institutions (see also Annex I.17 ).

**Overlapping responsibilities of authorities in disaster events sometimes cause gaps in the provision of services and inconsistencies of instructions issued by different authorities.**

Conflicts have sometimes been experienced even in the same institutions. For instance, in the 1999 Marmara Earthquake, the settlement plans for disaster prone areas were prepared by two different General Directorates of the Turkish Ministry of Public Works and Settlement in the exercise of planning responsibilities provided in the Public Works Law (Law No.3194) and the Disaster Law (Law No.7269). Both of the laws provide for plan preparation responsibilities in disaster areas without addressing a specific General Directorate. To resolve the ensuring ambiguity, two General Directorates negotiated an ad hoc formula for the coordinating settlement plans in disaster prone areas; however, this formula applied only to the 1999 earthquakes. Similar problems were experienced in search and rescue activities and relief organizations after disasters.

**Several disaster mitigation activities revealed a lack of coordination between central and local authorities.**

There are some fundamental reasons behind it. First of all, Turkey is a central state with a strong central government. Secondly, many disaster-related responsibilities are bestowed on ministries and other central authorities due to the fact that central authorities have better financial resources and technical personnel than local authorities. Although local authorities are easier accessible and are more familiar with local conditions, central authorities in Turkey traditionally wield most powers. In order to improve cooperation and coordination among central and local authorities in the disaster mitigation process, a new system should be developed with devolution of competencies to local authorities, NGOs, and various organizations of local community (Management of Natural Disasters in the Eastern Mediterranean Region, 1998).

**The 1999 Marmara Earthquakes, inconsistencies were observed among disaster management approaches, methods, and even terminologies of various governmental and non-governmental organizations involved in the process.**

Hence, disaster managers in GOs and NGOs should be trained according to a common concept of disaster management, organization and coordination with common approaches and disaster terminology (The Turkish Ministry of Public Works & Settlement; 2004). Moreover, an integral disaster management system is urgently needed; this system would have to intend all phases of disaster management, namely, preparedness, prevention, response, recovery and mitigation. A single institution should coordinate the interaction institutions and organizations operating within this system.

**INTEGRATION OF DISASTER MITIGATION ACTIVITIES AND SPATIAL PLANNING INSTRUMENTS:**

Although Turkey is prone to frequent natural disasters, **disaster mitigation techniques and approaches are not reflected in spatial planning methods and procedures.** This dichotomy

undermines the effectiveness of disaster mitigation in Turkey, notably with respect to earthquake hazards. As earthquake hazards correlate with spatial planning standards and building codes, earthquake mitigation techniques should be inserted in tools of spatial planning and construction works. Natural disaster mitigation techniques should thus become an integral part of national and local level planning activities (Management of Natural Disasters in the Eastern Mediterranean Region, 1998).

The “GEMITIS” Project introduced in the International Seminar on the Management of Natural Disasters in the Eastern Mediterranean Region presents an example for integrating disaster mitigation techniques into spatial planning approaches. The GEMITIS Project which is supported by the French Committee for IDNDR, aims at forming of regional networks of cities committed to joint action in the spheres of disaster prevention and sustainable development. Disaster mitigation will be at the core of close collaboration between cities until a systematic exchange of information and experiences coordinated by French specialists. Reference procedures will be adapted by the participating cities to their socio-economic, technical, political, and cultural circumstances (Management of Natural Disasters in the Eastern Mediterranean Region, 1998).

Akin to the GEMITIS Project’s dynamics and principles, disaster hazard assessment data can be inserted into spatial planning analysis base maps which provide guidance to spatial planning decisions. Risk assessment and mitigation techniques can also be taken into consideration in making spatial planning decisions. For instance, disaster risks and other spatial planning criteria can be taken into account in developing site of the residential areas, standards and construction details of new residential areas. Such approaches were initiated in Turkey in areas with high earthquake hazards, especially after 1999 Marmara earthquakes. It is recommended to redesign all spatial planning tools and materials with a view to various natural disaster risks in countries prone to frequent natural disasters like Turkey.

In addition to integrating disaster mitigation approaches with spatial planning tools, Turkey needs to rearrange her entire spatial planning procedures and processes. At present, **Turkey has a quite chaotic spatial planning system overlapping responsibilities of various institutions involved in spatial planning with various planning legislations.** The existing spatial planning system of Turkey consists of 18 institutions and 56 different types of spatial plans. Besides, there are more institutions (approximately 50 institutions having responsibility of spatial plans and decision making processes) took part in the decision making process of the spatial planning (Duyguluer, 2007). Fragmented spatial planning responsibilities and complex planning processes tend to cause difficulties in integrating disaster mitigation approaches with spatial planning tools.

PUBLIC & INSTITUTIONAL AWARENESS AND TRAINING: This topic will be developed in some detail in the criticism of the “Disaster Training Committee”. In this context, some topics and principal recommendations will be underlined with respect to institutional awareness and training which indirectly affect public awareness. All institutions taking part in disaster mitigation

and management processes should provide training to their staff and they should follow a common definition of key disaster-related terms such as risk, mitigation, hazard, vulnerability, etc. All institutions with responsibilities related to spatial planning and building sectors should be fully familiar with the control process for spatial plans and constructions. Such institutions should employ planners, architects, civil engineers, geologists, cartographers, etc. with criteria of technical proficiency, liability, and experience.

Spatial planning institutions should also initiate a public participation process in planning and disaster mitigation topics. Such initiative might be easier to adopt on the local level than on the central level. Local citizens or civil society organizations can be involved in the process of developing local spatial plans and disaster mitigation projects via local authorities, i.e., municipalities and governorates (The Istanbul Metropolitan Municipality, 2002).

SUSTAINABILITY OF INSTITUTIONS AND INSTITUTIONAL ACTIVITIES: The criticism under this subtitle derives from on personal practical experience and observations as well as international working groups on disaster mitigation and cooperation in Turkey. Turkey has a high capacity of building new institutions and enacting new legislation. **Nevertheless, Turkey has experienced many failures in sustaining new institutions and organizations as well as in solving conflicts between new legislation and related (existing) legislation.** For instance, the Prime Ministry/General Directorate of Turkish Emergency Management was established in the wake of the 1999 earthquakes to coordinate disaster activities has thus for failed to provide effective coordination. To some extent, such failure is due to weaknesses of the enabling legislation of decree laws (law nos. 583 and 600) rather than full-fledged laws with proper budgetary allocations. Another unfortunate example is the Turkish National Earthquake Council. Established in 2000 (just after the 1999 Marmara Earthquake) due to urgent needs, the Council was abolished by circular of the Prime Ministry dated 6.1.2007. It is difficult to explain the instability of these key institutions in the light of the high disaster threats and hazards in Turkey. The decision makers in Turkey should review their approaches to institution-building. Adequate time and efforts should be spent on deciding the question whether a new institution is necessary or not. Before it is decided to establish a new institution, legislative, financial, and organizational foundations should be designed properly. Similarly, before an institution is abolished, a cost-benefit analysis should be carried out including an assessment of its activities and an evaluation of its performance.

**Frequently, the members of committee or working groups on disaster topics do not serve sufficiently long terms to sustain activities or programs.** For instance, the Turkish Delegation to the South-eastern European Countries Civil-Military Cooperation Workshops (see also 2.5 International Seminars & Conventions-Stability Pact) in 2000-2001, attracted considerable criticism because of frequent changes of its members. Several measures are proposed to remedy this problem. First members of both local and international working committees should be

carefully selected and appointed. Secondly, technical persons appointed to various disaster working groups should be able to accomplish their tasks without fear of being replaced arbitrarily or as a matter of administrative routine. Thirdly, working group or committee members should be relieved from other tasks so that they can devote sufficient time to the task of the committee or working group. Lastly, members of disaster committees should not be replaced as a result of changes in the central government and other political conflicts.

FINANCE: Securing sufficient financing is a significant challenge in organizing or reorganizing the disaster management system in Turkey. Lack of financial support and budgetary constraints related to disaster mitigation activities make it difficult to organize an effective disaster management system and to build necessary institutions. As substantiated in more detail under the criticism of the “Funding and Disaster Insurance Committee”, new funds, budgetary items and related financial measures are necessary to sustain an efficient disaster management system in such a disaster prone country as Turkey. New financial measures are also necessary for scientific research and technological developments for disaster mitigation. Especially with respect to earthquakes, scientific researches and technology based methods are inevitable for building disaster resilient settlements since major threats do not emanate from the earthquakes themselves but inadequate and inefficient adherence to construction and spatial planning standards.

**The Disaster Legislation Committee** aimed at examining and criticizing the existing earthquake legislation in Turkey. As already mentioned, in Turkey, the earthquake legislation is understood to encompass legislation directly addressing earthquake issues, spatial planning legislation, and building legislation (see also “3.1. Review in Turkish Disaster Legislation”).

**The main criticism relates to the chaotic condition of the earthquake legislation itself with myriad of laws, regulations, and decrees enacted by various institutions in various earthquake incidents without coordination.** As a result, many conflicts among different institutions have been experienced so far. It is strongly recommended to build a new coherent legislative system that furthers a common understanding, terminology, approach, and coordination among related institutions.

**The existing earthquake legislation moreover does not include definitions of key terms, such as risk, risk assessment, and disaster mitigation.** An effective earthquake legislation is especially important for Turkey where more than half of the population lives in urban areas. In accordance with the assumption of this study, urban areas are more vulnerable to earthquakes than rural areas due to the density of population and constructions.

Detailed criticism of existing earthquake legislation and proposals for new legislation will be elaborated under three following three subtitles:

**EARTHQUAKE LEGISLATION:** As noted above the existing earthquake legislation consists of myriad laws, decree laws and regulations with insufficient coordination among various institutions involved. To resolve this problem a new earthquake frame law clarifying responsibilities and interaction of various institutions in the pre-disaster period, in the course of disaster, and the post- disaster period is needed. The new frame law should outline disaster mitigation activities and approaches. Disaster mitigation activities should encompass:

- i) preparation of earthquake hazard and risk maps
- ii) building and developing local and international networks of earthquake information
- iii) preparation of urban earthquake risk maps and risk assessment studies
- iv) management of the earthquake insurance system

**PLANNING LEGISLATION:** The existing spatial planning system chiefly concentrates on earthquake recovery activities. After 1999 earthquakes, some amendments to the existing planning legislation addressed risk prevention (see also “3.1. Review in Turkish Disaster Legislation”). These amendments, however, are not sufficient to make settlements disaster resilient. The Public Works Law (Law No.3194) as a main planning law has been criticized for rather soft obligations and penalties with respect to building permits. According to a 1992 report on the assessment of the earthquake in Erzincan, especially articles 31, 32, and 42 of the existing Public Works Law need to be revised urgently. These articles set out obligations and penalties in the case of buildings without construction and/or settlement permits (Ergunay et al., 1993).

In terms of approaches, the spatial planning legislation needs to be revised with respect to risk assessment and disaster mitigation. For that purpose, the Disaster Legislation Committee proposes to incorporate some new terminologies and approaches into the existing planning legislation. These are “micro-zoning”, “mitigation plan”, and “urban transformation action plan”. The concept of “micro-zoning” requires the preparation of maps that relate earthquake risks to settlement areas. For this purpose, settlement areas could be divided into a few types of micro zones such as zones where buildings are prohibited, zones where special ground survey analyses are required, zones where buildings are permitted only subject to adherence to special technical standards, and safe zones. This approach should also be inserted into spatial plans. Spatial plans should also have plan notes to determine conditions of settlement and construction for each earthquake risk zone.

The “mitigation plan” is a document to provide guidance on coordinating outputs of risk analyses and risk management activities in various sectors such as housing, transportation, infrastructure, public services, etc. Such guidance can be provided, and hence mitigation plans be prepared, for settlements, regions, or an entire country. Mitigation plans serve to: (i) create data bases for risk



analyses of various sectors, (ii) assess risks, (iii) generate methods for risk reduction and sharing, (iv) prepare multi-stake holder mitigation programs in the short-, medium-, and long-run, (v) prepare public training and awareness programs and projects, and (vi) organize monitoring programs for mitigation activities. A mitigation plan should also address responsibilities of various institutions involved in action program of disaster mitigation for a settlement prone to earthquakes. A mitigation plan should be prepared as a base map of a spatial plan. All planning decisions should be taken in light of the risks pointed out by the mitigation plan.

An “urban transformation action plan” is a spatial plan with an action program; this might include resettlement activities, measures to strengthen all constructions, measures to upgrade the environment in high disaster risk areas pointed out in the mitigation plans.

**BUILDING LEGISLATION:** As already mentioned, the building legislation in Turkey comprises technical specifications for constructions, building related regulations, circulars, and standards for building materials. It also includes the Public Procurement Law No. 4734 with implementing regulations issued by the Ministry of Public Works and Settlement as well as, the Building Inspection Law No.4708 and the building insurance legislation. Provisions on buildings can furthermore be found in the Public Works Law (see also “3.1. Review of Turkish Disaster Legislation”). It is recommended to aggregate all these partial legislations in a new “Building Law” to improve efficiency and effectiveness in the quality control of building stocks.

As a complementary part, the Turkish building legislation entails provisions on the ground survey analysis. In the light of lessons learned from 1999 earthquakes, the following basic mistakes are addressed in the respect to ground survey analyses of buildings:

- The difference between geological surveys for spatial plans and ground survey analyses is often misunderstood or ignored. Geological surveys for spatial plans serve the purpose of proper site development for settlement areas. So far, results of geological surveys for spatial plans have been used in lieu of ground survey analyses for building dots. However, ground survey analyses are necessary to establish basic technical standards for buildings. To clarify roles of geological surveys and ground survey analyses, respectively, **the Ministry of Public Works and Settlements has prepared a document called “Basic Principles on Preparation of the Report on Ground Survey and Analysis of Building Foundations” in 1993. The document was prepared on the basis of Eurocode 7.**
- Lack of control and unqualified staff engaged in ground survey analyses have caused many failures and losses in earthquakes, even though such deficiencies are not peculiar to earthquake events. Ground survey and building foundation analyses should only be performed by expert engineers who bear all technical responsibilities. In the case of larger area ground survey and building foundation analyses, an expert engineer group consisting of geological engineers, geo-physical engineers, civil engineers, and mining engineers should be appointed (The Turkish Ministry of Public Works & Settlement; 2004).

**The Disaster Information System Committee** has been tasked with developing a Disaster Information System that would gather process and assess all geological and seismic data. A Disaster Information System (in Turkey mainly with a view to earthquakes) is considered as a useful basis for a Disaster Mitigation System. Building a Disaster Information System requires four steps, namely (i)rehabilitating and integrating existing seismic networks and observatories, (ii) designing a seismic and geological data base and building an earthquake data bank, (iii) determining earthquake threats, and (iv)micro-zoning.

**In Turkey, some existing seismic observatories and networks are already operative. These networks need to be upgraded in response to existing needs and in light of modern technologies.** Turkey needs a National Seismic Network System which will help to observe and asses seismic data, send reliable data rapidly to disaster emergency management units, disseminate information to the media and public, generate and file data for scientific researches on disaster mitigation. The Committee proposed a National Seismic Network System with the following sub-systems:

- ☒ A National Earthquake Observatory
- ☒ A National Seismic Network
- ☒ A National Network on Strong Motions
- ☒ Regional, Local and Temporal Networks

A reliable and sufficiently comprehensive data base on geological and seismic conditions is a prerequisite for determining real earthquake threats; such determination in turn provides the basis for disaster mitigation activities. The Committee proposed that data base concentrate mainly on active fault lines and paleo-seismology which explains numbers and frequency of hazardous earthquakes stemming from active fault lines in historical and pre-historical periods. A seismology map showing fault lines and protection zones should be prepared based on such data bases.

In conjunction with creating the aforementioned data base, the Committee also proposed to build an earthquake data bank which provides an opportunity to share and exchange all earthquake related data by all types of users, such as emergency management units, relief organizations, scientific researchers, etc. Some initiatives on this topic have been taken by some universities and municipalities in Turkey, but none of them has sufficiently progressed yet. Towards a national scale earthquake data bank, the Committee proposed to:

- ☒ Build an earthquake data center based on space technology and GIS(=Geological Information System) to manage the data bank,

- ☐ Adopt governmental policies that guide institutions in participating in data gathering and assessment that institutionalize coordination among the various institutions involved in the process,
- ☐ Define a common terminology and information standards for disasters and/or earthquakes, and
- ☐ Strengthen international cooperation on space based technology and organize training programs in this field.

As already mentioned, the concept of threat implies a combination of the probability (or frequency) of occurrence of a natural hazard (see also Annex III). In accordance with this basic definition, an earthquake threat can be described in terms of the probability of occurrence of a hazardous earthquake. The determination of earthquake threats in the frame of a National Disaster Information System implies analytical studies of geological, seismological and historical data, classification and mapping of earthquake sources, modeling on earthquake events and reoccurrences, and transforming outputs of earthquake threat analyses into technical specifications for buildings.

Micro-zoning is a method for preparing detailed analyses of the geological structure and ground conditions in regions threatened by earthquake. The micro-zoning mainly serves to purpose of determining earthquake hazard zones in urban plans. Micro-zoning can be implemented in three basic steps and scales: (i) In 1/25 000 scale maps, main characteristics of earthquakes are determined in accordance with probabilistic method for different regions. (ii) In 1/5 000 scale maps, geological, topographical, and geo-technical features of ground strata are determined for each regions. (iii) In 1/ 5 000 or 1/1 000 scale maps, micro zones are determined to guide planning decisions of urban settlements (The Turkish Ministry of Public Works & Settlement; 2004).

Since disaster mitigation has many interrelated sub-topics, different working committees sometimes have presented common solutions, e.g. micro-zoning. While this method is a proposal of the Disaster Legislation Committee, the Committee of Disaster Information System also suggests this method as a disaster mitigation measure.

**The Examination of Existing Building Stock and Building Inspection Committee** aimed at analyzing the disaster/earthquake resilience of existing building stocks as well as at determining problematic areas in the building process and possible solutions for improvements. The Committee proposed a method of graduated assessment of the existing building stock. This method envisages three grades of assessment:

1. Primary Grade: Quality assessment of buildings on the basis of observation from outside, e.g. from the street. At this level, data such as outlook of a building, number of storeys, single or attached building, and overhangs can be collected.

2. Secondary Grade: Detailed analysis and data collection from the inside of a building. At this level, data are collected from architectural and structural plans, sections, etc. The assessment at this level mostly serves risk classification. The outcomes of this assessment improve decision-making on the future of the building stocks, such as retrofitting, removal, and renovation (Sucuoğlu, 2006).

3. Tertiary Grade: At this level, detailed analysis is performed on buildings in need of special attention, such as highly damaged buildings and important public service buildings. Detailed information on ground survey of the building, building materials, bearing system materials, etc. is needed for that purpose.

The proposed method of graduated assessment should also be supported by data from earthquake risk maps and micro-zoning. The stability of buildings and building performance can be measured by synthesizing geological data and building data.

As another important element of the method of graduated assessment foresees a classification of building stock. The Committee proposed to classify urban building stocks in Turkey according to their use and building types as follows:

- ☐ 1-7 storey concrete buildings
- ☐ 1-5 storey masonry buildings
- ☐ High rise buildings (more than 7 storeys), such as business centers and residential buildings
- ☐ Schools, hospitals, and fire brigade buildings
- ☐ Public buildings
  
- ☐ Single industrial buildings, such as 1-2 storey concrete buildings, prefabricated buildings, organized industrial site buildings, etc.
- ☐ Industrial establishments, such as factories
- ☐ Strategically important buildings
- ☐ Buildings containing hazardous waste
- ☐ Bridges and viaducts
- ☐ Wood constructions
- ☐ Infrastructure networks
- ☐ Cultural assets

The method of graduated assessment for the examination and measurement of earthquake safety of existing building stock should be supported by building inspection. Building inspection involves two steps, namely project control and construction control. Project control denotes the control of architectural, static, electrical plans by the authorities in charge according to principles drawn laid down in the Public Works Law (Law No. 3194). Construction control is based on the Building Inspection Law (Law No.4708) (see also “3.1. Review in Turkish Disaster Legislation”). The Building Inspection Law sets out a building inspection system aimed at saving lives and assets, increasing the quality of buildings for that purpose, clarifying responsibilities and authorities of technical staff such as building contractors and building inspection institutions<sup>2</sup>, architect and engineer controllers in the building process. The building inspection system also aims at increasing awareness of consumers, protecting of consumers, and applying sanctions in the case of failure in legal aspects. The implementation of the system is presently tested in 19 provinces in Turkey on a pilot implementation basis.

The Building Inspection Law (Law No.4708) has some weaknesses. Most notably is the failure of setting out a compulsory the building insurance system in the frame of the Law. **The Committee strongly recommended a building insurance system that would facilitate improving the solidity of buildings and the prompt repair of constructional damages** (The Turkish Ministry of Public Works & Settlement; 2004).

**The Building Materials Committee** aimed at analyzing existing construction quality and building materials in Turkey and at developing some recommendations on improving the build-up environment. Since this thesis mainly focuses on spatial planning for urban settlements, the topic of building materials is not studied in detailed. Only the quality and usage of building materials are significant in the context of the present thesis.

The Committee categorized building materials into three groups, namely main building materials, repairing and rehabilitation materials, and isolation materials. Two main problem areas related with building materials are -relevant in the present context- inadequate quality of building materials and improper use of building materials in a construction. For instance, buildings have severe damages after earthquakes due to low quality of building materials, failure to observe technical standards in the construction process, and improper condition of fixing building materials. In light of lessons learned in the 1999 Marmara earthquakes in Turkey, the Regulation on “Building Materials” was adopted (issued in the official gazette of 1.12.2006, no.26363). This Regulation was based on EU Directives on “Construction Products” (EU Directive No.89/106EEC).

The Committee also categorized materials used in existing building bearing systems in Turkey as follow (The Turkish Ministry of Public Works & Settlement; 2004):

-In Concrete Construction: Concrete and steel installation

-In Masonry Construction: Bricks

-In Wood Construction: Wooden materials

-In Construction of Rural Areas (Stone & Sun-dried Brick construction): Stone and Sun-dried Bricks

-In Steel Construction: Steel and metal materials

Upon the analysis of the existing situation, the Committee made the following recommendations towards improving the quality and use of building materials (The Turkish Ministry of Public Works & Settlement; 2004):

-A comprehensive legislation on building materials should be prepared.

-A market surveillance and control system for building materials based on the existing and/or new legislation should be established.

-The number of building material testing laboratories should be increased to support the market surveillance and control system.

-A Supreme Council for building materials which guides surveillance and control of building material with respect to issues of principle building, activities, control and training should be established.

**The Funding and Disaster Insurance Committee** aimed at mitigating disaster risks by a disaster insurance system and designing a model for financing necessary activities in pre-disaster and after disaster periods. Since all aforementioned ad hoc committees concentrated on earthquakes, an insurance system and a finance model were derived from the dynamics of earthquakes.

**The Committee recommended creating the following systems and facilities for financing activities in the pre-disaster, in disaster, and post-disaster periods:**

**-A Disaster Insurance System**

**-A National Disaster Fund**

**-A Model on Sustainable Housing Ownership Subsidy and Rehabilitation**

In Turkey, so far, activities, measures, and programs in the course of disasters and in post-disaster periods have been financed by the central government budget. Foreign grants and credits have been obtained and new taxes have been imposed to finance budget deficits emanating from disaster related expenditures and investments. This traditional mode of financing had causes a lack of investments in disaster preparedness in Turkey. While a compulsory earthquake insurance system was established in 2000, the following problems remain unresolved (see also "3.1.Review in Turkish Disaster Legislation"):

-Due to economic crises in the wake of disasters, lack of public awareness and recognition of earthquake risks, and weak enforcement of the compulsory earthquake insurance system, the rate of insured dwelling units remains low.

-The Natural Disaster Insurance Institution under the Undersecretariat of the Turkish Treasury faces organizational and legislative difficulties. It in particular needs an enabling legislation which provides sufficient authority and sanctions to implement compulsory earthquake insurance system.

-Especially after 1999, the increasing number of devastating disasters worldwide lead to a shortage of reinsurance capacity and a rise of reinsurance premiums. This has adversely affected the insurance market in Turkey for disaster risks.

In light of these problems, Governmental incentives are strongly advised by the Committee to increase the number of earthquake insurance holders. In addition to such incentives, the following financing methods are recommended to decrease the risk of earthquakes and the costs of possible earthquake hazards.

**Since Turkey is a country prone to disasters which may exceed her own coping capacity, the Committee strongly advised to create a main disaster authority that organizes disaster preparedness and response activities with the support of special funds and an organizational structure**(The Turkish Ministry of Public Works & Settlement, 2004). Although a special “Earthquake Fund” had already existed, the fund was in the wake of 1999 earthquakes transferred to the central budget (see also “3.2.Institutions Involved the Disaster Mitigation Process”). The Committee strongly recommended a new disaster fund supported by some other monetary resources such as some transfers from the insurance sector, revenues from the use of some goods and commodities (e.g. certain percentage of Value Added Tax), and some portions of the central budget revenues.

Another recommendation of the Committee was a model for a sustainable housing ownership and rehabilitation subsidy to help people living in earthquake prone areas to improve the building stock. This model recommends public-private partnerships for new housing areas and rehabilitation projects for existing settlement areas (The Turkish Ministry of Public Works & Settlement; 2004). Recommendations of the Committee do not imply a fundamentally different approach than that followed by the Ministry of Public Works and Settlement in earthquake related projects. The latter Ministry prepares many plans and construction projects for temporary settlement (prefabricated units for earthquake victims after earthquakes) and permanent settlement areas. Nevertheless the Ministry of Public Works and Settlement encounters considerable difficulties due to the lack of financial resources and technical personnel. Better results could be achieved through a public-private partnership model with the support of financing methods as proposed by the Committee. The author’s practical experiences on earthquake mitigation projects suggests that existing and experienced institutions rather than

newly founded institutions should be responsible for planning and constructing new settlement areas as well as rehabilitating existing settlement areas. Otherwise all lessons learned from former disasters can fall into oblivion.

In addition to the above outlined financial proposals, regional and international cooperation in accordance with the principles of the Yokohama Strategy and the Hyogo Framework, is essential to mitigate disaster risks including strengthening of financial coping capacities (see also “2.5. International Seminars and Conventions”).

**The Disaster Training Committee** aimed at organizing training on disaster mitigation topics at various levels. The task of this Committee hence included compiling techniques and methods that should be used in disaster mitigation of a country like Turkey where 92% of its land is prone to earthquakes (See also “3. Disaster Mitigation Approaches and Lessons Learned in Turkey”). Before designing effective training methods and techniques, the Committee drew a hazard profile of earthquakes in Turkey with the following items:

☐ Casualties

☐ Injuries, permanent physical disabilities, and mental defects depending on post traumatic stress

☐ Loss of livestock

☐ Loss of building

☐ Building hazards

☐ Transportation route hazards (roads, railways, ports, etc.)

☐ Infrastructure hazards (sewerage, pipelines, etc.)

☐ Technical service hazards (electricity, drinking water, energy lines, telecommunication networks, etc.)

☐ Interruption in public services (security, health, education, etc.)

☐ Hazards of cultural assets (historic buildings, culturally protected buildings, archaeological sites, etc.)

☐ Environmental degradation

With a view to the above hazard items, **the Committee distinguished between two main training groups, namely formal education and mass education.** Formal education comprehends compulsory education from pre-school education to university education. In this process, hazard-related theoretical and practical lectures are inserted into students’ study curriculum. Mass education relies on the voluntary participation and contribution of people. In the mass education



process, there are two main target groups, namely (i) people who are prone to disasters and (ii) politicians, administrative staff, and public personnel who take place in the political, economic, social, and physical planning procedures. More specifically, the Committee identified four target groups for mass education:

- ☐ National education
- ☐ Adult education
- ☐ On-the-job training
- ☐ Training of business groups and NGOs

In national and adult education, priority is given to teachers, heads of districts/villages, group leaders and members of district volunteer organizations, building managers, chaplains, disabled people. The primary target groups for on-the job training are the staff of central authorities, local authorities, sectors of civil defence, fire brigades, public works, conservation of cultural, historical, and natural environment, education, rural affairs and forestry, health, technical infrastructure, transportation, telecommunication, security, and armed forces. Technical training and certification programs for professionals and university students in spatial planning, geology, and the construction sector can be carried out in the frame of both on-the-job training programs and training of business groups and NGOs. Especially in earthquakes, where risks are largely exacerbated by improper constructions, co-workers and technicians in spatial planning, geology, and construction sectors should be well trained on standards, qualified works, and new technologies. Media representatives are another target group which should be taken into a consideration for training of business groups and NGOs. The Media representatives should be trained on methods of obtaining reliable and transparent information and disseminating such information without creating panic among the people, as well as on building efficient and effective relationship with governmental bodies and scientific groups in light of the psychology of people prone to disasters. **The Media should also be trained on how to inform people about risks and increase public awareness of disasters** (The Turkish Ministry of Public Works & Settlement; 2004).

**It is moreover important to increase community awareness by training people on what should be done before, during, and after disasters.** Such training programs can be carried out in meeting format such as lectures, seminars, workshops as well as published documents such as handbooks, posters, etc. Prior to disasters, people and institutions can be trained on techniques of staying alive in the course of disasters, search and rescue activities, first aid methods, construction qualities in housing markets, and risk awareness for their living environment. Public administration staff should also be trained in disaster preparedness, response, relief, and recovery process, in addition to disaster and risk management methods and strategies. After

disasters, people and institutions should be organized to conclude lessons learned and overall criticism of last events (Karanci & Aksit, 2000).

The Disaster Training Committee finally recommended to include disaster management in the university curricula for city planning, architecture, civil engineering, public administration, and other related disciplines. These curricula should offer lectures on disaster risks, disaster mitigation, disaster management, and related topics (The Turkish Ministry of Public Works & Settlement; 2004).

### **3.8. SWOT Analysis as an Evaluation**

In this part, the findings under the above chapters (“3.3”) will be evaluated in terms of Strengths-Weaknesses-Opportunities-Threats (SWOT). A SWOT Analysis will be helpful in designing a best model for disaster resilience for several purposes, such as decision making, physical planning, controlling procedures, participation and organization.

Originally, the SWOT analysis was designed as a strategic tool for planning and decision making at multiple levels within an enterprise or public or private organization. The father of the SWOT analysis was Albert Humphrey. Albert Humphrey and Robert Stewart developed the SWOT analysis in a team work with colleagues in the Stanford Research Institute during 1960s. The SWOT Analysis was initially developed for business management purposes, soon became a planning tool (SWOT Analysis Resource Page, 2008).

Four aspects of the SWOT analysis can be defined in several ways. In this study, the Turkish Disaster Mitigation System will be elaborated in the light of following criteria of the SWOT aspects: (ص139- سوات)

**-Strengths:** As a simple definition, the strengths of the Turkish Disaster Mitigation System denote the positive results, achievements, and sustainable trends to the benefit of various stakeholders, such as institutions, organizations, media, business owners, and citizens. From a deeper perspective, strengths can be determined in terms of factors crucial to the effectiveness of the mitigation system, namely general advantageous in comparison with other countries, geographical location, geo-political status, institutional coping capacities, resources, assets, experience & knowledge, innovations & technology used, finance & marketing items, cultural level (literacy, value judgments, attitudes) & awareness, administrative & management process and procedures.

**-Weaknesses:** Weaknesses denote exactly the opposite of strengths. However, in order to define weaknesses of a disaster mitigation system, it is also possible to use similar criteria as for “strengths”. For instance, while the vast human resources in Turkey can be evaluated as strength, over population and/or misallocation of human resources may well be interpreted as weakness.

To avoid confusion, different criteria are suggested for measuring strengths and weaknesses, respectively, to the extent possible. Thus, weaknesses of the disaster mitigation system may best

be measured in terms of general disadvantageous, adaptation and development capacities in general, institutional and legislative gaps, regional cohesion, shortage of resources, vulnerable items, frequency of disasters and time frames for preparedness and recovery, reliability of institutions, authorities, and other stake holders in the disaster mitigation system.

**-Opportunities:** Although opportunities have some similarities with strengths; the main distinctive feature of opportunities can be determined as positives stemming from external effects. The criteria for assessing opportunities can be a peaceful and stable political atmosphere, positive global influences, new technologies and business sectors, new markets and export quotes, willingness of foreign partners in cooperation on various topics, such as information, disaster projects, funding, exchange programs, etc., innovations and international scientific studies.

**-Threats:** Similar to the relationship between opportunities and strengths, threats have some common features with weaknesses. Both threats and weaknesses refer to negatives yet, while threats refer to external negatives on the disaster mitigation system, weaknesses denote shortcomings in the system.

Criteria used in the SWOT analysis for assessing opportunities may also be used for assessing threats. For instance while the geo-political situation of Turkey provides some advantageous, it may also entangle Turkey in political problems. While Turkey has a chance of building cooperation in her region on earthquake mitigation, such efforts can suffer from the political turmoil in her neighbour countries. The following aspects may be taken into account is assessing threats in the context of a SWOT analysis: disaster profiles in neighbouring regions, adverse political developments, international and bilateral agreements and conventions, environmental effects such as transboundary waters, pollutions and contaminations, adverse climate effects such as global warming, erosion, external market dynamics such as import, export, oil prices, changing trends in technology and consumption behaviours.

In the following tables (see also table 8 & 9), disaster mitigation activities and programs in Turkey are examined on the basis of the SWOT analysis. Disaster mitigation activities and programs in Turkey are organized in accordance with the terms of reference of working committees of the Ministry of Public Works and Settlement in 2004 (see also “3.3.Criticism on Existing Disaster Mitigation System and Process in Turkey”). However, it is useful to add two remarkable issues to the results of the following tables. As already mentioned, the first issue is lack of general policy and/or master plan for disasters in Turkey. Although Turkey is one of the high disaster risk countries, such topics as urban risk assessment, disaster threats for urban settlement, disaster mitigation to achieve sustainable urban settlements are not mentioned at all in the recent (9th plan for 7 years) Development Plan. The second issue is many failures of governmental organization in disaster response activities of 1999 earthquakes due to many shortcomings. These shortcomings are very similar to the various weaknesses underlined in below tables. Hence, resolution of weaknesses mentioned below will serve to a better disaster mitigation process as well as an effective disaster response program in Turkey. جداول سوات در 3 صفحه – از.

As an overall assessment of disaster mitigation activities and programs in Turkey, some basic strengths can be acknowledged in terms of institutions, theoretical frame of legislation, spatial planning standards and building codes, technical staff, building inspection and insurance system. These strengths are, however, undermined by many shortcomings on specifics. For instance, Turkey has several institutions specializing on disasters, but efficient operations of these institutions are curtailed by instable institutional structure, budgetary constraints, and inadequate organization and coordination. On the other hand, the 1999 earthquakes gave rise to reviewing the entire disaster mitigation system. Many initiatives and ongoing studies on legislation, institution-building, insurance, and quality control look promising for disaster resilient settlements.

Institutional cooperation, coordination, and organization are three key issues to be developed in Turkey to sustain various initiatives after the 1999 earthquakes. Experiences of Turkey in former devastating earthquakes show that inefficiencies in institutional organization, coordination and cooperation are main threats for a modern disaster mitigation system (see also “3. Disaster Mitigation Approaches and Lessons Learned in Turkey” and “3.2. Institutions Involved in the Disaster Mitigation Process”). In this respect, after 1999 earthquakes, an initiative for establishing a single disaster coordinator institution is an promising event. However, the process and procedures of organization of this authority is still continuing due to an introduction of new legislation and disagreement of relevant institutions (see also Annex I.17).

Lessons learned from 1999 earthquakes also emphasized the necessity of building a Disaster Information System in Turkey. Despite of the presence of several seismic observatories and data collecting institutions, there are many problems in data collecting and sharing. Thus, Turkey needs a National Seismic Network System to provide a modern services in observing and assessing seismic data as well as user friendly platform for data sharing and updating. Training and public awareness are other weaknesses in such a densely populated country as Turkey. It is obvious that an effective disaster mitigation system cannot be built on well designed institutional structures and legislation alone. **It should also be supported by public awareness which requires public training.** Turkey is capable of organizing disaster training programs for a broad public. According to outputs of the SWOT Analysis above, new curricula and approaches should be introduced in Turkey. For instance, disaster training programs should not be limited to teaching survival techniques to the public in the course of disasters. Various training programs can be designed for different target groups such as local authorities, citizens, trainer for trainees, etc. The ultimate issue of public awareness and training refers the training of Media on public information. According to the lessons learned of 1999 earthquakes, it is understood that citizens can reduce the willingness to comply with essential rules and procedures of disaster mitigation



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activities when they are misinformed about some public services or when they are in a panic due to some inappropriate information of the media.

**As a consequence, lessons learned from the 1999 earthquakes can provide guidance to design a disaster resilience model for urban settlements. While the evaluation of best international examples gives precious inspirations to develop the model (see also table 5), the results of the SWOT Analysis above share more hints of the disaster mitigation capacity of a country prone to devastating earthquakes.**

تا اول فصل 4 - صفحه 147