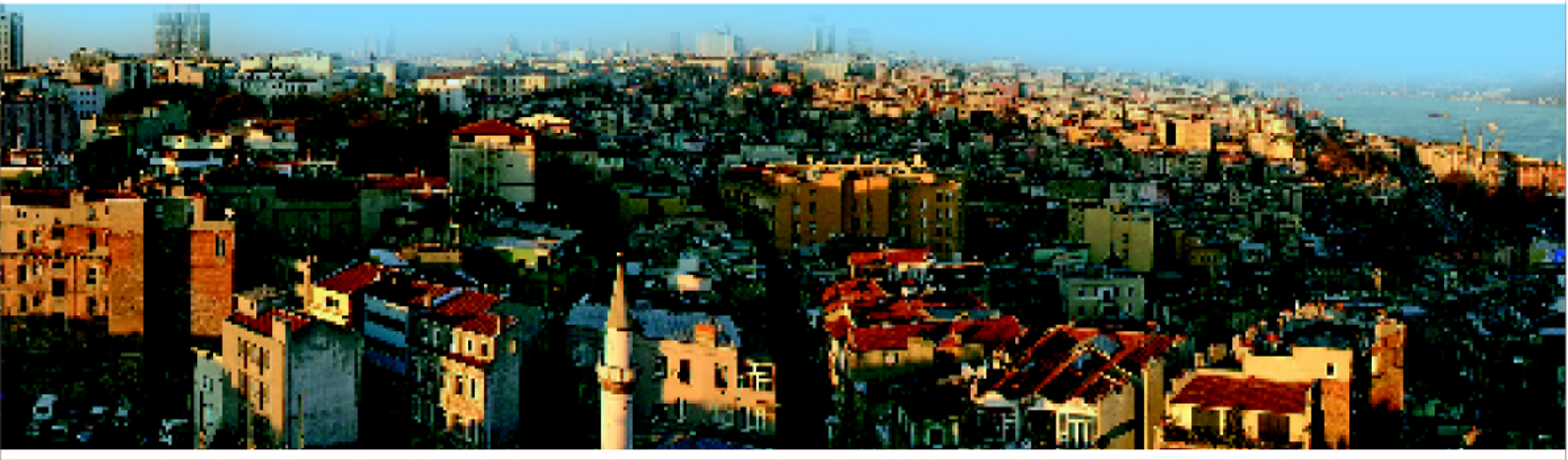
Istanbul Seismic Risk Mitigation and
Emergency Preparedness Project
ISMEP

Urban Planning and Construction for Disaster Mitigation

TRAINING GUIDELINE FOR COMMUNITY REPRESENTATIVES



TRAINING GUIDELINE FOR COMMUNITY REPRESENTATIVES

TRAININGS ON SAFE CITY SAFE LIFE

Urban Planning and Construction for Disaster Mitigation

Istanbul

April 2009

TRAINING GUIDELINE FOR COMMUNITY REPRESENTATIVES

TRAININGS ON SAFE CITY SAFE LIFE

Urban Planning and Construction for Disaster Mitigation

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Introduction

Aim

The aim of this training program is to give information to the participants on natural hazards and their impacts on urban land, strategies on disaster preparedness, their role and responsibilities and to provide necessary skills on disaster mitigation. The program, moreover, shows to the participants how they can be involved to the disaster mitigation activities and their responsibilities.

Scope

This training guideline focuses on urban planning and construction in the frame of disaster mitigation with; natural hazards and their impacts on settlements, strategies on disaster preparedness, structural and urban risks and activities to reduce probable risks. In this context, participatory techniques will be applied using the experiences and environment of participants to examine the possible method and techniques that can be used for.

Motivation

The motivation of this program is the need of disaster mitigation planning due to a collective method which can support long term social and physical rehabilitation against natural hazards. It is crucial that cities are planned disaster resilient and sustainable, especially in Turkey where devastating hazards occur frequently. Disaster preparedness should be provided not only at urban scale but also at building scale. Technical staff have very important roles to achieve this process so called "Safe City, Safe Life". Briefly, related issues are required to be informed and disseminated. This training program, therefore, aims to contribute necessary information for community representatives.

Definitions

Disaster mitigation strategies on urban planning stress sustainable development, livable and safe cities. This approach is based on, in one hand, the reduction of probable urban risks which are likely to cause deaths and losses and on the other hand, integration of policies and strategies with public ownership. Disaster mitigation on urban planning gives responsibilities to all stakeholders of the community. These responsibilities can be either collective or individual. Cities have chance to be prepared against disasters by means of participatory disaster mitigation planning.

Target Group

The target groups of this training program are local decision makers, local technical staff and community representatives who are the key stakeholders in disaster mitigation on urban planning and construction process. This training guideline is prepared for community representatives and citizens.

Main Objectives of the Guideline

This training program which focuses on disaster mitigation at both urban and building scales, aims to give information to local decision makers, local technical staff and community about situation which they will face with and how to deal with. These are as follows:

1 **Enlighten urban and structural measures in urban risk reduction**

Existance of un-planned settlements causes great losses during natural hazards and it worsens the way of dealing with disasters. Urban planning tools are effective to reduce or eliminate probable risks. This training program aims to eliminate or reduce risks in urban areas, to evaluate current state at urban and structural scale and to develop and how to apply necessary strategies and techniques.

2 **Provide synergy among participants**

Participatory planning requires developed decision making, applied and monitored by all stakeholders. This training program aims to activate target groups to disaster mitigation with a perspective of participatory planning which focuses on " producing ideas together".

3 **Improve participatory decision making and using relevant skills**

In order to have concrete success in collective decision making, the integrative process and related methods and techniques should be provided. This training program targets learning by doing actions that participants develop skills which would help them to enhance their new knowledge due to case studies and to apply and to disseminate what they have learned.

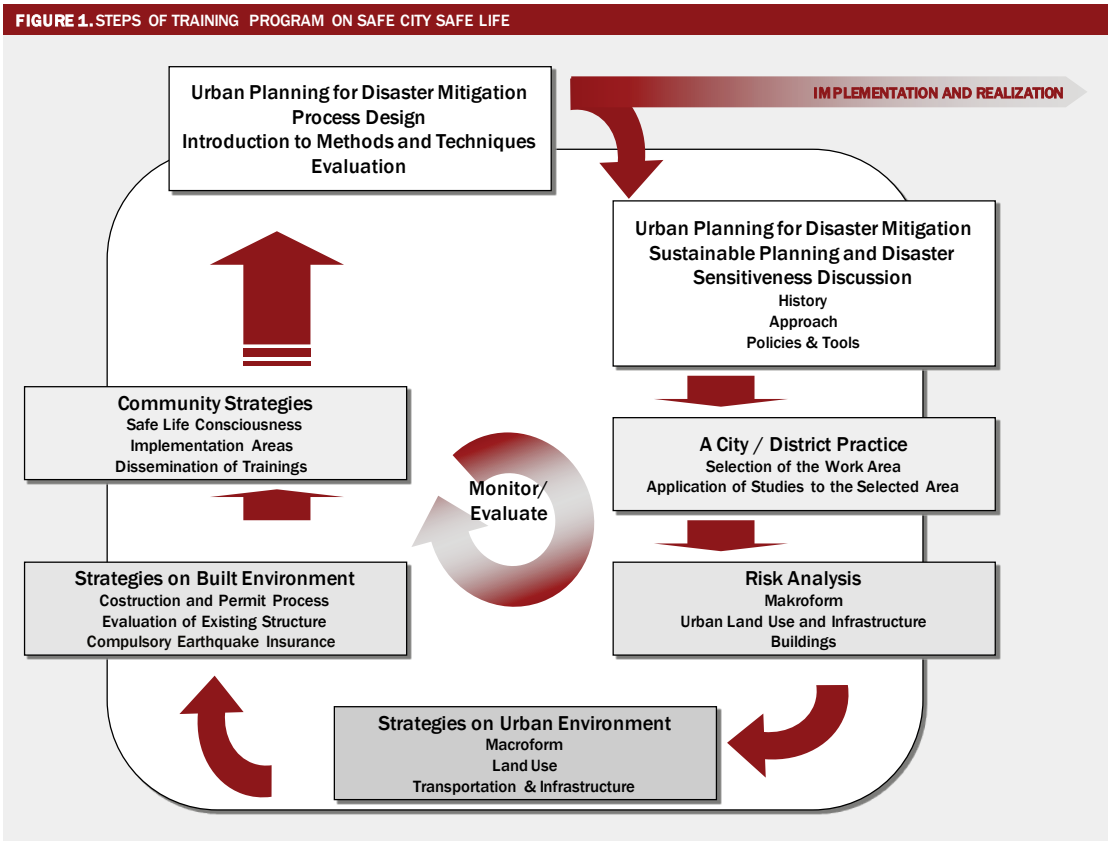
Knowledge and Skills

The objectives that participants would achieve are; evaluation of risks related to natural hazards, techniques in disaster mitigation, precautions and responsibilities on urban and building scales, participatory planning process and its implementation methods. Beside theoretical information, participants will practice discussion methods. On the other hand, the training program will help to increase their risk perception on building environment and land uses.

Content of the Program

The main aim of the training program is to evaluate precautions on urban and building scale against natural hazards with a perspective of participatory planning in disaster mitigation (Figure 1). In the first step, natural hazards and their impacts on settlements will be evaluated. In this section, risk related hazards on settlements will be introduced. In this framework, the importance of urban planning and construction on disaster mitigation will be underlined. Subsequently, strategies on urban and building scales, necessary tools and collective responsibilities will be defined. In this case, participants will evaluate their own living environment. At the last stage, mitigation strategies on urban risk reduction, methods and techniques will be summarized and evaluation of the training program will be done.

FIGURE 1. STEPS OF TRAINING PROGRAM ON SAFE CITY SAFE LIFE



Part 1 – Natural Hazards and Their Impacts on Settlements

Natural Hazards: Natural hazards such as earthquakes, floods, land slides, volcanic eruptions and storms which occur frequently for hundreds or thousands of years, now threathen settlements and can cause disasters because of the rapid increase and expansion of the world's population. Especially in big cities, when no precautions are taken, natural hazards affect not only the geographical area of the occurance but also large territories and even countries by the means of social economic consequences.

However, all natural hazards are not defined as disasters. For instance, while an earthquake with a magnitude of 8,5 in Yakutat Gulf at Alaska in 1899 is named as "*big natural event*", on the other hand, 1999's earthquakes at Kocaeli and Duzce-Kaynasli, 2004 earthquake at Sumatra and 2008 earthquake at China are called "*natural disasters*" because of the great size of death tolls, injuries and economic losses. (Figure 2)

FIGURE 2. RELATION OF NATURAL HAZARDS – RISK - DISASTER

Disaster: Any event causing negative impacts on human activities or lifes is called as disaster. Disasters are related the size of losses due to the occurrence of natural hazards.

Disasters can be cited into two groups: **1)** Natural; **2)** Technological.

NATURAL DISASTERS	TECHNOLOGICAL DISASTERS
• **Atmospheric** (*ex*: storms, freeze, drought) • **Hydrological** (*ex*: flood, melting of glaciers) • **Geological** (*ex*: earthquake, landslide, volcanic eruption) • **Biological** (*ex*: epidemic)	• **Fire** • **War** • **Accidents** (*ex*: car accidents, airplane accidents) • **Explosions**

In this section, natural hazards and settlements will be introduced in detailed first, and secondly the probable impacts when natural hazards hit settlements and types of risks to be faced with.

Natural Hazards

Earthquake, flood, landslide and fire are most well-known natural hazards. These kinds of hazards can occur in everywhere of the world. While the frequencies of occurrence of natural hazards are nearly steady in whole around the world, according to the exposed population and settlements the impacts of events vary. Especially, less developed and developing countries suffer from natural hazards more because of the rapid population growth, expansion of urban land and settling onto inconvenient lands which increase the intensity of hazards.

EARTHQUAKES IN TURKEY

- 96%EARTHQUAKE PRONE AREA
- 98% OF THE TOTAL POPULATION LIVE ON THIS AREA
- 70% OF THE TOTAL POPULATION LIVE ON THE 1ST AND 2ND DEGREE EARTHQUAKE ZONE
- IN THE LAST 100 YEARS, IN EVERY 4,5 YEARS AN EARTHQUAKE BIGGER THAN Mw=7.0 OCCURED
- IN THE LAST 100 YEARS, 118 EARTHQUAKE BIGGER THAN Mw=5.5 OCCURED
- IN THE LAST 60 YEARS, 60% OF ALL STRUCTURAL DAMAGES WERE CAUSED BY EARTHQUAKES
- 95% OF DEAD TOLL DUE TO EARTHQUAKES WERE CAUSED BY STRUCTURAL DAMAGES

Referance: Serdar, İ. (2004). Deprem ile birlikte yaşamak. *Türkiye Mühendislik Haberleri*, 433, 2004/5.

EARTHQUAKE: Earthquakes occur because of the ruptures at the earth crust which release of big amount of energy propagating like waves and which cause big shakings on the earth. *The intensity of an earthquake* depends on: magnitude of earthquake, distance from the epicenter, ground conditions and building quality. Earthquakes can also trigger *secondary hazards* such as tsunami, land slides, floods and fires. Figure 3 and figure 4 show seismic activities in Turkey between 1900-2001.

FIGURE 3. SEISMIC ACTIVITIES IN TURKEY BETWEEN 1900-2001

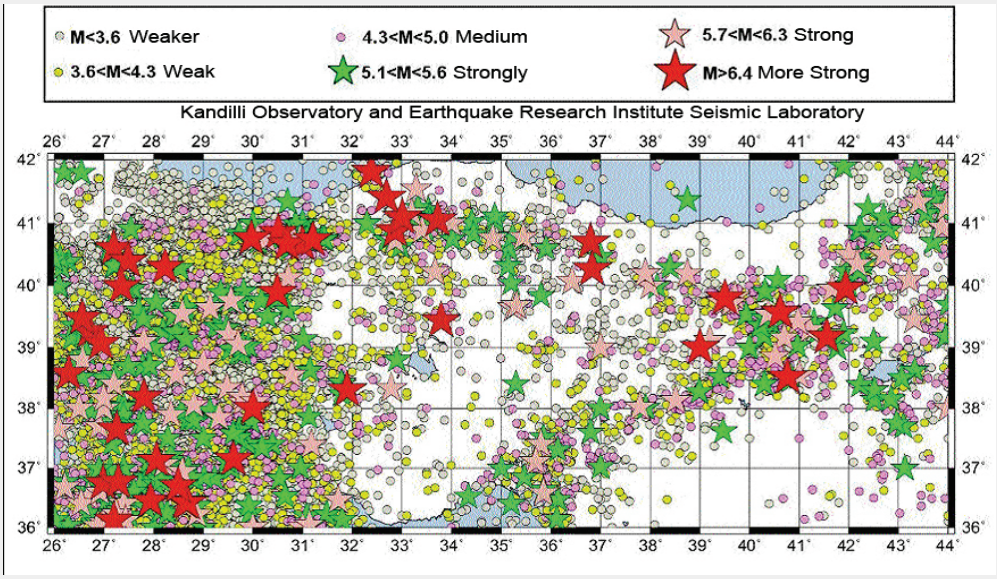


FIGURE 4 DAMAGES AND LOSSES FROM MAJOR EARTHQUAKES OCCURRED AFTER 1990

EARTHQUAKE	MAGNITUDE	DAMAGES AND LOSSES
1992 ERZİNCAN	6.4	DEAD TOLL 653; INJURY 3850. 3200 HOUSING AND 850 BUSINESS UNITS WERE TOTALLY COLLAPSED OR RECEIVED SEVERE DAMAGE. 12000 HOUSING AND 700 BUSINESS UNITS RECEIVED MEDIUM AND LOW DAMAGES (ŞENGEZER, 1999).
1995 DİNAR	6.2	DEAD TOLL 90-1000; INJURY 170-230. DAMAGES ON HOUSING: 2727 HEAVILY, 1417 MEDIUM, 2166 LOW. DAMAGES ON BUSINESS UNITS: 282 HEAVILY, 231 MEDIUM, 148 LOW (TMMOB, 1998).
1998 ADANA-CEYHAN	5.9	DEAD TOLL 145. ACCORDING TO THE OFFICIAL DECLARATION; 1,113 HOUSING AND 11 BUSINESS UNITS WERE TOTALLY COLLAPSED, 9,067 HOUSING AND 210 BUSINESS UNITS RECEIVED HEAVY DAMAGES, 21,052 HOUSING AND 581 BUSINESS UNITS RECEIVED LIGHT DAMAGES (AFET İŞLERİ GENEL MÜDÜRLÜĞÜ, 1998).
1999 KOCAELİ	7.4	DEAD TOLL 18000. 75,000 HOUSING AND 12,500 BUSINESS UNITS WERE COLLAPSED. 74,000 HOUSING AND 11,000 BUSINESS UNITS RECEIVED MEDIUM DAMAGES, 89,000 HOUSING ANDBUSINESS UNITS RECEIVED SLIGHT DAMAGES. SEVERAL ADMINISTRATIVE BUILDINGS WERE EITHER COLLAPSED OR DAMAGED
1999 BOLU DÜZCE	7.2	150,000 FAMILY BECAME HOMELESS (AFET İŞLERİ GENEL MÜDÜRLÜĞÜ, 1999). DEAD TOLL 845, INJURY 5,000 (BELGENET, 2002).

Reference: Kanlı, İ.B., & Ünal, Y. (2004). Üst düzey planlama sistemi ve afet yönetimi ilişkileri, *İTÜ Dergisi*, 3, 1.

LAND SLIDES: Land slides occur due to several reasons which caused by soil unstability at the steep hills and or filled soil (Figure 5). *The main reasons* of land slides are: high precipitation, melting of snow, increase of underground water, overload on hill, earthquake and volcanic eruption. *Land slides occur mostly* on spring and fall when there are high precipitations. For instance, especially at the Black Sea Region due to snow melting the number of land slides events increase.

LAND SLIDE

IF A BUILDING IS CONSTRUCTED ON A LAND SLIDE PRONE AREA:

[MASS OF SLIDING LAND] +

[MASS OF BUILDING] =

INCREASE IN SLIDING PROCESS !

FLOOD: High precipitation and melting snow can also cause floods. When there is no precaution taken floods may cause inundations. The most crucial thing about river basin is it is not limited with where the water is running. River basins are quite large areas where water is running in one plan and later on another plan because while the water is running it brings particules and stones which overlay during the time. Big earthquakes can give damage to dams. A dam which experienced a big earthquake is vulnerable and weak to hold tons of water behind its huge wall. For instance, at the 2008 earthquake in China, because of the damages occurred in dam, near by settlements were evacuated to prevent another big disaster.

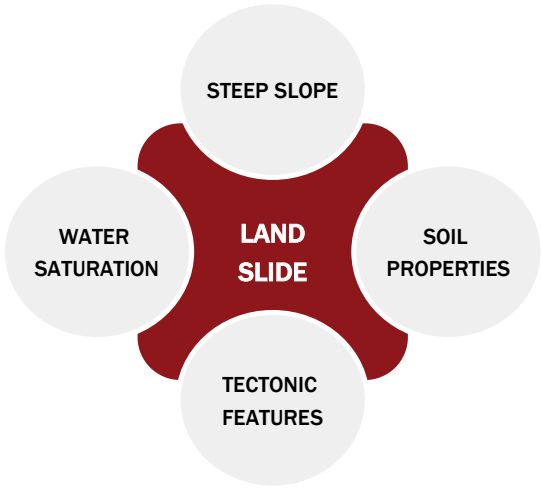
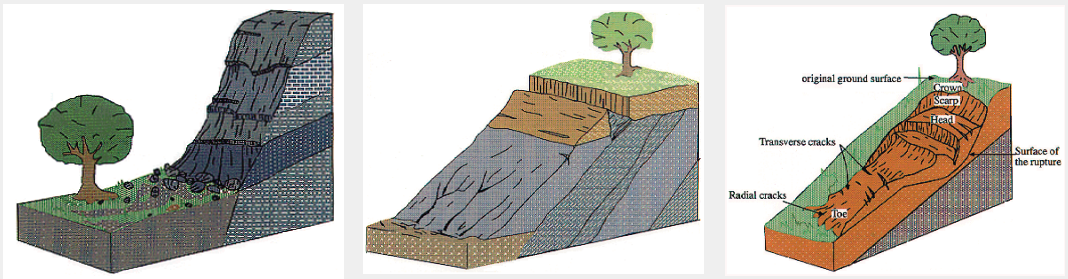


FIGURE 5 TYPES OF LANDSLIDES



1) 2) 3)

FIRES TRIGGERED BY EARTHQUAKES

- 1923 KANTO (JAPAN). 110.000 OF THE TOTAL DEAD TOLL (120.000) WAS CAUSED BY FIRES
- 1995 KOBE(JAPAN). 4500 OF THE TOTAL DEAD TOLL (5500) WAS CAUSED BY FIRES
- 1999 KOCAELİ. FIRE STARTED AT TUPRAS OIL RAFINERY WHICH CAUSED A LOSS OF 32M USD (2% OF THE TOTAL ECONOMIC LOSS)

FIRES: Fires, which are called as technological hazards, occur because of careless actions or misusage flammable/explosive materials and also after big earthquakes due to damages at structures and infrastructures. Especially, the most vulnerable facilities are big factories, oil refineries, warehouses, electrical and natural gas lines. Fires triggered by earthquake can be more devastating than the direct impacts of earthquakes.

Components of Cities

The probable impacts of natural hazards on structural and infrastructural systems of our cities depend on ground conditions. Earth crust is covered by soil and rocks. This cover experiences long term transformation of meteorological conditions, erosions, chemical reactions and interactions during the 4,6 billion years. Earthquake waves are propagating through these layers with different responses.

EARTHQUAKE – SOIL RELATION

BUILDING CONSTRUCTED ON THE ROCK FEELS SHAKING IN SHORT PERIODS.

ON THE SOFT SOIL VIBRATIONS LAST LONGER.

Ground conditions increase or decrease the impacts of earthquakes according to intensity.

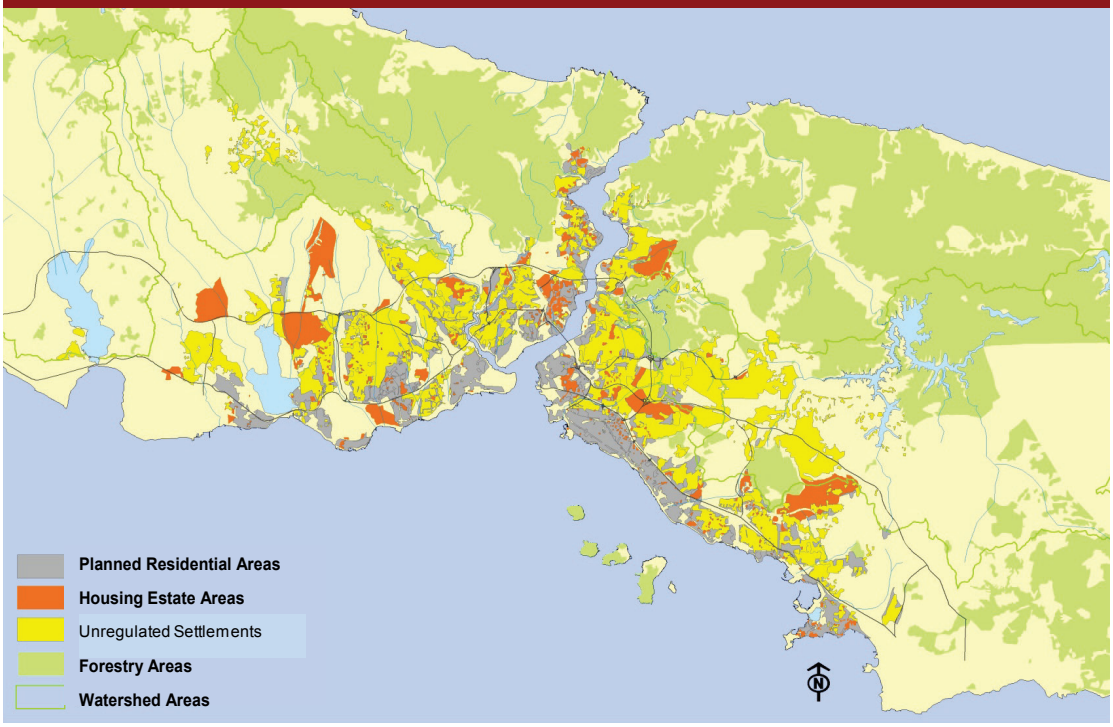
The relationship between soil condition and land use (education, health, resident, infrastructure, transportation) is very important. Land uses can be either risk holder because of difference in their reactions and triggering positions between each other. On the other hand, land use affects the way of disaster response as well.

Land use covers locations of different activities and their relations on urban settlements. Different land uses requires different locations criteria. For instance, near to residential areas, commercial areas are appreciated to ease daily life of residents and on the other perspective, this combination increases land value of residential areas. However, industrial areas are not appreciated for residential areas because of pollutants which cause lower quality of life. Transportation system, on the other hand, should be designed according to the urban land use pattern and should be provide necessary mass flow among other land uses (such as shopping malls and high rise buildings).

RESIDENTIAL AREAS: Sheltering is a basic and a legal right of all individuals, however, when this basic need is provided by illegal ways, it can cause serious problems and risks not only for the future of cities but also their owners as well.

It is very well-known that illegal settlements give uncoverable damages for long terms. Therefore, it is crucial to have and to implement all kind of regulations to protect human life against hazards. Figure 6 shows the distribution of residential areas in Istanbul.

FIGURE 6 RESIDENTIAL AREAS IN ISTANBUL



HOUSING DEVELOPMENT IN TURKEY

- MAJORITY OF URBAN LAND IS COVERED BY RESIDENTIAL AREAS (50–60%)
- DIFFERENT TYPES OF HOUSING: 1) HIGH RISE; 2) 1-2 STOREY; 3) INDEPENDENT

1) *Built-up areas on river basins:* Illegal settlements developed at the protection zones of water basins can cause contamination of drinking water. Especially, nowadays, when dealing with drought caused by global warming, drinking water is a most scarce resource for metropolitan cities in priority and for all Turkey.

2) *Built-up areas in forest areas*: Illegal settlements in forest areas cause, in one hand, destructions on natural environment by the means of flora and fauna and in the other hand they catalyze in shifting micro climate of the city (Figure 7).

FIGURE 7: DIFFERENT RESIDENTIAL AREAS IN

3) *Built-up areas on inconvenient grounds:* Illegal settlements are most vulnerable areas against earthquake hazard. Especially when ground conditions are not convenient by the means of carrying capacity and buildings are not properly built by engineering consultancy, risks taken by owners are greater for themselves and their family. Inconvenient soils (such as alluvial soil), so called "soft soil" in everyday conversation, can increase impacts of seismic waves to buildings. Highrise buildings are most affected by this amplification.

4) *Unauthorized built-up areas:* Buildings are designed by engineering calculations which are mentioned in regulations where soil amplifications, carrying capacity and damping are taken into consideration. This process is quite complicated and should be conducted by experts. On the other hand, buildings not in conformity with building regulations are vulnerable against natural hazards and have great potentials to give harm to people living inside.

WORKING AREAS: Working places are another basic need after sheltering not only to work to get goods but also to receive commercial services. Working areas are essential for both individuals and national economy of country. Productions provided by working areas help development and welfare of a nation and have important role to achieve quality of life. Moreover, location of working areas is crucial to decide in order to reduce disaster risks.

FIGURE 8 URBANIZATION ON AGRICULTURAL AREAS

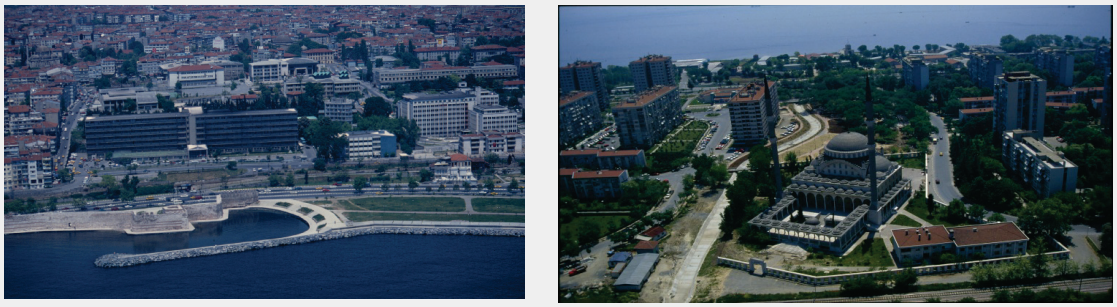
1) *Agriculture and Husbandry:* Agriculture and husbandry require special kind of soil for production. Areas convenient for these activities are susceptible against impacts of urbanization. When agricultural areas are reserved for residential or industrial purposes, it can also give damage to future food production. (Figure 8)

2) *Industry:* Agricultural and mining activities are basis for industry. According to the final output, location of industrial activities is very important to decide. Industry likes to be near to resource, labor force and market. On the other hand, location of industrial activities should have adequate ground conditions to carry out this activity. However, this criterion is not achieved in several cases. For instance, when 1999 earthquakes hit most industrialized part of Turkey, the direct and secondary impacts (such as fires) gave great damages to natural environment and regional/national economy.

3) *Service Sector:* Services cover all commercial activities such as shopping, finance and professional consultancy. When this sector receives damages from natural hazards, depending on the size of disaster, there may be short or long term business interruptions which would affect daily life and economic vitality.

URBAN FACILITIES: Urban facilities cover **educational, health, religious and cultural** facilities (Figure 9). In well planned settlements, facilities are distributed according to the population size. Urban facilities are not only for daily usages but also are crucial land uses in crises such as big disasterous events. Most important facility at this moment is health facility. Aftermath of a disaster, injured people need to receive immediate care or intensive care, so that health facilities should be distributed through city wide according to population size and should be fed by high accessible transportation system. Schools and other facilities are secondary crucial areas which can be used as temporary shelter and/or temporary health care points. Especially, courtyards of these buildings can be used to settle mobile health cabinets.

FIGURE 9 URBAN FACILITIES



GREEN AREAS (to be allocated): Green areas help to preserve biological diversity in nature and provide reacreational activities (Figure 10). Several researches indicate that recreational areas in cities have positive influence on human psychology. Moreover, in disasters and other critical events, green areas have crucial roles. For instance, in 1999 earthquakes, most of the Istanbul citizens spent night on parks near by. Grean areas (or recreational areas) should be designed in a systematic approach which forms a green system in city wide. Areas where ground conditions are not adequate for buildings would be better used as recreational areas as it is implemented in many countries.

AREAS TO BE ALLOCATED AS GREEN AREAS

- Filled land on shores
- Near to river basins
- Land slide areas

FIGURE 10 GREEN AREAS

TRANSPORTATION: Transportation lines are for connecting different types of landuses and easing accessibility among them. Transportation system is very critical when settlement is hit by a hazard. Especially, during and after a disaster, it is vital that search and rescue teams reach as quicker as possible to the scene. High accessibility could prevent the increase of the size of disaster. Istanbul Greater Municipality indicated **emergency roads** which are mostly main transportation axis in Istanbul. It is prohibited for parking on these roads. However, it is not likely that people respect a lot on this directive.

INFRASTRUCTURE: Beside transportation, electric, sewerage, drinking water, natural gas and telecommunication are called as infrastructures. In a case that any of these services are not provided for 24 hours, there would cause not only to individual uncomfortability but also serious losses at every level of urban system. The breaks at infrastructures could cause two kinds of impacts such as direct and indirect (secondary).

1) *Direct impacts to different uses:*
    i. Living environment: After a disaster occurs, despite buildings stay steady, if infrastructures received damages, it may decrease the quality of life of affected region. In such cases, it is not easy to survive for a long period.
    ii. Health: The importance of infrastructures is more noticeable when there is a shortage in any of them, for instance in disasters. In several health facilities there are big generators and water tanks, however, thay can provide necessary service not for a long time. Therefore, systemic vulnerability could cause an increase in losses.
    iii. Industry and Services: As mentioned in health facilities, interruptions in production can cause short and long term impacts on regional and/or national economy.
2) *Secondary Impacts:* Damages received by an earthquake can produce secondary hazards such as fires and condamination of natural resources. From this perspective, especially, natural gas pipes are critical even they have auto-switch. Aftermath of an earthquake, to prevent fires and explosions, it is better to control if there is any leakage on the system and not to use fire near by.

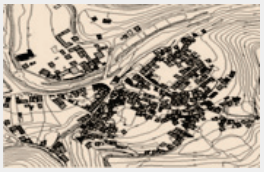
Urban Risks related with Natural Hazards

Vulnerability level of all urban components such as different land uses and buildings indicates probable risks. Compatibility with ground conditions and building inspection according to engineering measures are crucial to reduce urban risks. However, unfortunately, there are opposite development in many cities. Within this background, it is an urgent need to evaluate all risk components and to take precautions for disaster mitigation.

There are several factors increasing risks at urban and building scales. In order to disaster preparedness, these factors are needed to be investigated and therefore, develop strategies in risk reduction (Figure 11).

1) *Building risks (building scale)*: These risks are defined as evaluation with resistancy of buildings against earthquakes, building inspection and occupancy permit.
2) *Risks in living environment (building lot/neighborhood/urban scale)*: These risks are related with land use decisions, density, occupancy types, and resistancy of uses againsts earthquakes.

FIGURE 11 FACTORS AFFECTING RISKS



URBAN AREAS
- HAZARDOUS USE
- TRANSPORTATION
- INFRASTRUCTURE SYSTEMS (WATER, GAS,ELECTRICITY)

FACTORS INCREASING RISKS

BUILDINGS
- BUILDING TYPES
- RESILIENCE AGAINST EARTHQUAKE
- STRUCTURAL CHANGES
- LACK OF BUILDING INSPECTION
- BUILDING USE
- CHANGES ON BEARING SYSTEM

All types of risks affect the level of vulnerability and therefore probable losses in human life and economy.

Example 1: Location of health facilities is important for either they should stand in emergency periods to response or accessible by the means of transportation.

Example 2: Storage of explosive materials near or inside dense settlements can cause secondary impacts such as big urban fires and destructive explosions.

AREAS	EARTHQUAKE	LAND SLIDE	FLOOD	FIRE
Residential Areas	*Risks* • Damages according to site conditions and building • Damages according to non-structural risks.	*Risks* • Damages on housing units due to land slides.	*Risks* • Damages on ground or under-ground floors of buildings.	*Risks* • Complete or partial damages in housing units.
	Needs and Problems • Need of shelter • Replacement of housing units • Low recovery potential of individuals.	*Needs and Problems* • Need of shelter • Relocation of settlement to a safer zone.	*Needs and Problems* • Increase in cost by replacement of furnitures and other domestic materials.	*Needs and Problems* • Need of shelter
Working Areas	*Risks* • Partial or total collapse of working units; losses in stocks. • Damages in industrial facilities which will cause secondary hazards.	*Risks* • Medium or heavy damages on some working units.	*Risks* • Damages on equipments at gound or under-ground floors.	*Risks* • Medium or heavy damages on some working units
	Needs and Problems • Medium through long term losses to production and labour causing economic failure.	*Needs and Problems* • Relocation of working units to a safer zone.		
Urban Facilities	*Risks* • Damages on urban facilities such as health, education and administration. • Low response level of these facilities in recovery process aftermath of an earthquake.	*Risks* • Medium or heavy damages on some critical urban facilities.		
	Needs and Problems • Potential usage as temporary shelters for earthquake victims.			
Green Areas	*Needs and Problems* • Potential usage as temporary shelters, storage and aid distribution for earthquake victims.	*Needs and Problems* • Crucial role to prevent land slides in certain zones.		*Risks* • Forest fires, wild fires

AREAS	EARTHQUAKE	LAND SLIDE	FLOOD	FIRE
Transportation	*Risks* • Collapsed building to block main roads. • Damages on main transportation axis.	*Risks* • Damages on transportation axis.	*Risks* • Interruption of traffic flow.	
	Needs and Problems • Shortage in accessibility of search/rescue and aids.			
Infrastructure	*Risks* • Short circuit in electrical and leakage in natural gas systems can cause urban fires.	*Risks* • Interruption of services	*Risks* • Outbrust in water and sewerage system.	*Risks* • Interruption of services
	Needs and Problems • Negative impacts on daily life. • Damages on economy for medium through long term.			

Example 3: When urban facilities such as administrative buildings, schools and health centers receive damages due to earthquakes, they can not operate properly by the means of their primary function and moreover, they can not be used as emergency points required in harsh periods.

Example 4: Administrative buildings are crucial aftermath of an earthquake to organize rescue and recovery system. These buildings have an important role to provide security, to organize aids and to support efforts in recovery by the means of quality of life.

Example 5: Industrial facilities are likely to cause secondary hazards aftermath of an earthquake. Especially, chemical production, explosive material and storage facilities are vulnerable and make their environment vulnerable in case of an accident. On the other hand, with economic concerns, probable losses in industrial activities can cause great failures in regional or/and national economy.

Example 6: When infrastructures receive damages, it can be difficult to provide daily needs and on the other hand it can cause serious problems such as epidemics.

Example 7: Communication and transportation systems are crucial to get proper information and to have access to problem areas urgently.

Besides these examples, in the previous table, risks and needs/problems related different hazards and land uses are mentioned deeply.

Part 2 - Importance of Urban Planning in Disaster Mitigation

In this section, importance of urban planning in disaster mitigation will be discussed by the means of disaster preparedness, planning concept, planning process, planning hierarchy and regulations.

Urban plans and programs are designed to organize living environments (competency among urban components such as residential areas, working areas etc.), to protect both natural and cultural assets and to achieve liveable settlements. In this frame work, decisions taken and implementations on urban planning are important to reduce probable risks.

Importance of Urban Planning for Disaster Mitigation

COMPLEMENTARY DISASTER MANAGEMENT

Complementary disaster management system covers four stages of emergency planning (preparedness, mitigation, response, recovery) and forms a cycle. This system requires a comprehensive framework for disaster management system.

More than half of world population is living in urbanized areas. In metropolitan areas of most developing countries, urban development is integrated with un-planned areas and un-healty conditions. When natural hazards hit dense settlements of those countries, the consequences are usually disastrous.

Disaster management covers to organize any kind of resources in prevention of mass damages, to analyze hazards and risks, to make decisions and to evaluate. In order to achieve this system, a comprehensive disaster management system should be required. Disaster Management comprehends 4 basic sequential phases (preparedness, mitigation, response, recovery). The nature of disaster management system requires a comprehensive planning approach as well.

1 *Preparedness:* To define duties and responsibilities and to organize resources in emergency periods.

2 *Mitigation:* To reduce or to remove risks in long period which are likely to cause losses in human life and assets due to hazardous event.

3 *Response:* To search and rescue aftermath of a disaster.

4 *Recovery:* To recover infrastructural, physical and social environmental problems occurred after disasters to get better living conditions.

According to the development pattern of settlements (existance of un-planned areas) "**risks**" are likely related with built-up area, community and economy. However, it is possible to eliminate such risks due to mitigation strategies in disaster management. Therefore, tools of **urban planning** play an important role in reducing negative disaster impacts. This training program focuses on how to mitigate disasters due to urban planning tools.

Roles and Responsibilities

In mitigation planning process, decision makers, technical staff and community representatives have either overlaid or independent responsibilities and roles. These responsibilities and roles can be defined as two sub-process called "strengthening" and "decision making".

Strengthening Process; This process covers all three target groups to have information about their duties, to comprehend, to commit and to embrace them. Therefore, *Decision Makers* are expected to know global and national risks, mitigation strategies, participatory planning processes, enhance institutional framework, provide resources, improve policies and standards and make necessary legal adjustments. *Technical Staffs* prepare plans and programs at regional and local scales by taking into account hazards and risks, they produce efficient tools and systems, monitor implementations and interfere on technical issues. *Community Representatives* get prevention measures against hazards and risks due to their knowledge, participate community programs, be active members of mitigation planning activities and implementation process.

Decision Making Process; provides a common dialogue among decision makers, technical staff and community representatives to discuss and to commit decisions In this process, all target groups are expected to get necessary knowledge on disaster

mitigation strategies and to act as active members of this process. In the decision making process, all target groups are represented as equal and democratic way.

DECISION MAKERS	TECHNICAL STAFF	COMMUNITY REPRESENTATIVES
• Implement global risk mitigation methods; • Get knowledge on hazards and risks at national scale; • Organize and manage participatory planning process. Set institutional structure; • Provide sources; • Develop policies and standards; • Make legal adjustments.	• Prepare mitigation plans and programs according to regional/local hazards and risks; • Develop tools and systems for implementation; • Monitor implementation and interfere on technical issues.	• Take prevention measures against hazards and risks; • Participate community programs; • Be active members in disaster mitigation planning and implementation process.

Urban Planning for Disaster Mitigation

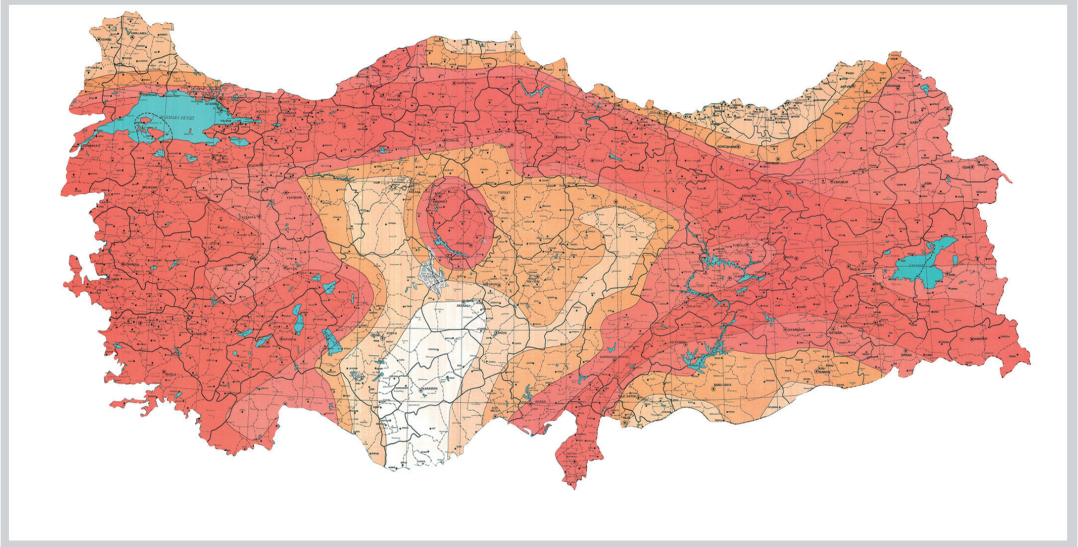
While rapid urbanization which lets development of unplanned and unhealthy settlements in one hand and on the other hand the increase of population density in hazard prone areas, they all urge a strong requirement in disaster focused policies at both local and central level in Turkey. Once looking at the earthquake hazard map for Turkey, we can see that large territories with dense urban settlements are under the threath of serious earthquake hazard where we unfortunately are likely to face social and economic losses (Figure 2).

The primate city of Turkey, Istanbul, is under the pressure of negative urban impacts and earthquake threat at the same time. As Istanbul is more than a simple city which carries an important global role, the risks are bigger.

Content: Urban planning as a tool for disaster mitigation is crucial to sustain community and economic existence and welfare for livable cities. In this section, only the components of disasters are mentioned to define and to understand natural hazards[1]. The aim of this section, therefore, is to indicate devastating impacts of hazards on human settlements.

[1] *Mikrobölgeleme ve Hasar Görebilirlik Çalışmaları Metodoloji El* Kitabı, (2006) ABS Consulting, UCER-ALTER, MEER Projesi (Marmara depremi acil yeniden yapılanma projesi)

FIGURE 12 EARTHQUAKE HAZARD MAP OF TURKEY (BİB, AİGM)



Settlement Profile	Urban Components	Explanation
REGULATIONS AND IMPLEMENTATION TOOLS	• **Regulations on Urban Planning** (*development and land use decisions*) • **Development Law** *(to standardize development system)* • **Environmental Law** (*to protect natural resources)* • **Development Plans** (*future development of cities*) • **Emergency Plans** (*to reduce losses in human life and economy)* • **Mitigation Plans** (*to reduce losses)*	Regulations to be implemented at regional ad urban scales. Mitigation plans comprehend urban planning, development plans, emergency plans and environmental law which are mentioned in zoning code.
ADMINISTRATIVE STRUCTURE OF MUNICIPALITY	• **Authorized area** (*urban and rural areas inner boundaries*) • **Opportunities** (*technology/equipment, financial resources, human resources)*	Related with authorized area and opportunities of municipalities.
POPULATION STRUCTURE	• **Total Population** (*population, density, location, economic and social characteristics)* • **Income** (s*ocio-economic aspect of community*) • **Housing** (*location of residential areas and their typology*)	Related with demographic, social and economic aspects of population and living standards.

Settlement Profile	Urban Components	Explanation
NATURAL ENVIRONMENT	• **Location** (*geographical location)* • **Topography** (*morphology, slopes and physical structure*) • **Climate** (*weather conditions*) • **Forestry** (*flora and fauna)* • **Geology** (*physical structure and condition of soil*) • **Batimetry** (*physical and morphological structures under water*) • **Water Basin** (*water resources and rivers*)	Natural environmental systems which cover water basins, natural pattern, flora, fauna, open and green areas. Topography, climate and geology are also important in these systems.
CULTURAL / HISTORICAL ASSETS	• **Cultural** (*concrete and abstract values*) • **Historical** (*historical assets*)	Values presenting historical and cultural assets of a community.
URBAN ENVIRONMENT	• **Building Inventory** (*structure, vulnerability and occupation*) • **Open Spaces** (*open and green areas for public use*) • **Transportation** (*docks/ports, airports, railways, roads etc.)* • **Infrastructure** (*electric, natural gas, oil, telecommunication, water, swerage, dams, channels etc.)*	Built-up areas comprehend all structural and infrastructural systems. Open spaces and infrastructural systems are crucial aftermath of a disaster to survive.

Urban planning focuses on all environmental aspects of a settlement regarding to regulations and municipal structure to achieve mitigation strategies. Regulations refer all legal statements concerning the region, city or an area. Municipalitiy administration structure covers political authority and opportunities. Population is defined as demographic and socio-economic aspects of community. Cultural and historical values refer concrete and abstract values of a community. Urban environment comprehends physical built-up environment and infrastructure. Table below shows components of settlements.

Consistency of strategies in planning hierarchy: Regarding to urban and demographic dynamics and development scenarios of a city, coherent strategies and policies should be developed and integrated from the scale of regional plans through strategic plans, development plans and implementation[2]:

- Socio-economic plans drive physical development at national scale;
- Decisions on locations take natural hazards as constraints at national and regional level;

CONSISTENCY of STRATEGIES in PLANNING HIERARCHY

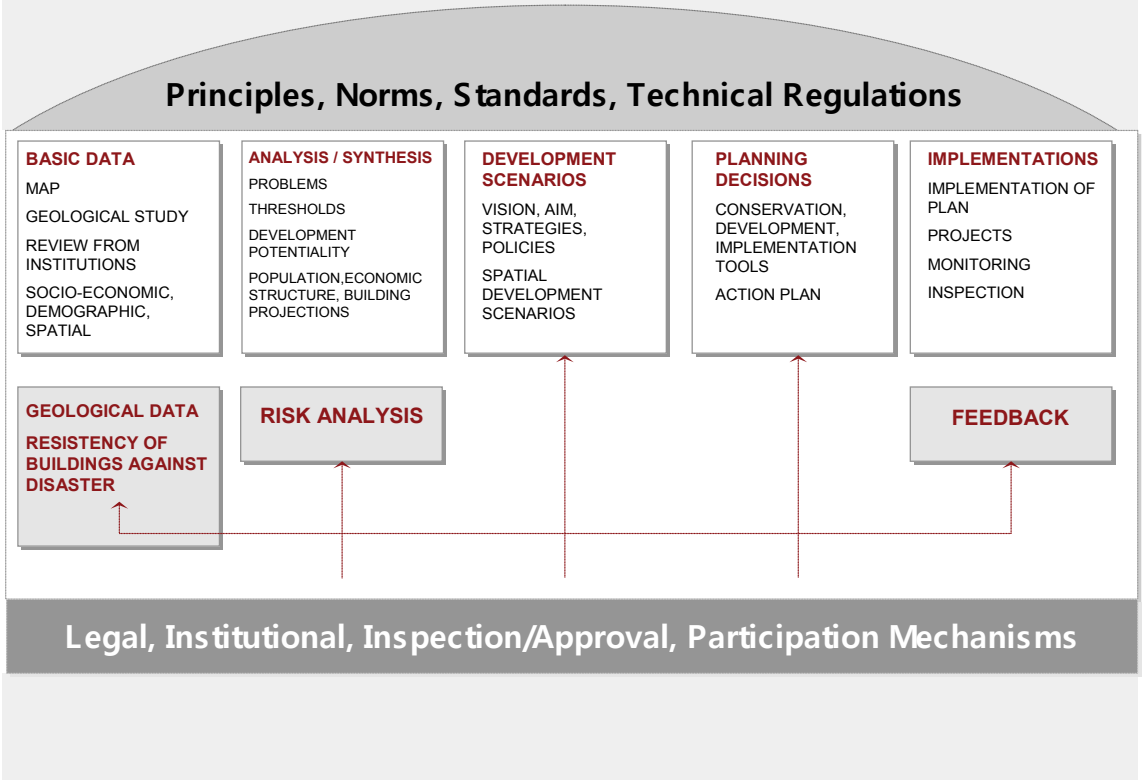
"For instance, relocation of critical facilities and investments at national level through hazard free zones and implementation of regional plans which note available safer zones for new urban development have important roles in reducing natural risks and mitigation activities"

[2] Tezer, A. ve Türkoğlu, H. (2008) Afet Zararlarını Azaltmanın Temel İlkeleri, T.C. İçişleri Bakanlığı ve JICA, Miktad Kadıoğlu ve Emin Özdamar (Editörler), JICA Türkiye Ofisi Yayın No: 2, Mart 2008, Ankara.

- Plans with different scales are compatible;
- Policies are produced to ease interactions between environment and community.

Planning process and disaster mitigation: Planning process is defined as a comprehensive implementation process respecting to rules, norms, standards and techniques and consisting of legal, institutional, consultancy/approval and participatory mechanisms. However, planning process and implementation of every community should be compatible according to their own dynamics. Planning process is described in 5 main stages. (Figure 13): 1) Data; 2) Analysis/Synthesis; 3) Development Scenarios; 4) Planning Decisions; 5) Implementations. The first stage refers to gather data and to map at environmental, physical, demographic and economic scale. In the second stages, date gathered are analyzed and evaluated. In the third stage, referring to the output of the second stage, vision, aim, main objectives, strategies, policies and spatial development scenarios are developed. In the forth stage, conservation, development and implementation tools are described and action plans developed. The last stage is described as implementation, monitoring and consultancy of plans.

FIGURE 13. PLANNING PROCESS AND DISASTER MITIGATION



The most important analysis of planning process is **Site Suitability Analysis**. In this analysis, ground conditions and carrying capacity are evaluated. Topography, geology, under-ground water and slope stability are used to indicate site conditions. Municipalities prepare these maps with approval of the Directorate of Disaster Affairs and indicate **1)** Convenient Areas; **2)** Areas with safety measures; **3)** Areas requiring detailed geolojical studies; **4)** Inconvenient Areas.

Areas	Explanation
Convenient	These areas have no problems with carrying capacity. Moreover, there is no need to take special precautions before construction.
With safety measures	These areas need to have taken necessary engineering measurements and precautions before construction.
Needed detailed geological studies and investigations	These areas require detailed studies to better understand ground conditions and afterwards, before and during the construction process a set of precautions should be taken.
Inconvenient	These areas have low carrying capacity, therefore they are not convenient for building development. Usually, they are used as green and open public spaces.

Risk analysis plays a crucial role in mitigation strategies and urban planning which design future settlements as a sustainable and safer way. The primary data on this process is obviously data on ground conditions which can affect the intensity of shaking and the other one is about the building inventory. All kind of analysis should be evaluated at urban scale to drive future settlements. Another important point in this process is that feedbacks at every level which eases monitoring.

Participatory approach: There is no unique process in disaster mitigation planning. However, the common point of best practices is practicing participatory planning.[3]

URBAN MANAGEMENT AND PARTICIPATORY PLANNING

In participatory approach, groups of interest ae not just be informed but also they are involved in decision making process. Participation enables all groups of interest to claim their rights and on the other hand it enables economize of resources caused by one way feedbacks. Moreover, participation improves democracy, strength and community learning during decision making process.

Participation in local administration and planning emphasizes democratic participation of groups of interest into decision making process, anticipates development of collective intelligence, takes differentiation among participants as the potential of creative ideas and provides collective production of ideas and taking action for individual and community learning. In participatory approaches, knowledge should be developed through action. Otherwise, the process may be faced with a threath of dissappearence. Collective development of ideas should go through collective actions.

[3] *Mikrobölgeleme ve Hasar Görebilirlik Çalışmaları Metodoloji El* Kitabı, (2006) ABS Consulting, UCER-ALTER, MEER Projesi (Marmara depremi acil yeniden yapılanma projesi)

Participatory approach, comparing with the traditional approaches, has some benefits such as: effective decision making, contribution to democratization, commitment, supporting to individual and community learning and shifting decisions through actions.[4]

1 *Effective Decision Making*: This is the process where all groups of interest participate in decision making and therefore it would prevent some disadvantageous decisions to certain group of interest.

2 *Democratization*: This is the democratization of decision making on settlement issues with all groups of interest. Participatory planning process requires open dialogue and equality of all groups on the issues.

3 *Commitment:* This stage enable decision makers and other groups of interest to come together and therefore decision makers are up to commit about issues.

4 *Learning*: Participatory planning process provides comprehensive learning environment. It is based on gathering people from different interest, skills and level of knowledge and specialists to develop collective ideas, collective discussions and exchanges.

5 *Being Action Oriented*: At the last stage of decision making process where all shareholders contribute in, action plans are produced. Abstract concepts are easy to vanish. This process enables decisions to be action oriented. Action plans comprehend the steps of projects, implementation mechanisms of institutions, timing and budget. It is crucial that decision making mechanisms cover implementation, monitoring and evaluation stages. In this extent, decisions should be shifted through actions.

Regulations: Municipality Law (No: 5393) (2005), gives duty to special provincial administration, municipalities and villages to: provide competency in local services, cooperate public services, protect public interest, provide local needs and develop disaster preparedness/ emergency plans. In this law, it is mentioned about "Urban Regeneration". This implementation tool has a strong potential on disaster mitigation and enhancing public interest perspective. Urban regeneration should be reviewed with social improvement, economic development, natural preservation and democratic organizations.[5] In the regeneration areas, besides physical changes, according to the special features of the area, different social and economic policies can be implemented. This process should provide employment, support community strongness, physical recovery and safer construction.

[4] Ataöv, A. (2007). Planlamada sosyal bilmcinin değişen rolü: Toplumdan biri olmak", Mimarlık Fakültesi Dergisi (Journal of the Faculty of Architecture), 24(1), 139-152.

[5] Ataöv, A. & Osmay, S. (2007). Türkiye'de kentsel dönüşüme yöntemsel bir yaklaşım. *ODTÜ Mimarlık Fakültesi*, 24 (2), 57-82.

Metropolitan Municipality Law (No: 5216) (2004), entitles metropolitan municipalities to physical planning and management of infrastructural systems; Disaster Law (No: 7269) entitles governorships and district administration on education, health, transportation, environment and energy. In the Zoning code (No: 3194), local municipalities are entitled to make plans however mitigation activities are not mentioned.[6]

In the local administrative regulations, there are principles on disaster mitigation strategies and participatory planning process. Metropolitan Municipality Law (5216), Municipality Law (5393) and Special Provincial Administration Law (5301) indicate that local administrations should provide participation in developing their spatial and institutional strategic plans. Despite it is not clear how to participate in decision making process, it is still obligatory for local administration to provide participation in making plans. In the article 76 of the Municipality Law indicates that during the development of visions and strategies for cities, it is required a collaboration with City Council (which was found according to Local Agenda 21). Therefore, Local Agenda 21 which was related by the initiatives of local governance before 2005, has been legally interfered in local administration by the Municipality Law.

Part 3 – Strategies on Urban Environment for Disaster Mitigation

Strategies on urban environment for disaster mitigation are developed according to the findings of urban risk analysis. Urban risk analysis covers exposed objects such as population, urban facilities and their location. The further step covers response techniques and prioritization. According to the priorities, strategies on urban development should be developed (issues on disallowance or limitation of certain urban land uses).

Strategies on urban environment for disaster mitigation should be taken as a main stream by municipalities according to the special features about landuse, transportation and infrastructural system. Strategies on land use are related with main decisions and occupational volumes. Strategies on transportation and infrastructure comprehend precautions taken into consideration.

Landuse Strategies

- To drive Urban Growth according to probable hazards and exposed objects/areas;
- To indicate developed and developing areas according to natural hazards:
  - To prevent urban development in risky areas;
  - To relocate structure on risky areas step by step;
  - To drive new development out of risky areas;
- To develop structural strategies on residential, business, education, health etc. facilities to reduce vulnerability;

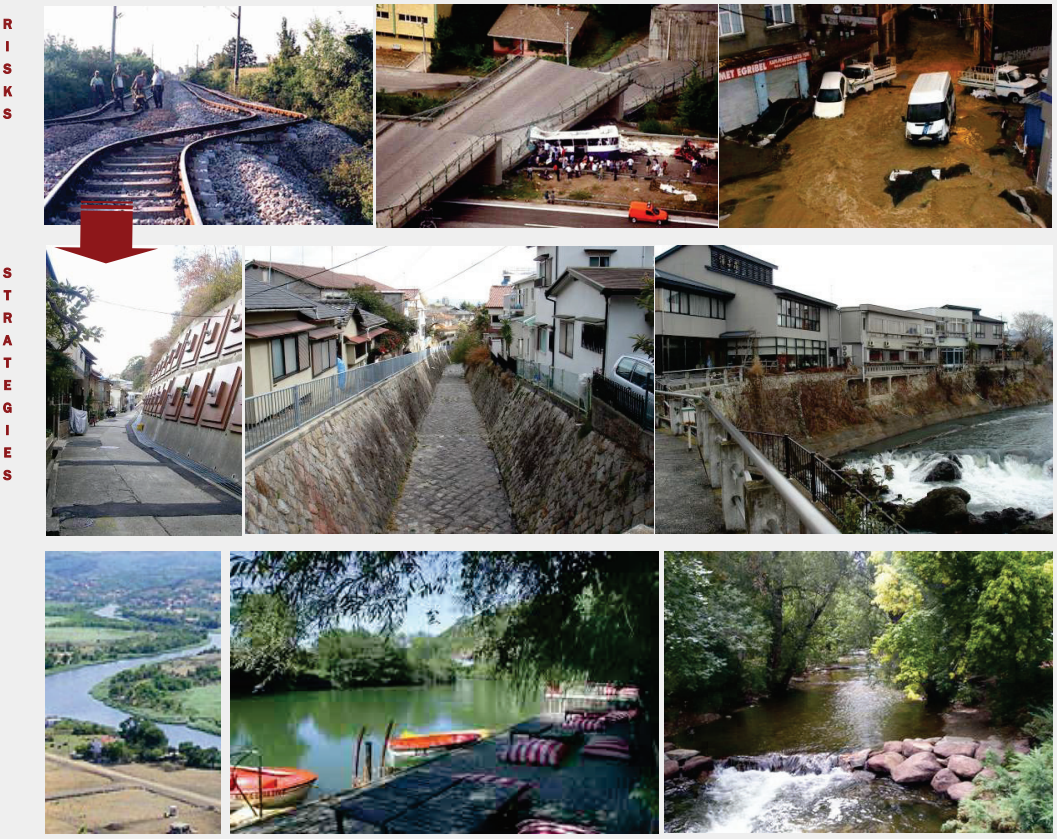
[6] Balamir, M. (2001) Recent Changes in Turkish Disaster Policy: A Strategical Reorientation?, P.R. Kleindorfer (ed.) Mitigation and Financial of Seismic Risk in Turkey, *NATO Science Series*, Kluwer Academic Publishers, pp. 207-234.

- To avoid new hazardous industrial activities; to take precaution for developed hazardous industrial activities;
- To provide adequate open spaces in city wide;
- To avoid structural development at shores;
- To take precautions at areas facing with erosion, water basins/reservoirs, forest areas to protect sensitive balance of the nature:
  - To rehabilate for sustainability and to protect;
  - To provide financement for expropriation.
  - To study on water basin management.

Strategies on Transportation and Infrastructure Systems

- To favor on engineering solutions such as river rehabilitation, landslides prevention, retrofitting infrastructures when natural precautions are inadequate. (Figure 14);
- To control natural hazards using semi-natural solutions such as slope stabilization, semi-natural filled-up at shores and protection of shores (Figure 14);
- To retrofit roads and infrastructural systems when it is necessary;
- To limit infrastructural development at risky zones to discourage future development;
- To avoid new critical infrastructures; if it is not possible -to prevent the collapse of the system- to simplify the system.

FIGURE 14 EXAMPLES TO INFRASTRUCTURAL RISKS AND STRATEGIES



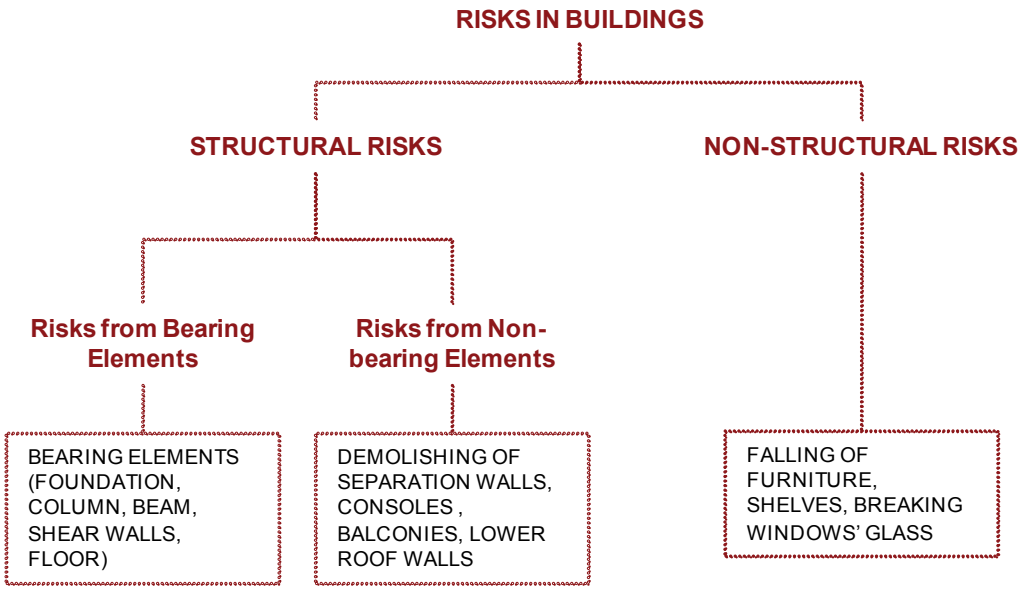
Part 4 – Strategies on Built-up Areas for Disaster Mitigation

In Turkey, regulations on building construction and design are developed according to new technological and scientific development. The main reason that there are still devastating impacts of earthquakes, is not to well implement current regulations and lack of control. This stuation shows that building stock in Turkey faces with serious risks.

In this section, types of risks and risky states at building scale will be presented. Moreover, strategies on structural precautions and building inspection will be discussed.

Risk Types in Buildings

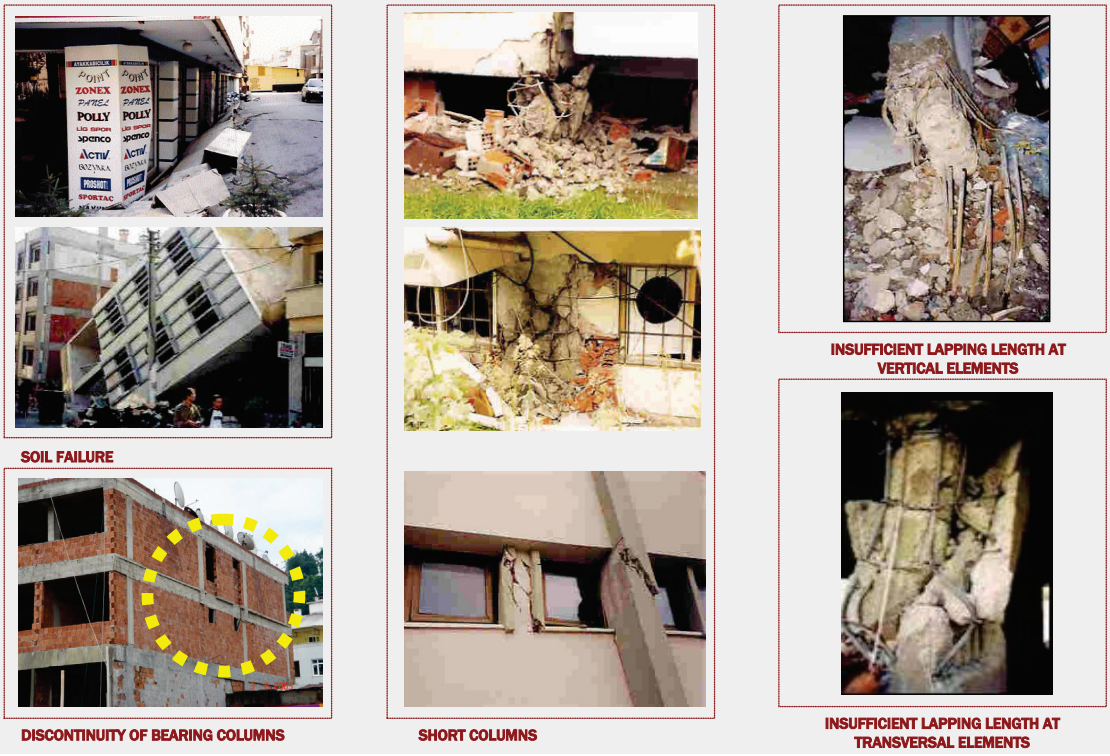
Risks in buildings are classified in two groups: **1)** Risks related with structural elements; **2)** Risks related with non-structural elements. The first group is divided in two sub-categories: **1a)** Risks related with damages on non-bearing structural elements; **1b)** Risks related with damages on bearing structural elements. This section focuses on 1a. This kind of damages can be devastating and moreover, buildings may collapse. The second kind of risks is due to non-structural elements.



Factors Affecting Risks in Buildings Due to Structural Elements

Structural risks can be groups as (Figure 15): 1) Risks caused by ground conditions and lack of engineering applications; 2) Non-projected interventions in building; 3) Irregularities in building structure; 4) Past damages received in buildings.

FIGURE 15 RISKS IN BUILDINGS (WHICH ARE NOT TAKEN INTO CONSIDERATION IN CONSTRUCTION)



1. Risks caused by ground conditions and lack of engineering applications (Figure 16) :

- Development at high risky zones (ex: fire at Tupras due to 1999 Marmara Earthquake);
- Development close to active faults;
- Not to consider ground conditions in project design stage and therefore mis-application in building basement (ex: carrying capacity of soil and liquefaction).
- Not to implement development regulations on building density and building heights.

FIGURE 16 BUILDINGS NOT IN CONFORMITY WITH SOIL CONDITIONS

2. Modifications Not In Conformity With Building Project :

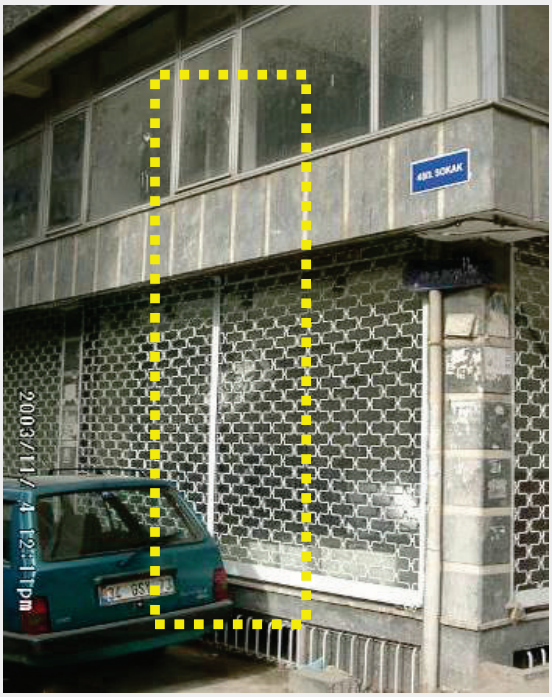
- Lack of relevant information on earthquake parameters of a building without project such as vertical and horizontal loadings, ingredients, ground conditions and bearing structural system.;
- Additional loadings on vertical and horizontal carrier system affecting statics of building;
- To cut columns and other bearing system on ground floor to provide additional spaces for shops (Figure 17);
- Not to use proper materials at necessary amount indicated in projects (e.i.: Low quality of concrete, no specific conditions for concrete production and foundry, lack of horizontal and vertical elements, un-appropriate elements in construction);

- To stress vertical displacement rigidity of building due to shear walls at basement where freedom at columns height diminishing during the construction process.

3.Risks related with structural discontinuity.

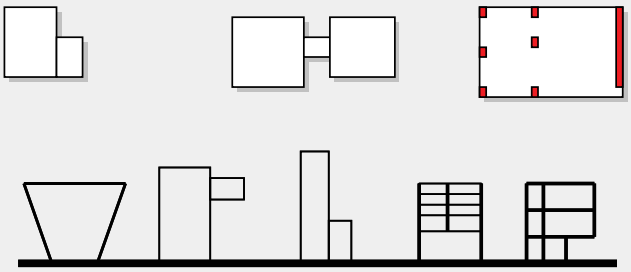
- To enhance additional torsionning impacts due to vertical and horizontal discontinuity; discontinuity of shear walls and columns (Figure 18);
- To design ground floors of buildings for commercial purposes where bearing elements, columns are not well constructed, therefore to form soft floors. In the case of earthquake, without necessary carrying system it can occur vertical displacements and complete destructions in building ;
- To provide large distant openings without using appropriate equipment, materials, anchorage method, mis-placement of columns and therefore to loss the resilience of building independent from any ground shaking;
- Not to construct floor and vertical elements correctly.

FIGURE 17 INAPPROPRIATE MODIFICATIONS ON BUILDING



DISCONTINUITY OF COLUMNS

FIGURE 18 IRREGULARITY IN BUILDING STRUCTURE



4.Risks related with past received damages.

- According to aging and environmental conditions, corrosion at building materials due to low quality ingredients.;
- According to the damages received in the past earthquakes, to reduce resilience of certain bearing elements of building.

Structural Safety for Disaster Mitigation

After the Marmara and Duzce earthquakes occurred in 1999, several damaged buildings were restored/retrofitted and few non-damaged buildings were retrofitted by the means of mitigation efforts. In Seismic Design Code revised in 2007 (www.bayindirlik.gov.tr), there are some standards on how to evaluate building safety measures and to make retrofitting (Figure 19-20-21).

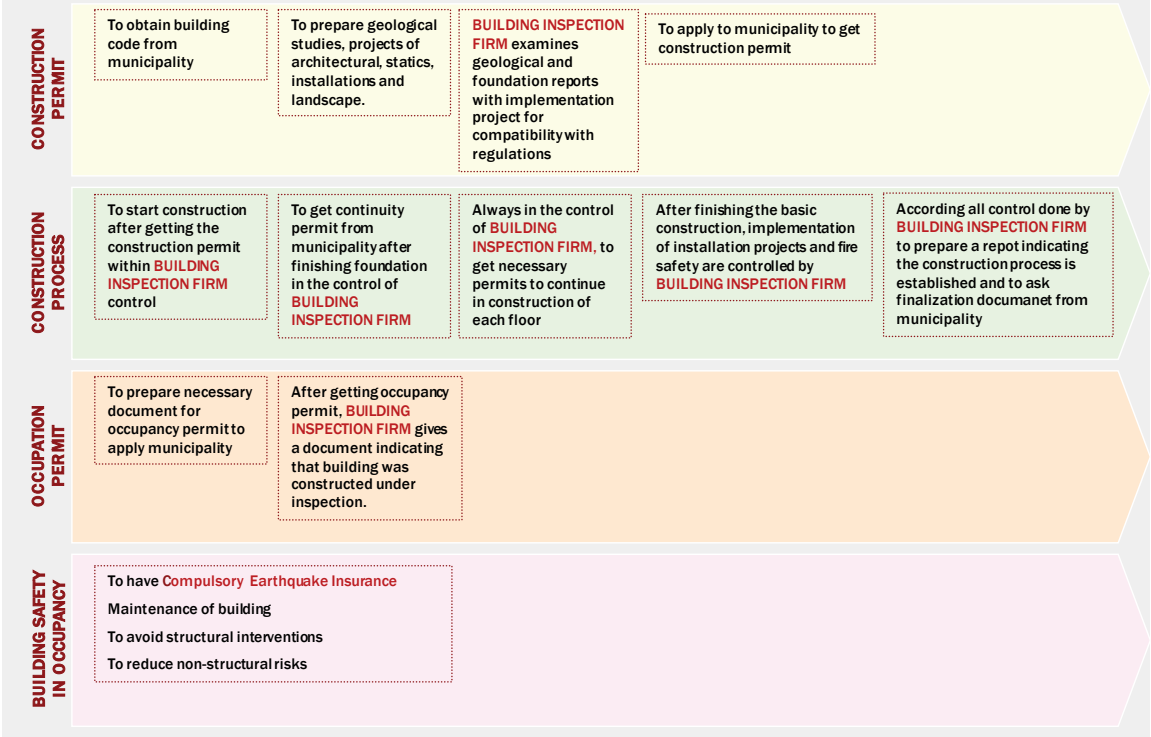
FIGURE 19 BUILDING RETROFITTING ACTIVITIES

FIGURE 20 DETAILED RETROFITTING ACTIVITIES

FIGURE 21 DETAILED RETROFITTING ACTIVITIES OF COLUMNS, BEAMS AND SHEAR WALLS

Building safety is very important at every stage such as the beginning of construction, construction process, completion and occupation. (Figure 22). Development Law, Building Inspection Law and Construction Regulations used by municipalities indicate all measures.

FIGURE 22 CONSTRUCTION PROCESS



BUILDING CONSTRUCTION PROCESS. Building construction process consists of 3 stages:

1) *Preparation of architectural project according to development and construction conditions*: All regulations are set for constructions on every plot respecting development laws. Construction conditions are differing according to plans of regions and urban areas such as building coverage area, building height. According to construction rules architectural project is prepared.

2) *Engineering investigations of architectural project*: To implement architectural project, ground studies, static and dynamic calculations are done. Afterwards, design stage is following. This process provides ground-building relations according to ground conditions.

3) *Construction process under the control of building inspection firm*: Construction process should be provided by independent inspection firms. Inspection firm and landlord make agreement. Inspection firm is responsible to control every stage of construction. It controls quality of materials, amount of iron and concrete used according to the calculations indicated in the projects. At the construction of each floor, concrete samples are tested in laboratories and for the payment inspection firm contacts with municipality. After municipally control documents, it allows for payment, otherwise inspection firm can not be payed.

In the building construction process, 3 permits should be taken by municipality:

1) *Construction Permit*: To start construction construction permit should be taken by responsible municipality.

2) *Construction Progression Permit*: After finishing the construction of foundation through the ground level, construction progression permit is obtained from municipality. Technical staff from municipality makes necessary controls and approves that the construction of foundation is established according to the project. To construct upper floors of building, progression permit is compulsory.

3) *Occupation permit*: After the construction is accomplished, another permit should be taken. After the last controls by inspection firm, architect and landlord signed a letter of application from municipality for occupation permit. Municipality, after making the last controls, provides this permit for infrastructural services such as water and electrical facilities.

BUILDING INSPECTION: After Marmara and Duzce earthquakes occurred in 1999, new regulations on building inspection are set and according to Building Inspection Law (act. 4708), independent inspection firms are charged at every stage of construction by the means of application of regulations.

Building Inspection Firms, consist of architects and engineers. These independent firms are responsible to landlord and municipality when building receives damages because of deficit in construction. **Building inspection service** is executed according to the acts signed by both inspection firm and landlord or his/her representative. In this process, landlord can not empower contractor as representative.

It is crucial, in order to reduce probable losses, to construct a building according to regulations and standards mentioned in laws. Today, there are several old buildings which should be replaced with new ones. In the case all requirements mentioned in relevant regulations are accomplished, it is likely that building stock would be resilient in the future against natural hazards.

Building inspection provides several **advantages** for owners in building safety considering quality of materials, project implementation and so on.

- *Guarantee process*: Buildings which received building inspection have 15 years of guarantee for bearing system and 2 years of guarantee for non-bearing system from the building inspection firm after getting occupancy permit;
- *Construction compatible with building project*: From each single stage of the construction, building is controlled by the inspection firm and in the case of any problem, inspection firm intervenes to take precautions to make building safer;
- *Installation projects*: Each additional project is controlled by inspection firm (static, mechanical, architectural);
- *Material inspection:* Building inspection firm controls all materials used in the construction of building at laboratories certified by Ministry;

- *Casting Inspection*: Concrete is prepared and founded under the inspection of the inspection firm. Examples from the concrete are taken and tested in laboratories. When materials fit with the current standards, construction process can go on.
- *Controls of additional projects*: Related with the permits, additional projects are consulted. Therefore, all activities besides the project are in control.

CONSTRUCTION PERMIT: It is legally obligatory to take construction permit before the construction starts. Otherwise, municipality makes necessary investigations and sealed the construction.

Permit departments at municipalities prepare necessary documents cited below with the application of land owner. In this process, the landlord(s), contractor, architect, engineer and construction inspection firm are responsible at every stage of construction and in the case that the concern building receives a damage by certain causes, they will be punished according to the relevant articles of the Turkish Criminal Code.

DOCUMENTS FOR CONSTRUCTION PERMIT

- ❑ APPLICATION FORM
- ❑ TITLE DEED
- ❑ ARCHITECTURAL PROJECT, STATICAL PROJECT, GEOLOGICAL SURVEY REPORT, INSTALLATION PROJECTS, LANDSCAPE PROJECT
- ❑ BUILDING CODE, GROUND LEVEL AND SECTION, ARCHITECTURAL SURVEY (OBTAINED FROM THE MUNICIPALITY)
- ❑ CADASTRAL EXTRACT, MAP WITH REFERENCE POINTS (OBTAINED FROM CADASTRAL DIRECTORATE)
- ❑ CREDENTIALS OR DEED OF CONSENT FROM LAND LORD(S)
- ❑ DEMOLISHING PERMIT (IF THERE IS A BUILDING ON THE PARCEL)
- ❑ INSTITUTIONAL APPROVALS OF THE PROJECT 1) WATER (ISKI); 2) FIRE DEPARTMENT (FIRE ESCAPE); 3) CIVIL PROTECTION DIRECTORATE (IF TOTAL CONSTRUCTION AREA IS MORE THAN 800 M^2, BURROW IS OBLIGATORY)
- ❑ COMMITMENT OF CONSTRUCTION CONSULTANCY FIRM IS SUING THEY WOULD BE RESPONSIBLE IN CONTROL AT EVERY STAGE (LICENSE, RESIDENCE, FORM OF FEE, DIPLOME OF CONTROLLERS, ETC.)
- ❑ APPROVAL FROM CONSAULTANCY FIRM ON BUILDING CONTROLLED AND APPROVED
- ❑ COMMITMENT DOCUMENT FROM CONTRACTOR (LICENSE FISCAL CIRCULAR, ETC.)
- ❑ RECEIPTS INDICATING ALL PUBLIC SERVICES ARE PAID

Therefore, *it is compulsory to have approval from municipality on geological surveys and projects and to get permit for construction.*

Accroding to Building Inspection Law, after getting permission, the construction should start in 2 years and finish in 5 years. Moreover, in these 5 years, occupancy permit should be obtained. Otherwise, permits should be extended.

OCCUPATION PERMIT: There are several illegal buildings in Turkey. Besides totally illegal buildings, many buildings do not have occupancy permit. However, according to the Development Law (3194), it is compulsory to get occupancy permit after the construction process. According to the 31st article of the Development Law, buildings without occupancy permit cannot get public services such as water, electrical, gas and so on.

Occupancy permit is crucial as it shows that **1)** construction was successfully accomplished; **2)** building has no problem for the required occupancy; **3)** building is safe.

DOCUMENTS FOR OCCUPATION PERMIT

- APPLICATION FORM
- CONTROL FORM OF INSTALLATIONS, DOCUMENTS OF PREVIOUS PERMITS TAKEN DURING THE CONSTRUCTION PROCESS
- APPROVALS FROM DIFFERENT INSTITUTIONS ON FIRE SAFETY AND SHELTER
- BOUNDARY DOCUMENTS
- CONSTRUCTION PERMIT (LESS THAN 5 YEARS)
- DOCUMENTS ON INSTALLATIONS SERVICES
- DOCUMENT FROM ELECTRICAL SERVICES
- 1 CONTAINOR FOR EACH 14 UNIT
- INSTALLATION OF TREES, PICTURES FROM GARDEN AND EACH SIDE OF BUILDING (SIZE 187X24, 2 COPIES)
- DOCUMENT INDICATING THERE IS NO TAX DEPT.
- REPORT INDICATING THAT THE BUILDING IS CONSTRUCTED ACCORDING TO THE REGULATION WITH THE CONTROL OF CONSTULTANCY FIRM AND SUCCESSFULLY ESTABLISHED

Therefore, building with no occupancy permit has always some risks coming from uncertainties related with engineering and safety measures.

When accomplishing all necessary document and controls, landlord(s) can apply to get occupancy permit (in 5 years) before construction permit will be over. According to this application, municipality makes relevant controls and prepare occupancy permit in 30 days.

IMPORTANCE OF CONFORMING TO CONSTRUCTION PROCESS: **Building inspection**, **construction permit** and **occupancy permit** are the legal and obligatory phases in construction process. According to the *Turkish Criminal Code*, if these steps are not established and therefore if the building suffers due to lack of this phases, all actors (owner, contractor, inspection firm, engineer, architect, municipality) in the construction process will be punished accordingly.

There are several **advantages** for owners to follow regulations in construction process.

- *Earthquake safety and guarantee*: Buildings which have all construction permits mean that they are controlled, their resiliency is approved and earthquake safety and guarantee have been provided;
- *Prevention of human loss and economical asset*: These buildings stand after earthquakes without causing any loss in human life and therefore, economic value of these buildings increases;
- *Construction in conformity with building project:* Occupancy permit indicates that the building is constructed according to regulations and it is approved legally;
- *Infrastructural services*: Buildings having occupancy permit can have public services such as electrical, water, gas, telecomunication.

MODIFICATION PERMIT: After getting construction permit, if owners require some alterations in their building, they have to get Modification Permit from the municipality. This permit shows the changes in the structure that do not affect structural bearing system negatively and this alteration is compatible with the projects. In other words, all alterations are guaranteed. Changes done without having this permit can reduce earthquake resilience and safety of the building.

According to the Article 21 of the *Development Law (3194)* alterations which do not need this permit are: **1)** Plastering and painting inside and outside of the building; **2)** Chamfer, window, door, floor and ceiling covers; **3)** Repair of roof; **4)** Repair of installation system; **5)** Decoration; **6)** Repair and alteration of non-bearing elements.

For alterations which cover changes in structural system, it is required modification permit with newer projects on architectural, statical, mechanical systems. These alterations are as follows: **1)** Changes in columns-beams; **2)** Changes on independent units and areas; **3)** Consoles and changes on the outside of the building; **4)** Occupancy alterations (under-ground floor to change residence, penthouse at attic, change of the entrance of ground floor shops, demolishing some walls for commercial purposes); **5)** Changes on stairs and stairwell; **6)** Changes at outer walls, windows and doors.

It is important to prepare "modification project" to get amendment permit from the municipality. *Unconvenient alterations threaten building safety!* It is obligatory to get permission from the municipality when the occupancy will be changed or big alterations will be done in the building such as changes in balconies. For the historical buildings, after getting modification permit, it is necessary to get additional permission from the Protection of Cultural and Natural Heritage Council.

For all damages that building receives because of unauthorized alterations, people who have done these alterations are responsible. Inspection firms, on the other hand, are responsible in structural risks that building is carrying out after these illegal alterations.

COMPULSORY EARTHQUAKE INSURANCE (DASK): After the earthquakes of Marmara and Duzce in 1999, Turkish Catastrophe Insurance Pool was established to partially recover economic losses due to disasters.

According to the Decree Law 587, all independent units, residential units, commercial units, offices mentioned in the Condominium Ownership Law (No. 634) should get the Compulsory Earthquake Insurance (CEI). CEI should be declared in the all deed processes. Therefore, it urges that all new buildings are constructed according to building codes.

Every landlord can buy CEI by paying **premiums**. Document of guarantee is called as **CEI Insurance Policy**. This policy is available for 1 year and each year it should be renewed. CEI is a very cheap policy. It covers all damages from earthquakes such as collapse, fire, landslide and explosions. In the case of damage occurs, CEI pay assurance in **1 month**. Whatever the real estate value of a unit is, the maximum assurance is **120.000 Turkish Liras**.

Part 5 – Strategies on Disaster Aware Community

This part aims to reveal activities that participants can easily adapt them to achieve safety living conditions. These activities can be realized in the frame of disaster mitigation planning practices or training.

As a top priority, zones or neighborhoods which need disaster mitigation planning immediately can be studied. Information taken from this training program can be integrated with planning practices in such areas. Implementation of what has been learnt in this program will boost community learning.

Vulnerability against disasters depends on how we are prepared for that. Besides institutions on planning and construction process and their responsibilities described in previous sections, as citizens, we have responsibilities as well. Moreover, it is crucial that we know about the factors increasing risk in our living environment before facing a disaster as well as our responsibilities during and after disasters. The most significants are:

1) To **control** building permits, implementation according to construction permits and project of building/apartment from municipality before buying. So that it will be possible to see in advance probable risks about building;
2) To denounce and to complain to municipality about misusages or misimplementations (e.i: White Desk, "Calling Center");
3) To adjust **construction permit procedures**;
4) To make alterations on structure and functionality according to **Modification Permit**;
5) To have Compulsory Earthquake Insurance (Premiums of CEI is the cheapest insurance and it costs nearly 1 Turkish Lira per day).

MOST OBSERVED CHANGES IN BUILDINGS

NUMBER OF FLOORS	NUMBER OF UNITS	PERMIT
❑ *Example:* IF THE BUILDING HEIGHT IS INDICATED AS 3 FLOORS IN THE PROJECT, BUT 5 FLOORS IN REALITY, SO THAT **ILLEGAL FLOORS** ARE CONSTRUCTED!	❑ *Example*: IF THERE ARE 12 INDEPENDENT UNITS IN THE PROJECT, BUT 14 IN REALITY, SO THAT **UNDERGROUND FLOOR** IS CONVERTED TO RESIDENCE!	❑ *Example*: UN-AUTHORIZED OCCUPANCIES CAN GIVE **SERIOUS DAMAGES** TO BUILDINGS! (example: sparkler workshop)

"WE ALL RESPONSIBLE FOR ALL OF US"

It is not enough that only our apartment should be resilient; our nearest environment and neighborhood should be resilient as well. To achieve that:

- To learn about our environment! (e.i. electric transformers, workshops or dead-end streets may cause problems)

- To research resources to get information about disaster preparedness.
- To be informed about the earthquake safety level of our building!
- To get information about what it has been done for our living environment and what we can do!

Secondly it is crucial to disseminate disaster awareness to all level of community, to be aware of urban risks factors, to have trainings on mitigation and preparedness and to increase the capacity of coping with disasters. Disaster mitigation training programs should be disseminated through community in this manner. However, it is important to develop these training programs and campaigns according to the target groups in order to make these activities efficient and sustainable.

Part 6 – Town Watch Study

The aim of town watching is to provide awareness of community on urban risks and factors affecting risk levels in their living environment; to enhance communication skills among community, local government and experts to better act together; and to get knowledge on how to protect themselves, how to help each other to mitigate disasters.

This section aims to reveal how participants perceive urban risks according to their daily life and own experiences. Participants can present their opinion using urban land use components and/or building scale features. This technique allows

RISK FACTORS

URBAN LAND USE	TRANSPORTATION / INFRASTRUCTURE	CONSTRUCTION / BUILDING	COMMUNITY
❑ DANGEROUS USES NEAR RESIDENTIAL AREAS (LPG, GAS STATIONS, ETC.)	❑ NARROW AND DEAD-END ROADS	❑ NON-COMPATIBLE CONSTRUCTION	❑ NOT BEING AWARE OF DISASTERS
❑ SCARCITY OF OPEN SPACES	❑ DENSE ROADS WITHOUT ALTERNATIVES	❑ STRUCTURAL CHANGE OUT OF PROJECT	❑ UNCONSCIOUSNESS ABOUT DISASTERS
❑ WRONG DECISIONS ON LOCATION AND DENSE URBAN PATTERN.	❑ NON-COMPATIBLE PIPELINE MATERIALS WITH GROUND CONDITIONS	❑ CHANGE IN USAGE AND THE STRUCTURAL SYSTEM	❑ ETC.
❑ ETC.	❑ NON-COMPATIBILITY OF INFRASTRUCTURAL NETWORK WITH	❑ ADDITIONAL FLOORS	
		❑ DISCONTINUITY OF COLUMNS AND BEAMS	
		❑ SOFT FLOORS, SHORT COLUMNS	
		❑ ETC.	

participants to evaluate, to systematize and to focus on the topic. The output of the process gives clues on further stages and focal points of this training program.

Town watching which covers evaluation of present state and risks consists of 3 stages: (Figure 23): 1) Field Work; 2) Observation and mapping; 3) Presentation and discussions.

1) **Field Work**: At this stage, neighbourhood will notify urban risks and positive and negative aspects of their city. They will note their observation down, take pictures and point their notes on maps. Furthermore, participants will have chance to make evaluations with instructors in place.

FIGURE 27 PRACTISING OF 'TOWNWATCH'

1) Observation

2) Producing maps

3) Producing shared ideas and vision

2) **Observation and Mapping**: At this stage, participants will work on maps using their observations and notes. This stage will provide participants in discussing, producing collective products, increasing awareness and enhancing cooperation at the same time (Figure 24).

FIGURE 24 VULNERABILITY / RISK MAPS

Vulnerability / Risk map

Flood prone areas, abandoned buildings, abandoned points, community center, hoparlor

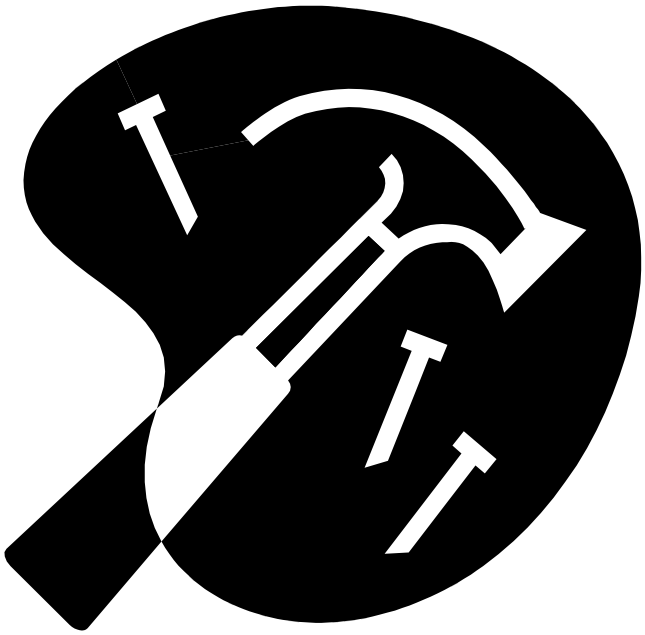
Vulnerability / Risk map Prepared by Municipality

3) **Presentation and Discussions:** At this stage, participants present their work to the other participants and they produce shared hazard maps for their community. During the discussions, common problematic areas are defined, responsibilities in solving problems are notified and solutions are discussed.

Group Working, Producing Shared Vision and Evaluation

Participants as a group of 7-8 are defining factors affecting risks during on the field. Participants make observation in the field during 30 minutes, turn back to study rooms and visualize their field observation as a group. This step lasts about 30 minutes. After finishing the group work, spokesmen of groups make presentation to other groups.

After the presentations the main idea will be discussed and common shared points will be revealed. Presentations and evaluation will take 60 minutes.



Planning Stages and Techniques of Training Program

Stage 1: **Town Watch Study**

1

Definition : Evaluation of present state and risks at the neighbourhood level

Participants : All participants with groups of 7-8 people

Timing : 1 hour

Process:

1 Site visit with all participants; to observe present risky areas, factors increasing risks by taking notes.

2 Brain storming in groups about this topic. To write down all observations and risks evaluated in the field on large papers.

3 To present outputs of each group, produce shared opinion and evaluation.

Discussion and Presentation:

Groups will present their own evaluations, all groups will collect the outputs and evaluate together. Instructors will give detailed information after the group work.

Dictionary and References

Infrastructural systems: Systems of water, swerage, electric, gas and telecommunication.

Land use: Different land usages such as residential, commercial, industrial, urban facilities.

Working areas: Areas for agriculture, industry and services

Natural hazards: Natural Phenomena which is not possible or hard to prevent the occurrence such as earthquake, volcanic eruption, landslide, flood.

Urban facilities: Facilities such as health, education, administration, culture and religion.

Secondary hazards: Hazards triggered by a primary hazard such as landslide triggered by earthquake.

Residential areas: Areas where the entire or the majority of occupancy are related with residential purposes.

Risk: In the case of the occurence of any hazard, potential losses according to the vulnerability level of exposed objects.

Urban planning: Science to organize space according to the future needs and trends of people and settlements by displaying all components of urban environment (built environment, natural environment, economic environment and social environment)

Modification permit: Permission document which indicates that alterations which would be done in the building are legally approved by the municipality

Hazard: Phenomena which may have negative impacts to human life and settlements

Technological (industrial) hazards: Usually man-made hazards which occur often due to lack of attention and control such as traffic accidents, explosions and fires

Transportation: Network which connects different land uses and settlements.

Construction (building) inspection: According to Building Inspection Law (4708) and Development Law (3194), concultancy at construction stage of buildings with controls on all projects, construction process and related documentation.)

Construction permit: Permission obtained by the municipality which indicates all primary studies and projects are accomplished according to regulation

Occupancy permit: Permission obtained from the municipality after the construction of building which indicates building is constructed according to regulations and purposes indicated in project.

Green areas: Recreational, open space inside and outside of settlements such as play grounds, parks, forest etc.

Mitigation: Actions taken to reduce risks and vulnerability, and when it is possible hazards.

Vulnerability: Potentials and weaknesses of exposed elements against hazards

Compulsory Earthquake Insurance (DASK): Insurance policy which partially covers losses in buildings caused by earthquakes

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