THE İZMİR CITY AND NATURAL HAZARD RISKS

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Abstract

Turkey has many geological disadvantages such as sitting on top of active tectonic plate boundaries, and why having avalanche, flood, and landslide and drought prone areas. However, this natural structure is inevitable; the only way to survive in such a harsh geography is to be aware of importance of these natural events and to take political and physical measures. Natural hazards are generally forgotten shortly after a while. Many projects that are planned to mitigate future hazards are suspended soon after natural hazards happened. Instead of taking pre- disaster measures and precautions, only emergency measures for recovery and post- disaster aid to the victims of a calamity are applied.

The major aim of this research is to bring up the magnitude of natural hazard risks in Izmir built-up zone, not being taken into consideration adequately. Because the dimensions of the peril are not taken seriously enough, the natural hazard risks, which are commonly well known, are not considered important or they are being forgotten after some time passes. Within this research, the magnitude of natural hazard risks for Izmir is being presented in the scope of concrete and local researches over Izmir risky areas.

Introduction

People have been concerned with the problems arising from natural hazards since early history. So-called natural hazards have always been part of the human history. Also the effects of the hazards could be magnified because of the human activity.

Natural hazards are natural events. The earth is a highly dynamic planet, and most of the natural events show a wide range of variation through the time energy and material of environmental process. The extreme natural events are not considered

hazards unless they cause death or damage to humans. A severe earthquake in a remote, unpopulated region is an extreme natural event of interest to seismologists, and no more.

Hazard is an ever-present, unavoidable part of life. The fact is that such events are not unexpected. As urban growth in hazardous areas continues and as buildings is constructed carelessly, the devastating potential of floods, earthquakes, landslides, and rock falls etc. increases at the same time, advances in mapping hazardous areas, assessing population vulnerabilities, and designing to withstand destructive forces have created new opportunities for reducing losses.

The main reason of perception and location is to do with establishing good pre-disaster and post disaster strategies and programs. It is indispensable to take measures integrally and locally against diversifying natural hazards, specific variations of which are regional and country- wide. Especially in countries having a risky geographical and geological structure, like Turkey, a concept of perception and measures against natural hazard are unavoidable.

Urban disaster risks and vulnerabilities are great problems for Turkey. The annual loss of life and property through disaster in the world's major metropolitan areas is increasing. Urban concentrations of the poor and less informed in environmentally fragile locations suffer the impact of disaster disproportionately. For example, the continued occupation of vulnerable locations in Turkey's metropolitan areas by law income Gecekondu developments will compound the inherent risks associated with high-density environments, in appropriate technologies, and inadequate infrastructure.

There are serious natural hazard risks in Izmir, which is a metropolis and third largest city of Turkey. Flood, earthquake, landslide and rock fall hazards have damaged to Izmir built up zone many times in the past. Especially, earthquake risk increases the hazard probability. But the competent authority cannot take main measures and precautions.

Natural Hazard Facts in Turkey Perspective

According to authority Ministry of Public Work and Settlement (2005), Turkey's geological, seismic, topographical and climatic characteristics combine to provide a setting for many types of disaster. 1 million houses have been damaged by hazards in Turkey in the last 70 years. About 78 percent were damaged by earthquakes, 25 percent by floods, 17 percent by landslides, 12 percent by rock falls and 10 percent by meteorological events and snow avalanches.

Three different factors increase the natural hazard risks for Turkey: Urban area problems, land use problems and squatter problems.

Urban Area Problems and Vulnerability:

As urban areas grow in population they tend to spread out into formerly rural areas. Land use follows a predictable pattern in expanding cities: the first use of land is agricultural; houses appear along the edges of field and roads. Then residential use predominates, finally many residences become workshops, and factories are built in the neighborhood. Urbanization and industrial growth exacts a severe environmental price, increasing the demand for under ground water while increasing the risk of disastrous pollution of the aquifer because of the degradation of the surrounding watershed.

Rising urban populations and housing shortage forced low-income groups into illegal and unplanned zones and shantytowns in metropolitan areas.

Turkish urban areas are vulnerable to a range of hazards, but disaster- related investments and donor attention have largely been concentrated on technical measures aimed at the study of earthquakes. Similarly, government policies have tended to be limited to land use rules and construction regulations that are often ignored most at risk and who need to use them the most.

Although the largest danger facing Turkish urban areas is natural hazards such as earthquakes and landslides, numerous other hazards exist. Improper handling of solid wastes causes' explosive methane built-up endangers the physical environment, reduces property values and destroys the scenic and tourist values of highly visited areas.

In Turkish urban areas where people, buildings, infrastructure and socio-economic activities are highly concentrated, natural and man-made hazards can produce greater physical damage and casualties than would take place if the people and activities were dispersed. Dense settlement interrupts natural regenerative processes and destroyed protective greenery and ground cover: ultimately the environment is degraded, usually severely. Environmental degradation increases disaster vulnerability, and every disaster has an additional negative environmental impact.

Turkey's laws related with lower vulnerabilities and pollution in urban areas are not sufficient in the unregulated settlement their unsafe buildings on unsafe land. Often these settlements surround industrial facilities planned for and constructed on open land with no residential neighbors. To encourage industrial development and associated employment opportunities, pollution controls were not adequately applied in the past and penalties for non-compliance were small. (Orhon, 1991) This combination of the increased physical vulnerabilities of urban settlements and environmental degradation increases urban disaster risks substantially.

Land Use Problems

Turkey's land surface area is 77.8 million hectares. The country is divided into seven geographical regions that show considerable variations in geography and climate. A large portion of the country is mountainous, except the Central Anatolian plateau and the coastal valleys. Although some areas receive heavy rainfall, such as the Black Sea coastal region, the country, as a whole, belongs in the semiarid zone of our planet.

There are official land classifications in Turkey designating the proper use for every piece of land according to its qualities. Land is classified into eight groups according to the nature of its topsoil, its slope and other properties. Land types 1-2-3-4 are reserved for agriculture. Types 5-6-7 are suitable for forestry and pasture. In between, there is type 4, which may or may not be used as agricultural land, depending on the climate and the socio-economic conditions of the area. It is best to use this type of land by alternating crops and plants every 10 to 20 years. Type 8 designates land not

suitable for any productive use but has to be planted in order to prevent floods and avalanches.

Table 1. *Land Use Classifications According to Land Types in Turkey (TEMA web page http://www.tema.org.tr)*

Land Use	**Land Types**	**Million Hectares**	**Percentage (%)**
Agricultural Lands	1-2-3-4	26.6	34.1
Suitable for Pasture and Forests	5-6-7	46.7	60.1
Lands not suitable for Agriculture	8	3.4	4.4
Lakes, rivers etc.		1.1	1.4
TOTAL		**77.8**	**100**

The table indicates that 60.1 percent of Turkey's land area is suitable for use as forests and pastures. In reality, however, 26 percent of the country's land area is covered by forest, with less than half of it in productive use. Table shows distribution of land according to actual usage.

Table: 2. *Land Use Classifications According to Land types in Turkey (TEMA web page http://www.tema.org.tr)*

Land Use	Million Hectares	**Percentage (%)**
Agricultural Lands	26.5	34.1
Meadows and Pastures	21.7	27.9
Forests	20.2	26
Non-agricultural Use	8.3	10.6
Lakes, rivers etc.	1.1	1.4
TOTAL	**77.8**	**100**

Maquis cover 3 million hectares of the actual 20.2 million hectares of forest area. Official statistics show that there is a significant amount of illegal timbering. The needy villager or the greedy developer also plays their part in accelerating

deforestation. Furthermore, only %10 of forest area is productive and the rest is degraded.

Pasturelands have suffered their share of degradation. In 1938, pasturelands were an estimated 41 million hectares. In 1980, they were down to 21.7 million hectares. There had been no new legislation on pasture use since 1858. The law regulates the use of state-owned grasslands by setting limits on the number of livestock that can be allowed to feed from a certain amount of land.

Agricultural fields constitute 26.5 million hectares, but only 6.4 percent of the total area is classified as primary lands. These prime lands are usually allocated for industry, mining, slum settlements, roads etc.

Gecekondu Problems

Gecekondus are numerous Turkey's larger urban areas, which are a coping device of the less affluent and a response to the rising land prices that often accompany rapid urbanization, placing legal build able lots outside of the reach of many families. Such spontaneous settlements are found in developing countries world-wide, and the words to describe them have become familiar: "busters" in India, "casbah" in Algeria, "macambo" in Argentina, "rancho" in Panama, "favela" in Brazil, "gourbeville" in Tunusia, and "bidonville" in Morocco. (Parker, Kreimer 1995) They are result of insufficient and inefficient policies for providing land, affordable housing, infrastructure and services in the cities.

Turkey began to urbanize rapidly between 1945 and 1950, just as a multi-part political system emerged. The move to big cities in the western part of the country was not accompanied by job creation.

All squatters (gecekondus) share certain characteristics. Usually they are built on somebody else's land or on public lands without the owner's permission; they are constructed without regard to building permit. And the areas where they are found are either inconsistent with residential use, or it is a violation of city development plans and other land use regulations.

Since a traditional squatter is built in a hurry with substandard materials, the structure is weak and vulnerable. Recently, however, more time and money has been put into their construction, and there are even squatter apartment houses. In

the early years of squatter development, the homes were built with a flexible floor plan so families could expand them as needed in response to change in family size.

Squatters (Gecekondus) are densely clustered in unplanned area using substandard materials, with no consideration of their vulnerability to natural and other disasters. They are often located on land that is already disaster prone; subject to flash flooding, landslides, and erosion or otherwise unsuited to development. Since they proceed without permits, the builders are not forced to conform to basic engineering and architectural requirements or safety codes.

Natural Haards within the Frame of Izmir Built-up Zone

Izmir survived as a big city throughout its history of 5000 years and has been frequently renovated under geopolitical and geological influences. Izmir has been greatly affected by some disasters such as earthquakes, fires, epidemics and etc. Thus many edifices that would reflect historical background of the city did not survive until today and present remains are generally few and known only by experts and the neighboring people (Local Agenda 21 in Izmir, 2003).

Izmir forms an interesting situation in terms of land-use and urban settlements. Most of the urban area is situated on the arable or agricultural land. Indeed the residential area is found on the southern edge of the Menemen deltaic plain, the Bornova plain and piedmont of Inciralti- Narlidere- Güzelbahçe. The squatter and public social housing developments are built on the land composed of andesitic mass (Local Agenda 21 in Izmir, 2003).

Population increases and its development pressure son rural areas were inevitable problems for Izmir. Urban housing supply could not meet the demand, the housing policies could not be integrated with that of urban land and the housing subsidies could not help to serve low-income groups.

Natural environmental features of Izmir increase its natural hazard risks. Izmir has topography slopes that surround the city shape. Further more, soil geology is unsuitable for to settle down in built up area. On the other hand natural hazard risks increase because of the spread of the illegal urban settlements and the build feeble building types.

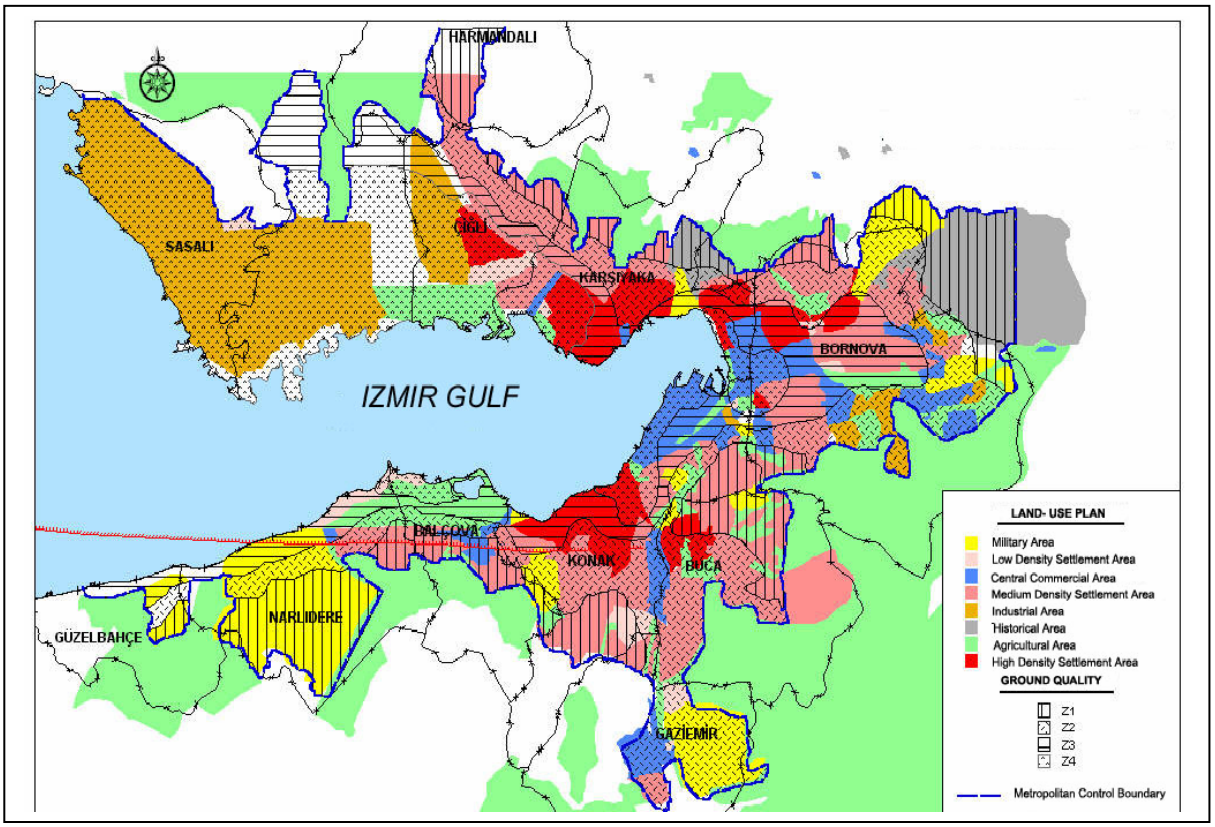

Figure 1: *Master Plan in2005 of Izmir Metropolitan Area (adapted from Izmir Metropolitan Plan)*

Topographic and Geologic Situation in Built up Zone

Soil character in and around Izmir is continuously changing at the expense of agricultural land and natural environment. Fertile irritable land is changing into settlement areas or express roads, factories; storage houses are constructed upon them. Some very specific types of agricultural products such as; artichokes, sultana grapes, olives and tangerines are now inhabited and lost from production point of view.

All these are the results of uncontrolled urbanization and planning practices undermining the ecological and agricultural objectives under the pressure of unacceptable escrowing of the city.

On top of the productivity and agricultural products reducing due to this unduly used land, concrete covered surfaces affect the climate, water and airborne pollutants degrade the soil properties and even sometimes the soil it is used as a raw material in industrial production and used out.

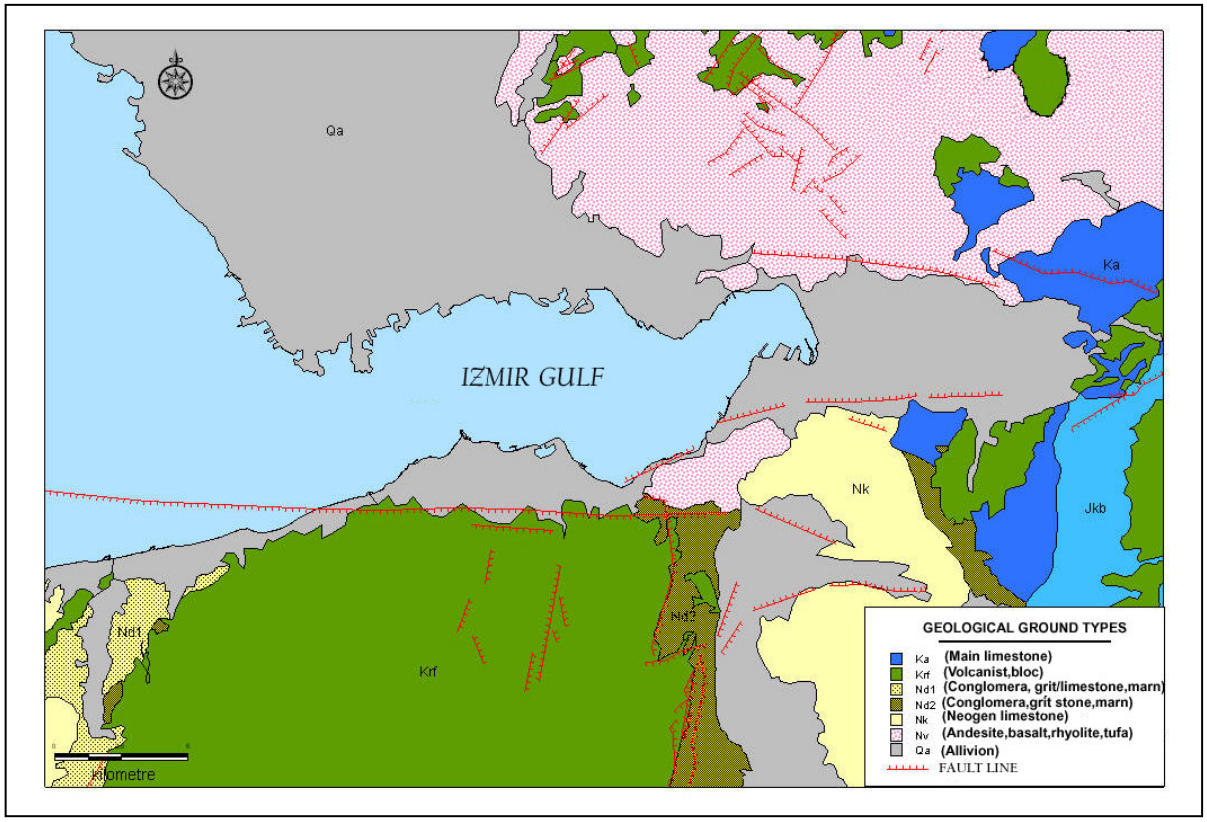

Figure 2: *Geological Map and Fault Lines of Izmir Metropolitan Area (adopted from RADIUS Project Group, 2001)*

Under all these pressures soil structures are affected badly, slope stability and sliding properties are changing and resistances of the soil against such pressures are diminishing. This causes lowering of the soil classes and takes away the withstanding capacity of the soil against environmental pressures. Continuing deforestation and tree cutting left open the soils to severe erosion. The severe flood that occurred on 4th November 1995 at the outskirts of Yamanlar Mountain and the flow of soil material together with it is an indication of this.

Earthquake Risks in Izmir Built up Zone

Izmir is one of the seismically active parts of the Aegean Plate. It shows a very complex, active, movie and rapidly changing tectonic pattern due to the relative motions of surrounding tectonic plates. According to history readers, earthquakes have been the most damaging natural disasters that have affected the Izmir built up area. There have been at least 20 disastrous earthquakes with magnitudes greater six reported, which are in literature. For example, readers documented that

historical cities in and around Izmir were destroyed in AD. 17, 47, 105 and 178. (Report of Radius Project August 2001)

In the last century three damaging earthquakes occurred in Izmir and its surroundings: 1928 Torbali, 1949 Karaburun and 1992 Seferihisar earthquakes mostly affected the southern part of Izmir. Izmir built up zone belongs to the first-degree hazard zone in the official Earthquake Hazard Rationalization Map of Turkey (see Table 3).

The Izmir area takes place at the west part of the Gediz Graben system and contains several morphologically prominent active normal faults with approximately east-west strike. Moreover, the NE-SW and NW-SE trending faults, whose kinematics characteristics differentiate, form north to south, take major roles on the tectonic regime of the region. Even though there is no evidence on the active faults that could create a high earthquake activity except Gediz Graben, both historical and instrumental seismic activity is rather dense between Karaburun–Chios, Izmir Bay-Lesbos and Doganbey-Samos axes (Selvitopu, 1999).

Table 3: *Major earthquakes in Izmir (General Directorate of Disaster Affairs Earthquake* Research Department, 2005)

No	City Area	Date	Proth (km)	Ms	Io	Heavy Damage	Medium Damage	Light. Damage	# of Death
1	Izmir-Torbalı	31.03.1928	10	7.0	IX	2100			50
2	Izmir- Dikili	22.09.1939	10	7.1	IX	1235			60
3	Izmir- Karaburun	23.07.1949	10	7.0	IX	824		946	1
4	Izmir- Karaburun	06.04.1969	16	5.6		443			
5	Izmir	01.02.1974	31	5.2	VI	47	2610	2800	2
6	Izmir	09.12.1977		4.8		11			
7	Izmir	16.12.1977	24	5.3		40			
8	Izmir-Foça	14.06.1979		5.9		22			
	Izmir	14.08.1992	27	5.2				150	
	Izmir-Urla	22.11.2003	35	5.4		35	200	650	
	Izmir-Urla	24.10.2005	18	5.9		250	510	2760	
	Izmir-Urla	28.10.2005	16	5.9		250	510	2760	

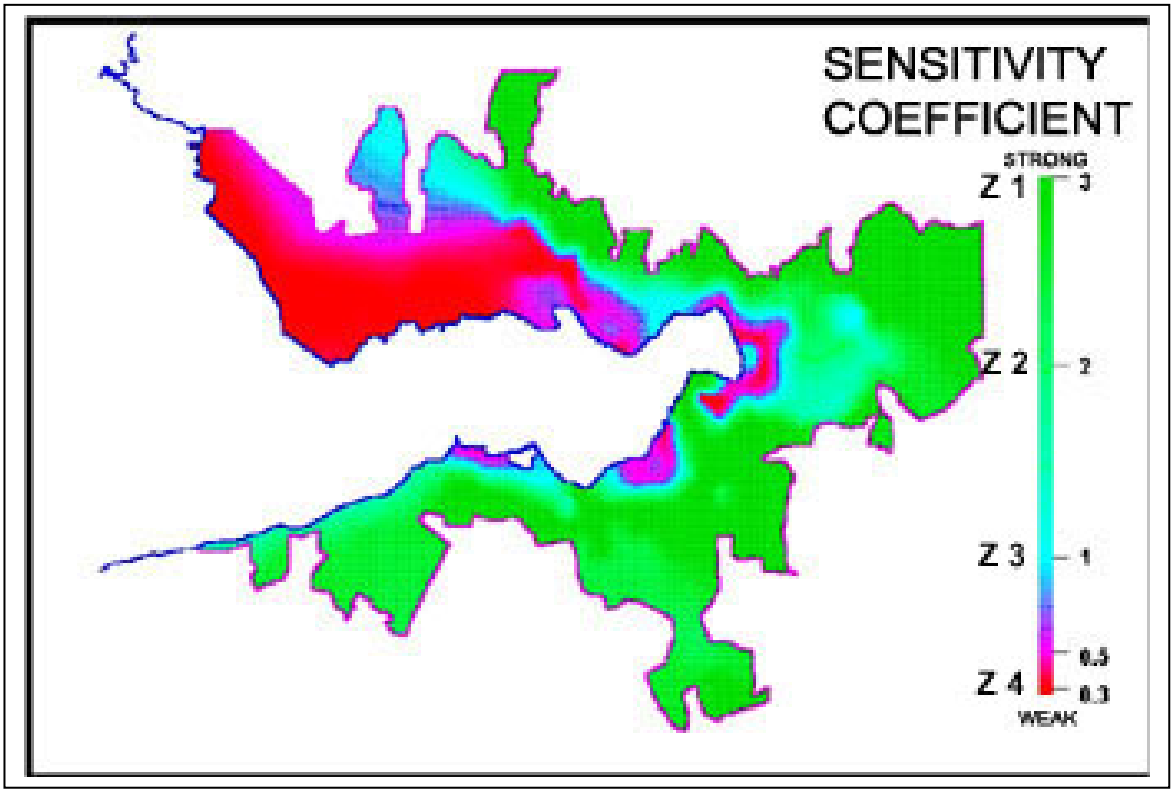

Figure 3: *Earthquake Sensitivity Coefficient Value of Izmir Metropolitan Area (adopted from RADIUS Project Group, 2001)*

According to RADIUS project group researches (2001), the soil characters in Izmir Metropolitan Areas separate four different parts. This soil codes which are named Z1-Z2-Z3-Z4 symbols, show to be influence with earthquake affect (Z4: the most weakly soil character, Z1: the most strongly soil character).

Flood Risks in Izmir Built up Zone

Flash floods associated with intense rainstorm have occurred many times in the Aegean and Mediterranean coasts of Turkey in the past, and the magnitude of these types of intense storms has risen in recent years.

A group of rainstorms swept through the Aegean and Mediterranean coast of Turkey during 3rd–5th November 1995 and led to devastating flash floods. Settlements along the Aegean coast suffered the greatest damage from the flood. The flood associated with the heavy rains claimed the lives of 67 people and caused more than 50 million dollars of residential and commercial property damage in Izmir. Cars, bridges and

buildings were swept away by the raging floodwaters of creeks, which had burst their banks. In this disaster, 322 buildings were destroyed completely, nearly 10.000 houses suffered major damage as a result of the flooding in the city. Damage from the flood was greatest in the Karşıyaka district, which is the major commercial and residential centre of the city.

Topography, geomorphology, land-use and urbanization are three main factors that have considerable impact on downstream extension of the flood and aggravated the consequences of the flood to a great extent in area. Topography and geomorphology can play a large role in the structure. The main topographic and geomorphic features of the area are Yamanlar Mountain and Yamanlar expression, Upper Karşıyaka plain, and Lower Karşıyaka plain. The Plain is formed by fine-grained alluvial deposits brought by the water table in the area is very high. The Karşıyaka district, which is the commercial centre of the city, is located in the plain and it suffered the greatest damage from the flood (Kömüşçü, 1995).

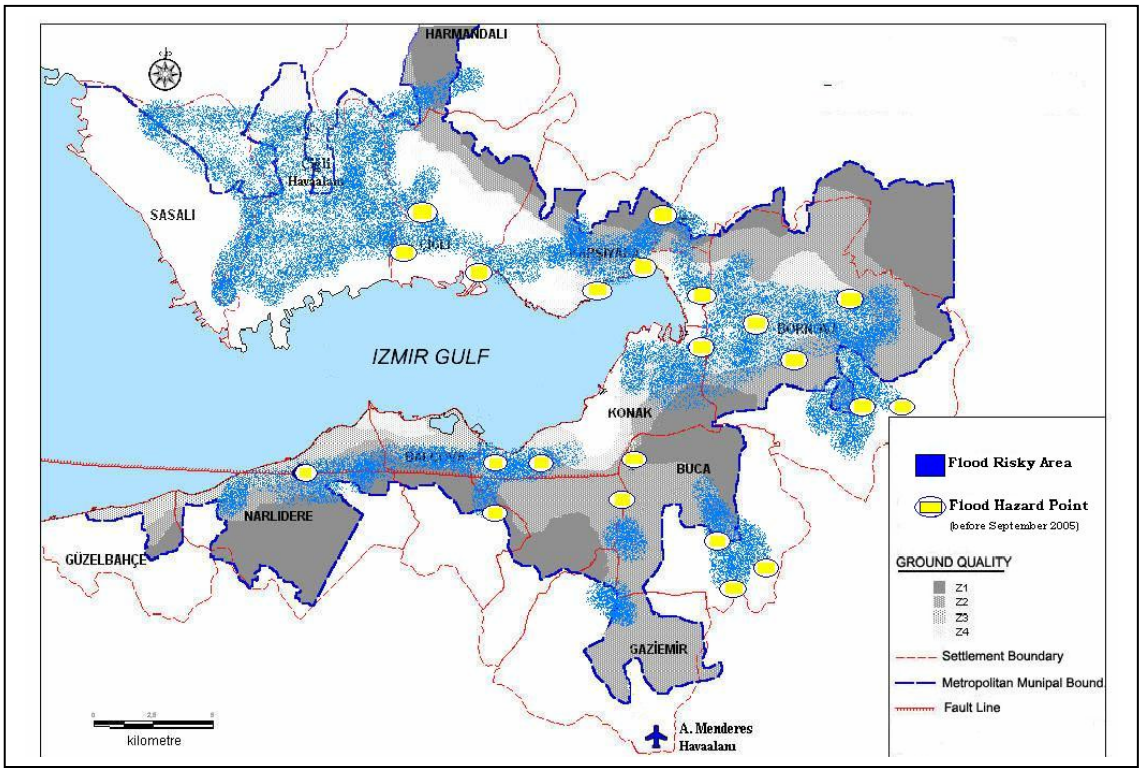

Figure 4: *Flood Risks Areas of Izmir Metropolitan Area (Adapted from Kutluca, 2001)*

The main issue of the flood in Izmir, however can be explained best by the uncontrolled urbanization factors. The population of the city has been rising steadily

and already exceeded 2 million people due to migration from other parts of the county. In order to absorb the increasing population new settlements were constructed in the Karşıyaka and Yamanlar district. In between 1987 and 1995, 50.000 new buildings were constructed in the Karşıyaka district. As a result of the increased construction activities in the parts of the Yamanlar and Karşıyaka district, more soil became vulnerable to the storm runoff due to the excavation (see table 4 and figure 4).

Table 4. *Major Floods in Izmir (Ministry of Public Work and Settlement General Directorate of Izmir, 2005)*

No	City	County	Village	Heavy. Damage.	Medium Damage	Light Damage	Non Damage
1	Izmir	Çiğli	8	77	13	28	170
2	Izmir	Narlıdere	8	25	9	30	29
3	Izmir	Karşıyaka	18	208	126	427	1047
4	Izmir	Konak	2	0	1	11	50
5	Izmir	Güzelbahçe	1	5	8	7	138
6	Izmir	Balçova	1	0	3	3	7
7	Izmir	Bornova	2	0	0	1	45
8	Izmir	Menemen	8	14	23	33	47
9	Izmir	Urla	4	0	5	3	13
	Total			**329**	**188**	**543**	**1546**

The other important problem about flood hazards was stream position for Izmir built up zone. Poor quality of streams and bridges that most of all caused floods were seem in 1995's disaster. Especially, Büyük Cigli, Bostanli, Yamanlar, Ali Bey and Narlıdere streams affected physical damage in built up zone.

Landslide and Rock fall Hazards in Izmir Built up Zone

In Izmir built up area, landslides are at two different regions, first of all can be seen in the bed of Kocaçay stream, Karagöl and Yamanlar village and their surroundings in north of Izmir Gulf. The other one is the Cretaceous detritics in the South of Izmir Gulf out cop in the South line of Balçova- Güzelbahçe (Avşar, 1997).

Similar to the landslide events, the rock fall events were evaluated using the Disaster Working reports registration data. Much report were not taken into consideration because of their occurring dates are not known exactly. 17 rock fall

events were recorded from the Disaster Working Izmir City Head Office reports between 1950 and 1998.

Landslide and rock fall areas are around the metropolitan city, especially, squatter areas are risky regions about them. In Izmir built up area, there are 15 different rock fall and landslide areas that are around the city (see table 5 and figure 5).

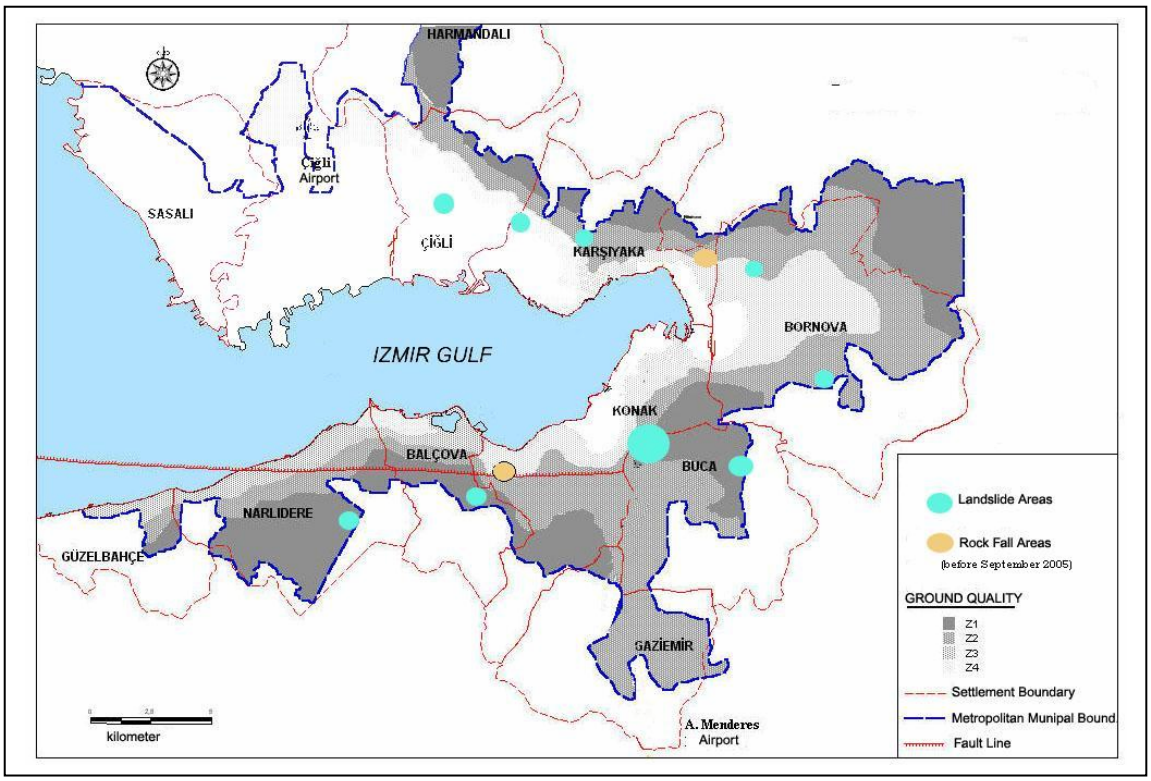

Figure 5: *Landslide and Rock fall areas of Izmir Metropolitan Area (Adopted from Kutluca, 2001)*

Landslides that are in the Izmir built up zone are studied as key study subject in this study. In the next chapter landslides will be explained as detailed. Moreover, three landslide areas which are in Altındag landslide areas, will explained together with habitants who lived in there.

Table 5. *Major Landslide and Rock fall Areas of Izmir Built up Zone (Ministry of Public Work and Settlement General Directorate of Izmir, 2005)*

No	Region	Damage Buildings	Natural Hazards type
1	Cigli- guzeltepe	440	Landslide
2	Cigli- Ornekkoy	18	Rock fall
3	Karsıyaka- Ornekkoy	50	Rock fall
4	Bayrakli- Cıcekkoy	20	Rock fall
5	Buca- Sakarya	44	Rock fall
6	Konak- Kocakapi	28	Rock fall
7	Konak- Gurcesme	10	Landslide
8	Asansor	54	Rock fall
9	Kadifekale	3162	Landslide
10	Altindag- Merkez	62	Landslide
11	Altindag- Kuyu	11	Landslide
12	Altindag- Camdibi	13	Landslide
13	Hakimiyeti Milliye	64	Landslide
14	Narlidere- Narkent	800	Landslide

All natural hazard risk maps and show that, Izmir was settled over the natural hazard risky lands. Earthquake, landslide, rock fall and floods can damage the city moreover: geology and topography are unsuitable for settlement. Therefore Izmir has settlements under danger risk for example, Karşıyaka district, Alsancak district, Üçkuyular region, Kadifekale and Altındağ regions. Because of is result, taking serious measures are very important to decrease the risks (see all figures).

If the natural hazards risk map and Izmir built up map would be superimposed, the habitant numbers that live in risky areas be observed and natural hazards risk size be clarified. Karşıyaka, Alsancak and Güzelyalı coast regions are very risky areas because of the land-soil quality (Alluvial soil), high density of population and to fill up the coasts. Hatay, Narlıdere, Kadifekale, Altındağ, Yamanlar regions are very risky areas because of the sloppy and heavy rainfall.

On the other hand, urban infrastructure systems which are electricity, water, canalization, transportation (highway and railway) and telecommunication networks, of Izmir Metropolitan Area be observed too (see Figure 6, 7, 8 and 9).

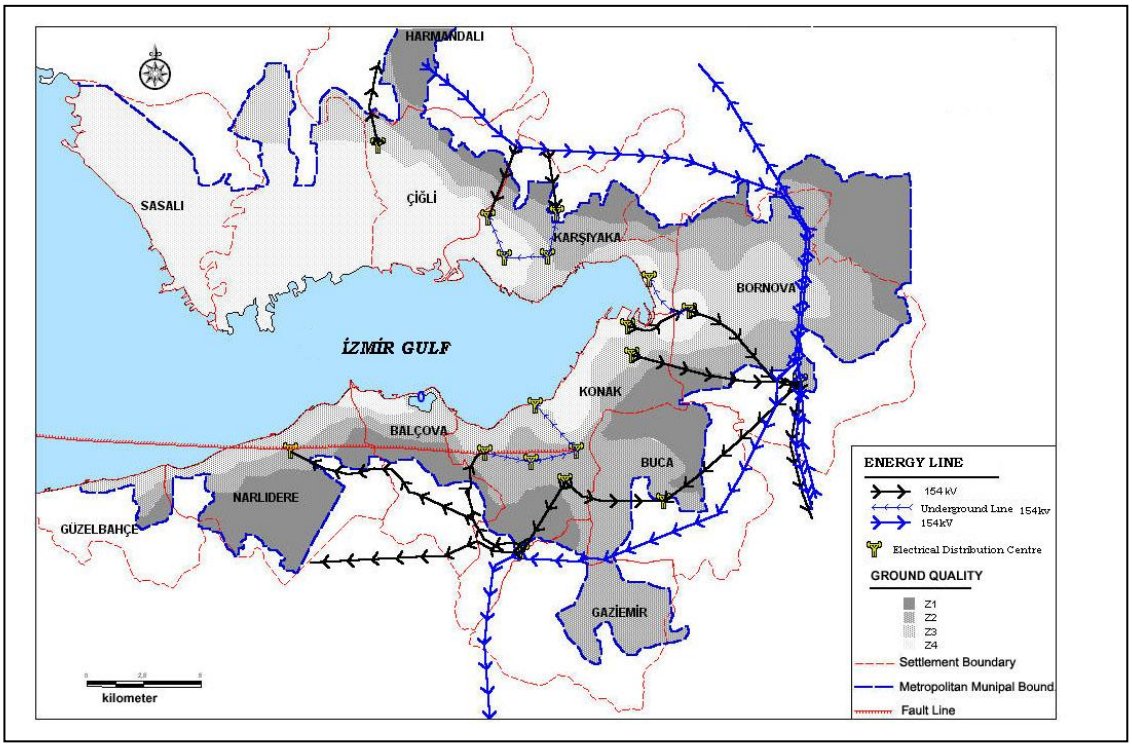

Figure 6: *Natural Hazard Risks for Main Electricity Energy Network Systems of Izmir Metropolitan Area (Adopted from Akbulut, 2003; Kutluca, 2004)*

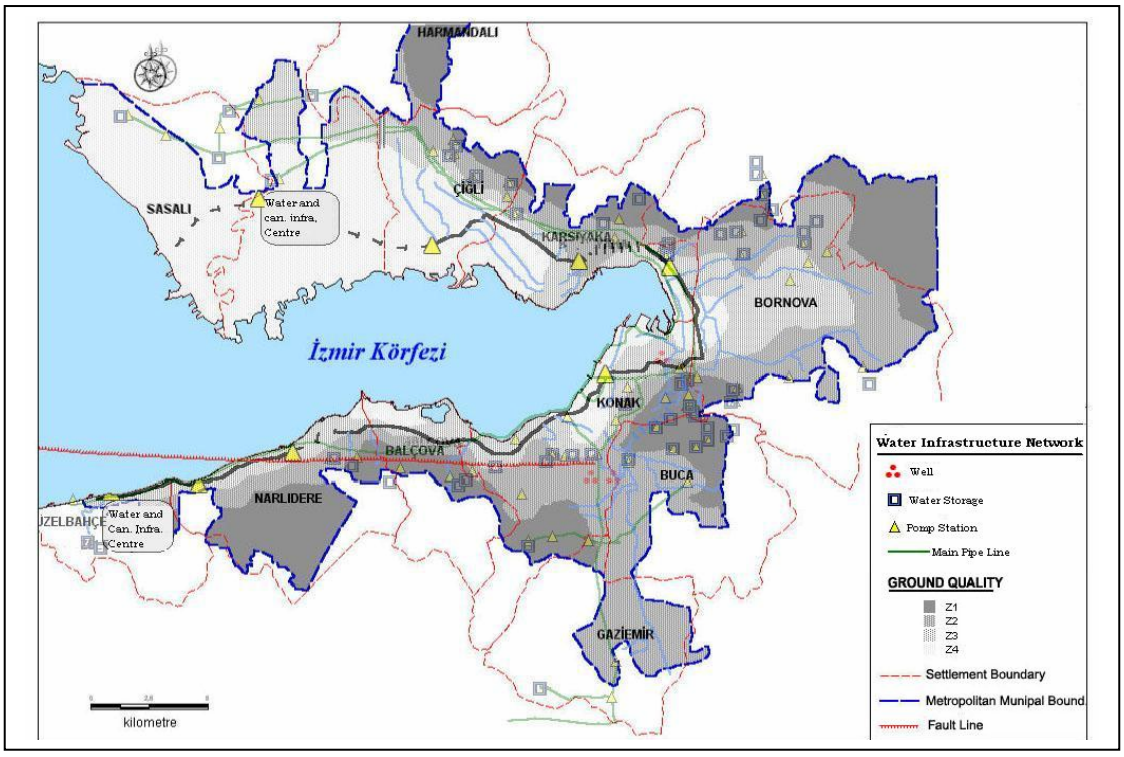

Figure 7: *Natural Hazard Risks for Water and Canalization Network Systems of Izmir Metropolitan Area (Adopted from Akbulut, 2003; Kutluca, 2004)*

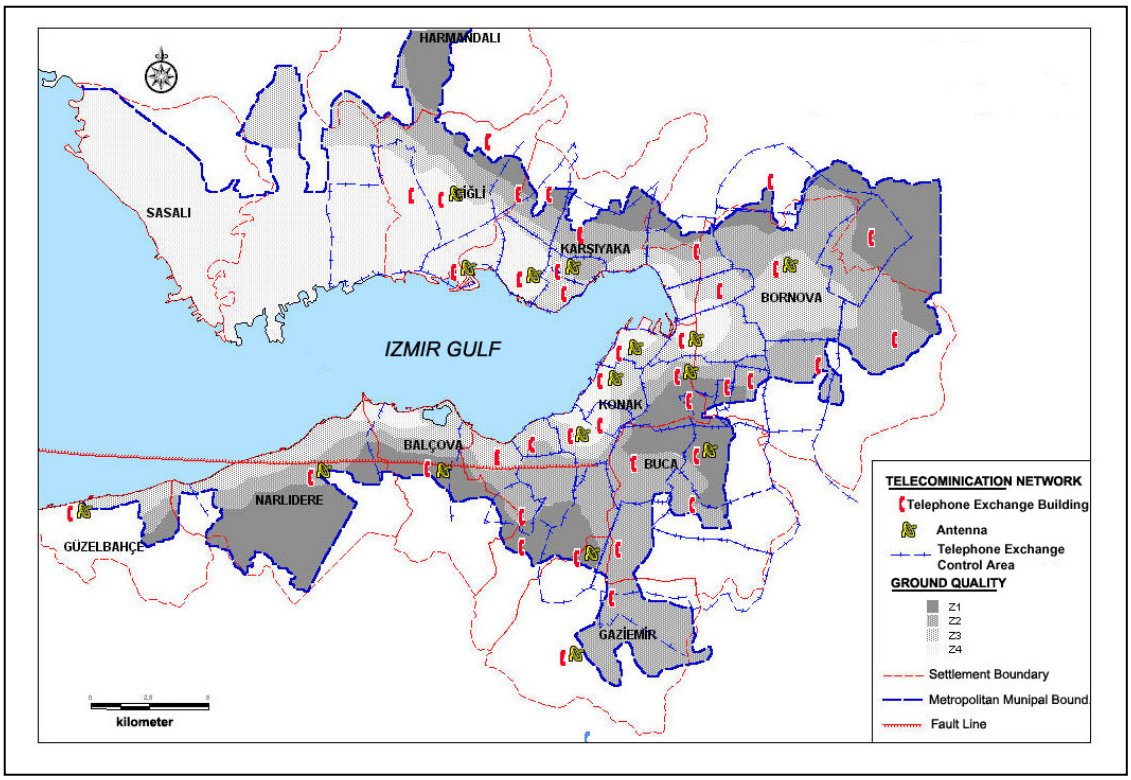

Figure 8: *Natural Hazard Risks for Telecommunication Network Systems of Izmir Metropolitan Area (Adopted from Akbulut, 2003; Kutluca, 2004)*

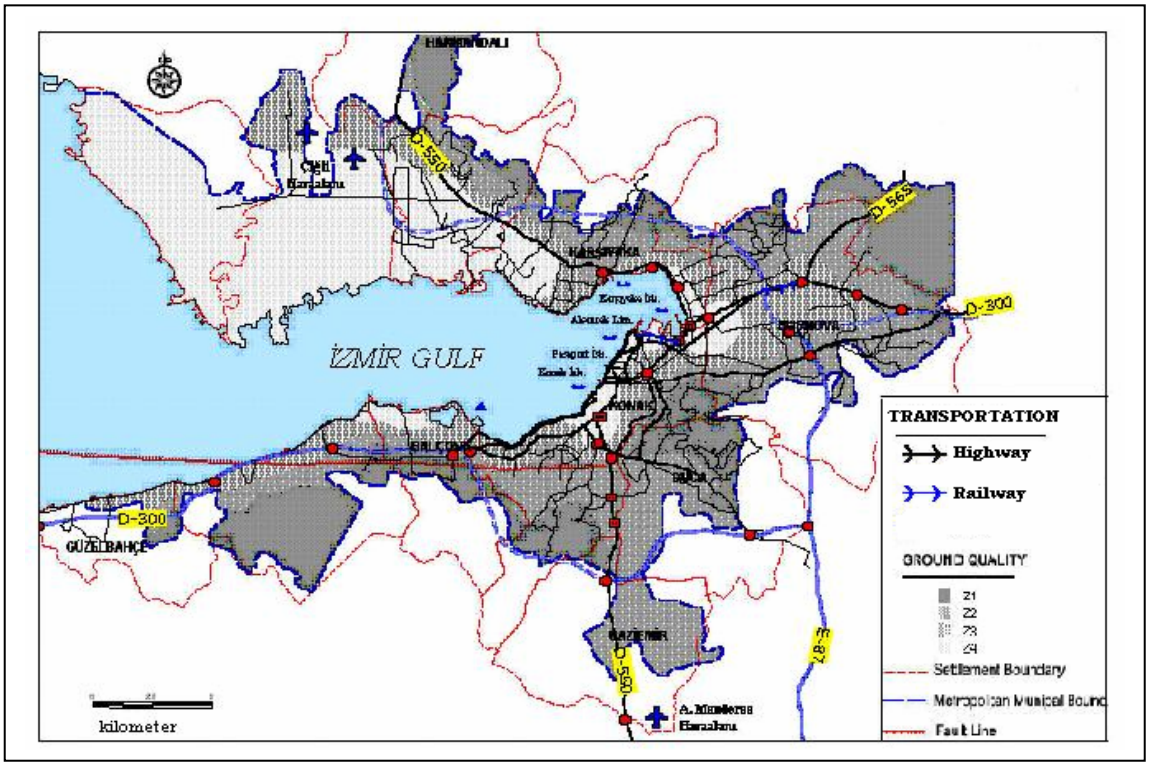

Figure 9: *Natural Hazard Risks for Transportation Network Systems of Izmir Metropolitan Area (Adopted from Akbulut, 2003; Kutluca, 2004)*

Conclusion; Planning Principles

The importance of work and readiness for preventing or minimizing natural hazard effects in Turkey, belonging to Developing Country Group, is doubled due to risks increased by its geological and geographical conditions. Turkish Natural hazard Policy, relating internal social and economical conditions, together with foreign relation arrangements, should be examined, and new strategies in law, institution and application fields determined.

First of all, Turkey should give up a post-disaster "recovery" policy. New pre-disaster, then post-disaster strategies, supported by civil organizations, should be developed.

Another important condition is to revise law and regulations revised. When making new laws, attention should be paid to pre- disaster matters, reflecting a number of proposals already made.

A condition of priority should be actualizing the Development Dispositions. Lack of active development dispositions represents a big defect. Detailed regulations, sensible to a natural hazard, should be prepared by laws, institutions or foundations to be newly constituted.

Another important matter is related with the revision of a building quality and supervision system. As the role of non-controlled construction in natural hazard impacts until nowadays is well known, necessary modifications should take place in building quality, building supervision field.

Professional skill and ethics, affecting a building quality, is one of the problem areas. Keeping professional people subject to a periodical theoretical examination is compulsory. Tight inspection of professional chambers is inevitable.

Detailed risk analysis, map and report archives on natural hazard risky areas of Turkey are indispensable. Data bank to be founded, used in new technologies, should form local threshold analysis. During periods other than natural hazarded, these plans should be effective in settlement development plans and strategies.

Producing natural hazard maps, revision of development plans; periodical-fortifying works on public buildings should be supported. This may be solved using a part of

post- disaster funds sources. Thus a decline in necessary post- disaster aid will be provided by previously established strategies.

To minimize natural hazard risks is the planning conception to be concretely discussed. Urban-scaled regional physical plans, land use plans, protection and improvement projects for old construction areas and new techniques should be assured by setting relations with new techniques and natural hazard concept.

Development and Regional Plans: Basic principles for diminishing natural hazard effects consist of balanced allocation of the population, economical operations and avoiding agglomeration in certain regions, creating reliable environments, bearable for living. This is the reason that distorted urbanization should be prevented. In other words, country leveled decisions be taken. National sources should be researched and a relation brought up between economical and physical events. Local physical plans should be supported with regional ones and consolidated. Crowding movements in metropolis, decrease of agricultural fields and constructing buildings in unfavorable alluvium lands, are facts, which increase natural hazard risks. Consequently, regional geology maps should determine inconvenient and natural hazard risky areas. Regional planning projects, which depend on mentioned regional geology maps, must be compulsory,.

Sub- Regional Plans and Metropolitan Plans: Basic problem is that the necessity of making metropolitan plans according to the country and regional plans goes to a dead end from the very beginning, due to a lack of regional plans. A fact affecting the most natural hazard risks in metropolitan areas is the matter or borders of municipalities determined by the law nr. 5216. Although actual physical development area of metropolitan municipalities, today there is no one responsible and authoritative organization, which provides coordination between different municipalities and prepares metropolitan physical plans.

Due to shortages in laws, metropolitan municipality being unable to make changes in borders, controls and coordination around border areas cannot be provided, which results in broken, disordered situations. This of course produces uncontrolled and uninspected problems in respect of natural hazard

effects. Insufficient organization level of the Ministry of Development and Reconstruction, responsible of making metropolitan plans, is one of reasons of non implementation of this process, too.

Local Implementation Plans: Local Implementation Plan as physical plans are known as basic physical plan in our country. Fixing the areas having natural hazard risky during planning process and limitative regionalization by these plans is quite possible. Compatibility between macro scaled plans, micro scaled plans and physical site can be assured, in order to reach a reliable physical building and structure. Lack of relation between planning levels, missing of new strategies in planning process for preventing natural hazard effects, supervision, are the most important problems in existing physical planning practice.

Preparation of physical plans without sufficiently previous research of ground base/geological conditions is the other important problem. Laws are anticipating the use of geological maps as a base for planning, but don't impose it as compelling. In addition, there is no explanation about map scale, necessary criterions for use.

Notwithstanding physical planning position is inter disciplinary process, it appears as the one not including disciplined application, nor common work of ground mechanical, geologist and earthquake engineer in natural hazard risky areas. Necessary legal procedures should get these common operations compulsory.

Some physical plans resulting from mentioned defects have a big role in increasing natural hazard risks. Due to political pressures and unconsciousness, physical plans are modified continuously and number of floors increased, so already limited urban utility fields decrease, additional floors affect seriously building real supporting capacity, creating thus higher risks of potential earthquake effects. Consequently, a general, transparent supervision thru people's participation should be assured by a tight control of revision plans, by inspecting systems giving such construction permits. In addition, plan revisions should comply with the whole, very small area revisions permitted.

Another plan, which named as "Improvement Plan", is another serious problem for existing built up areas of our cities, which are constructed illegally. Depending on

the last Amnesty Law; disordered unreliable sites have been produced. Repeated amnesty laws have not only motivated unlicensed constructions, but have also created condensed planning problems, difficult to resolve. This kind of applications increases natural hazard damages hundred per cent. Applications of nowadays in the Development Improvement Plans should be ended, reliable and safe sites, new models, decreasing risks, should be created. Mass housing projects may be the most convenient solution to this.

In the implementation process of physical plans %40 of the lands are gotten from the landowners without and costs and are used for urban utility services. This constant rate is defined in Development Law and is used in everywhere. However, highly crowded areas taken into consideration, this proportion, regarding a number of users, remains insufficient. Increase of utility portion, proportional to a population density, is proposed by a wide section of people.

As a natural hazard concept and planning are so close one within the other, this brings together a natural hazard sensible plan understanding in plan approach and implementation revisions.

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