

Code of Conduct in Disaster Response Urban and Architectural Planning Perspective in İstanbul

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Abstract:

İstanbul is considered one of the most vulnerable metropolitan areas for natural disasters, especially earthquakes. Although, it has taken advanced steps in disaster preparedness and early warning, it still faces many problems related to urban planning, and architectural design of buildings, due to the absence of clear and specific planning control system and design requirements for disaster. From the perspective of urban planning, this study investigates the dominant features shaping the urban planning elements in İstanbul, while focusing on the main factors creating the current situation. In addition, this study focuses on analyzing both the current applications and future strategies, like urban transformation projects, which are being implemented to mitigate the effects of the future disasters. For this purpose, some key parameters such as high population density in some districts, building heights and road width ratios, the close-interference between industrial and residential areas, as well as public and private buildings life cycle are investigated. Moreover, standardization of urban transformation implementations is evaluated. In the study, a mixed analytical method (qualitative and quantitative) is used, including statistics and surveys, to collect and analyze data from different resources. Then a comparative approach is applied to conclude the results. Five case studies; namely main Esenler bus station, and urban planning of Fatih, İkitelli, Zeytinburnu and Başakşehir districts, are presented as pilot projects for better understanding their conditions and generalize the results over the city. The problems in the selected samples lay in the difficulty of evacuating and rescuing the people during and after disasters. The results seek to propose amendments to the existing planning status of the existing areas, as well as to suggest new conditions for future urban planning.

Key words: Disaster response, urban planning, architecture, urban transformation, İstanbul.

1. Introduction

In the last century, the number of reported natural catastrophes has vastly increased, as directly consequence that today “about 25 percent world’s population lives in areas at risk from natural hazard” [1]. The major figures about the development and disasters (throughout the world) can be highlighted as follows;

- The natural disasters caused loss of 1.5 million lives in the last 20 years.
- While 15% of the population exposed to risk is in the developed countries, only 1.8% loss of life occur in these countries.
- 94% of natural disasters take place in developing countries.
- 98% of the population affected from natural disasters live in these countries.
- Annual GDP loss in developing countries is between 2-15%.
- The economic loss in developing countries is 20 times as much as developed countries.

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- The average annual loss resulting from disasters in 1990s is USD 63 billion.
- The annual loss resulting from disasters in 2050 is estimated as USD 300 billion.

1.1. Literature Survey

Code of Conduct in Disaster.

The book [2] remains one of the most important reference books dealing with this subject in detail. Another book [3] provides operational guidelines and field manual on human rights protection in situations of natural disaster. The resilience of the cities is investigated by the study [4] on the disasters behavior and intensity of all types, focusing on their impact on cities, especially on infrastructure, which is the main nerve of life in normal conditions and is the main nerve for the implementation of rescue operations.

Code of Conduct in Disaster Response.

In the field, a standardization attempt [5] can be considered a reference for governments to be a basis in the establishment of minimum requirements to respond to the needs of people in case of emergency situations after the disasters. The behavior of the population after the occurrence of disasters of various kinds to build upon it the development of architectural and planning requirements can be found in [6].

Urban Planning and Architecture in İstanbul.

Dimensions of urban re-development is studied for the case of Beyoğlu, İstanbul [8]. This book presents analysis and critique urban planning in İstanbul with the proposal of mechanisms for the development and improvement of urban planning by studying the area of Beyoğlu as a case study. On the other hand, “city of intersections” [9] enables understanding İstanbul with all the surrounding climate, history, diverse cultures and political data, and it brings us back to the city's old planning and developments. The paper [10] focuses firstly on the analysis of the characteristics of İstanbul and then proposes a new perspective of understanding.

Code of Conduct in Disaster Response Urban Planning and Architecture in İstanbul.

“The Disaster Prevention / Mitigation Basic Plan in İstanbul” [11] including seismic micro zonation study was carried out in response to a request from the Government of the Turkish Republic. The Government of Japan decided to conduct a study on the basic plan for disaster prevention / mitigation in İstanbul. A master thesis [12] is considered one of the most complete reference points that can be adopted in our study, taking into consideration the date of study and the changes that occurred in the city throughout this period. “Risk Management and micro zonation in Urban Planning” [13] paper aims to highlight the importance of the relationship between micro zonation maps and urban planning and to examine the status of implementation of risk management activities.

1.2. Research Methods used in the Study

In the study, a mixed analytical method (qualitative and quantitative) is used, including statistics and surveys, to collect and analyze data from different resources. From the perspective of urban planning, this study investigates the dominant features shaping the urban planning elements in İstanbul:

- Focusing on the main factors creating the current situation.
- This study focuses on analyzing both the current applications and future strategies, like urban

transformation projects, which are being implemented to mitigate the effects of the future disasters, especially earthquakes. For this purpose, some key parameters such as high population density in some districts, building heights and road width ratios, the close-interference between industrial and residential areas, as well as public and private buildings life cycle are investigated.

Then a comparative approach is applied, comparing these data and concluding the results. Five case studies; namely: main Esenler bus station, and Fatih, İkitelli, Zeytinburnu, Başakşehir Districts; are presented as pilot projects for better understanding their conditions and generalize the results over the city. The problems in the selected samples lay in the difficulty of evacuating and rescuing the population during and after disaster.

2. General Current Status

Türkiye faces high vulnerability to earthquakes, with İstanbul posing the most serious risk due its high seismic risk and its role as the population and economic center of Türkiye. Marmara earthquake in 1999 led to over 17,000 deaths and damage estimated at \$US 513 billion, but vulnerability to earthquakes remained high, especially for İstanbul. A major earthquake in İstanbul would be catastrophic, and could derail the country's development trajectory.

With the Municipality Law numbered 5393 and dated 2005, municipalities are authorized to implement urban regeneration and renewal projects in order to form residential areas, industrial areas, commercial areas, technology parks, public service areas, recreation areas and create all kinds of social reinforcement areas, reconstruct and restore the old parts of the city, protect the historical and cultural parts of the city and take precaution against disaster risk. 2005 dated and 5366 numbered Law on the Protection of Deteriorated Historical and Cultural Heritage through Renewal and Re-use aims reconstruction and restoration of protected areas and their surroundings in the concept of development of the areas and to form residential, commercial, cultural, touristic and social reinforcement areas, to take precaution against disaster risk, to renew and protect the historical and cultural heritages and to use them in order to make them live.

3. Disasters in Türkiye

Türkiye, one of the most seismically active regions of the world, according to the National Earthquake Hazard Zoning Map, published by the Turkish Ministry of Public Work and settlements in 1996, roughly two third of the country have been recognized under a primary seismic threat characterized by a peak ground acceleration (PGA) greater than 0.30g.[14] The seismic hazard could be assessed reckoning possible earthquake related natural phenomena such as ground-motion, fault rupture, soil liquefaction, etc. and considering its geomorphological characteristics. [15]

Türkiye experiences an average of one earthquake with a magnitude of 5 to 6 every year, and has the ninth place in the world with regard to human losses in earthquakes. Moreover, it is on the fifth place in terms of the total number of people affected. Each year due to earthquakes 1,000 people

die and 2,100 people are injured. According to statistics from the last 60 years, direct and indirect economic losses caused by disasters correspond to 3% of the GNP. All these statistics which are summarized in Table 1, show the importance of disaster management for Türkiye.

Table 1. Summary Data on Disasters Caused by Natural Hazards (1980 -2014)

Type of Disaster	Frequency	Loss of Lives	Injuries	Affected	Homeless	Total Affected	Total Loss ('000\$)
Earthquakes	38	21.193	63.684	4.880.751	1.027.490	5.971.925	24.534.800
Floods	32	593	214	1.678.270	97.036	1.775.520	2.195.500
Landslides	11	633	260	11.911	2.385	14.551	26.000

In summary, 96% of its areas is under the danger of earthquake hazard, where 70% of the population live and 75% of industrial plants are located in seismically active areas. 66% of the country is located on active fault zones, and thus 75% of damaged buildings and 64% of total disaster losses in the last century were due to earthquakes.

The statistics which define the earthquake toll in Türkiye can be given as follows:

- The estimated average annual direct economic loss in the last decade is over USD1 billion.
- Frequency of earthquakes over 5.5 M per annum: 0.76 (6th in the world).
- Annual loss of life due to disasters: 950 (3rd in the world).
- Loss of life per capita (million): 15, 58 (4th in the world).
- Average population exposed to disasters per annum: 2.745.757 (8th in the world).
- Loss of life per capita exposed to disasters (million): 346 (4th in the world).

The floods and landslides are the next in line hazards following the earthquakes. Floods occur mostly in coastal plains and exacerbated by deforestation, erosion and ignorant development, causing the 15% of total disaster losses. Similarly, 25% of country area is exposed to landslide hazard, and 11% of total population is located in landslide areas. 16 % of total disaster losses are due to landslides.

4. Disasters in İstanbul

Just for highlighting; this brief list should be more than enough: 8500 years of history, capital of 3 great empires, population of 15.5 million, 8th most visited city, World's Leading Congress Destination, 2010 European Capital of Culture, 2012 European Capital of Sport, connecting 2 continents – Europe and Asia, 78 public and private museums, 114 shopping malls, 5 imperial palaces, dozens of summer palaces and mansions, 4 historic bazaars, 56 universities, and 4 seasons throughout the year. [<http://icvb.org.tr/why-İstanbul/>]

İstanbul has taken advanced steps in disaster preparedness and early warning in recent years. However, it still faces many problems related to urban planning in general, and architectural design of buildings in particular, due to the absence of clear and specific planning control system and design requirements for disaster. The disasters risk in İstanbul is summarized in the sketch shown in Figure 1.

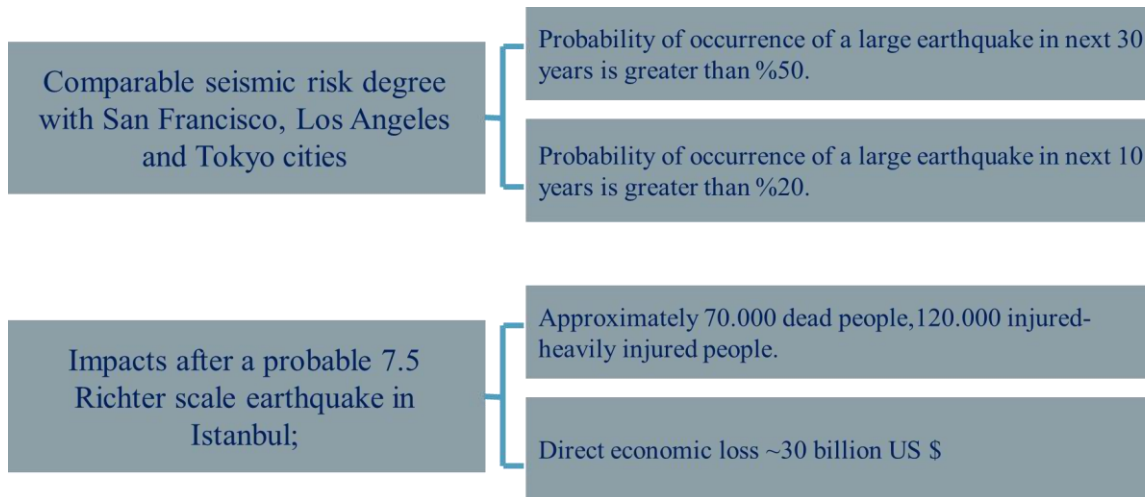


Figure 1. Disaster Risk Sketch in İstanbul

Areas with potential for serious damage have been identified as follows:

- * Estimated High Building Damage Area: lack of seismic resistant structures (squatter and irregular development areas) located in the estimated strong seismic motion area.
- * Lack of Safety Evacuation Routes: lack of sufficiently wide evacuation routes.
- * Lack of Safety Evacuation Spaces: lack of or limited parks and open spaces to provide evacuation spaces to residents protecting them from second and third earthquake motions.
- * Lack of Access Roads for Emergency Vehicles: areas normally connected by inappropriately narrow roads will be isolated and probably will not be reached by proper emergency response operations, such as rescue, firefighting, first aid, emergency medical care, and emergency food/water supply.

General description (current status).

The progress of disaster sensitive planning approach varies depending on the level of development in each country. In Türkiye, this approach was accelerated mainly after the Marmara earthquake occurred in 1999.

The output of different analyses is the classification of settlements in four categories:

1. Appropriate areas for settlement,
2. Areas for preventive actions,
3. Areas require detailed geotechnical survey,
4. Inappropriate areas for settlement.

Empirical studies show that although micro zonation studies have been currently undertaken, plan decisions based on residential areas are quite poor due to the challenges of restricting the development rights, regulating and discharging of those areas.

Goals of the Project for İstanbul

- Prevention of potential loss of life.
- Mitigation of social, economic and financial effects of a possible earthquake or flood.
- Formation of a model for the design and implementation of urban planning projects and activities within the field of disaster management.
- Creation of a model to improve emergency management capacities of local governments.
- Adopt as appropriate regulations and policies ensuring adherence to hazard-related

international standards, including, but not limited to: a. The SENDAI framework.

- a. Establishing a government Flood Risk Management Standard.
- b. Process for Further Soliciting and Considering Stakeholder Input.
- c. The government Earthquake Risk Management Standard (urban planning code).
- d. Risk Mitigation on Coast Interface (urban planning code).

5. Case Studies and Discussion

In this study the parameters, i.e. i) Population Data, ii) Building Data, iii) Building Construction Year Data, iv) Road Data, v) Major Urban Facilities Data (Educational Facilities, Medical Facilities, Fire Fighting Facilities, Security Facilities, Governmental Facilities, Prioritized Public Buildings, No. of Buildings to be retrofitted), are considered as the prioritization criteria. The discussions and the corresponding suggestions are presented for the following five case studies. For the sake of brief and clear presentation, bullet forms are used for each cases.

5.1. Main Esenler Bus Station

The main coach terminal is likely to cause serious damage during disaster, because;

- Station location within a high density residential area,
- The building is very complex and has very different uses (pedestrian, cars, buses, metro...),
- There are many signs of large cracks in the concrete with insufficient maintenance.

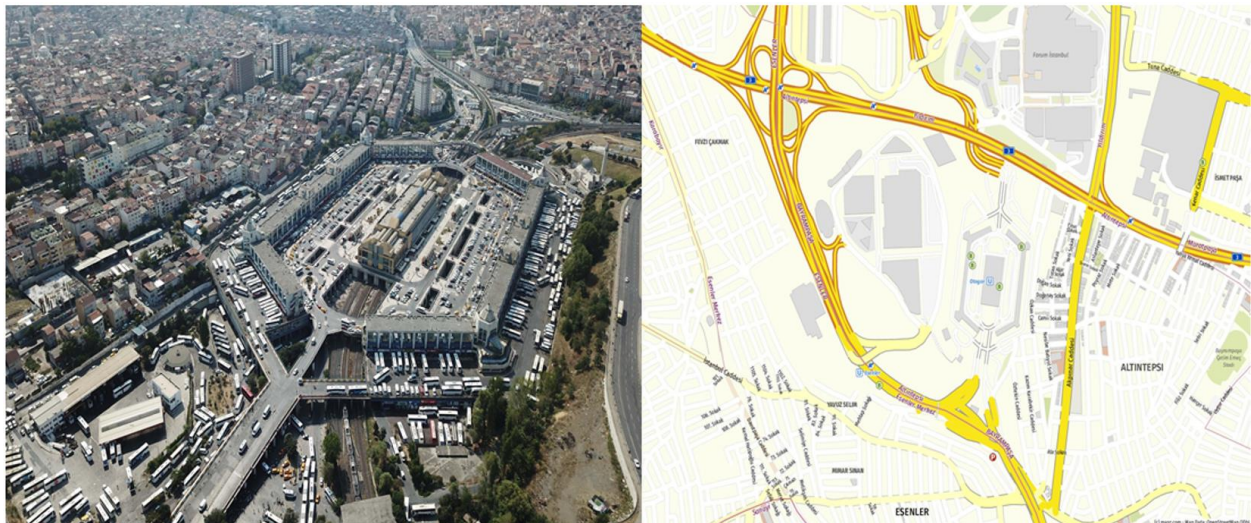


Figure 2. View and location of Esenler Bus Station

The important suggestions of the study for Esenler Bus Station;

1. Emptying the building as quickly as possible of his position,
2. Transmission of the main bus station of İstanbul to outside the residential areas, and consider to build a new one on the axis of the road Sultan Selim Bridge and new Airport intersections.
3. Demolition of the station building and concrete bridges around it, while maintaining the axis

of the metro rail and building the station in a distinctive and modern style.

4. Transformation the area of old station into a green area (garden) to form a green lung for the dense areas around it as well as a gathering area in the event of disasters.

5. Maintaining the main roads surrounding the garage area and connecting them with the green land in a way that will serve as a service center for the future.

7.3. Fatih District

The Historical Peninsula and Fatih District is evaluated within the first ten settlement areas exposed to high seismic risk (AFAD, 1996), due to;

- Lack of Safety Evacuation Routes,
- Lack of Safety Evacuation Spaces,
- Lack of Access Roads for Emergency Vehicles,
- High population density.

Fatih, historically Constantinople, is the capital district and a municipality in İstanbul, Türkiye, which hosts all the provincial authorities, including the governor's office, police headquarters, metropolitan municipality and tax office.

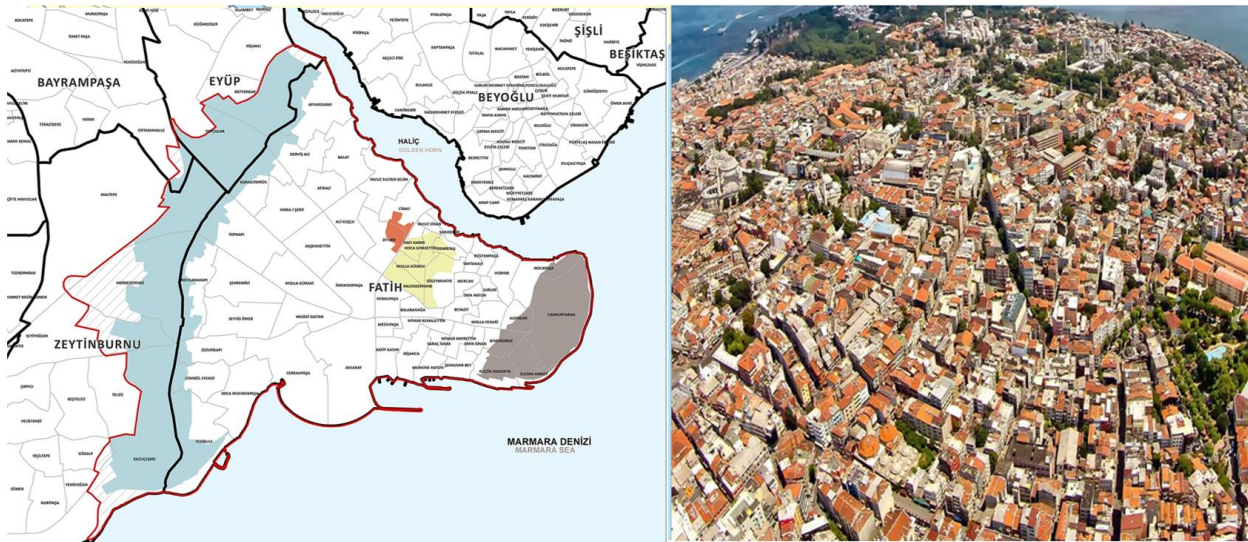


Figure 3. The map and an aerial view of Fatih

The common characteristics of priority areas in Fatih District indicate that local seismic attributes are not solely constituted of building stock but also historical urban texture, geological macroform risks, social inaccessibility, and vulnerable infrastructure and transportation network evaluated in emergency measures which have key roles in shaping the local risk pattern and increasing the potential vulnerability of the district; for that should re-planning district, mainly open wide road and design areas for assembly in disaster case. And, in the first should assessment all building and its resistance for earthquake.

7.4. İkitelli District

İkitelli is likely to cause serious damages, due to;

- Lack of Safety Evacuation Routes,
- Lack of Safety Evacuation Spaces,
- Lack of Access Roads for Emergency Vehicles,
- Intervention of residential and industrial areas,
- Narrow Streets,
- The heights of the buildings do not fit with the street view,
- The adoption of adjacent housing, which increases the density of populations,
- Scarcity of collection areas in and around designated areas.

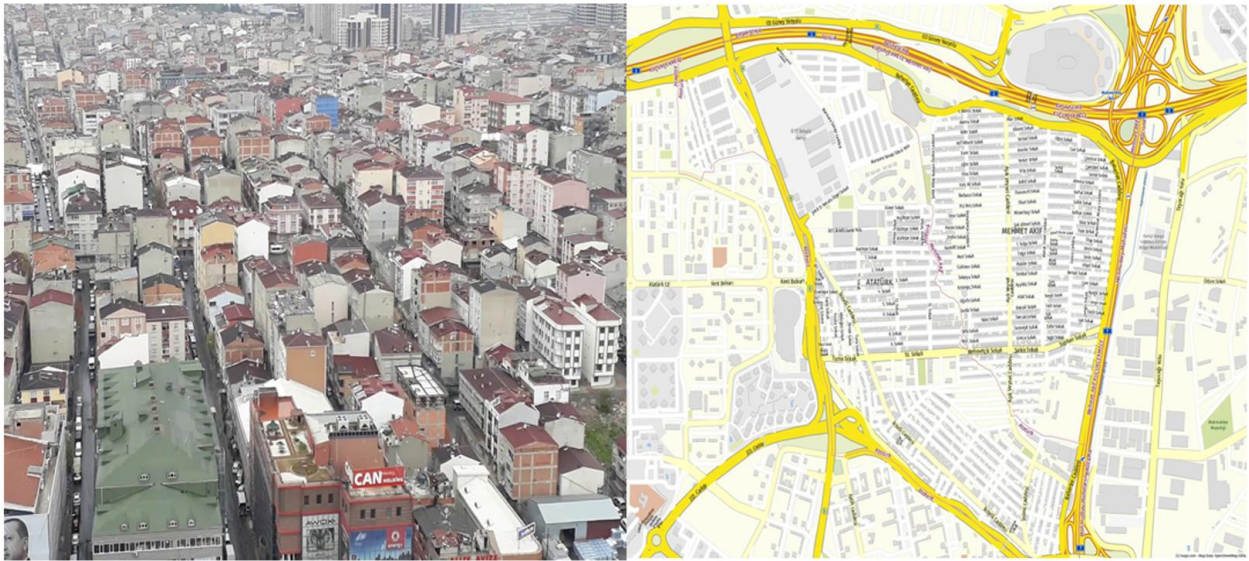


Figure 4. View and the map of İkitelli

- Isolation of industrial areas from residential areas and the transfer of excess space to areas allocated for gathering in disasters, and
- Re-planning the area to allow the modernization of buildings to be resistant to earthquakes on one hand and to increase areas and axes of evacuation is suggested.

7.5. Zeytinburnu District

Zeytinburnu is an important lesson for city planning in Türkiye, because it was one of the first slum (gecekondu in Turkish) districts. In other words, most of the buildings were built illegally, without infrastructure, and without any aesthetical concern. In the 1960s legislation was passed to prevent this type of building but by then this type of development had become unstoppable. At first these were little brick-built single story cottages. From the 1970s onwards the little houses were replaced by multi-story concrete apartment blocks built in rows with no space in between. In most cases the ground floor was used as a small textile workshop, and thus Zeytinburnu became a bustling industrial area with a large residential population living above the workshops. All this was still

illegal and unplanned and still lacked the infrastructure and the aesthetics. After a heavy rain the streets would run with dirty water for days, as one example is shown in Figure 5.

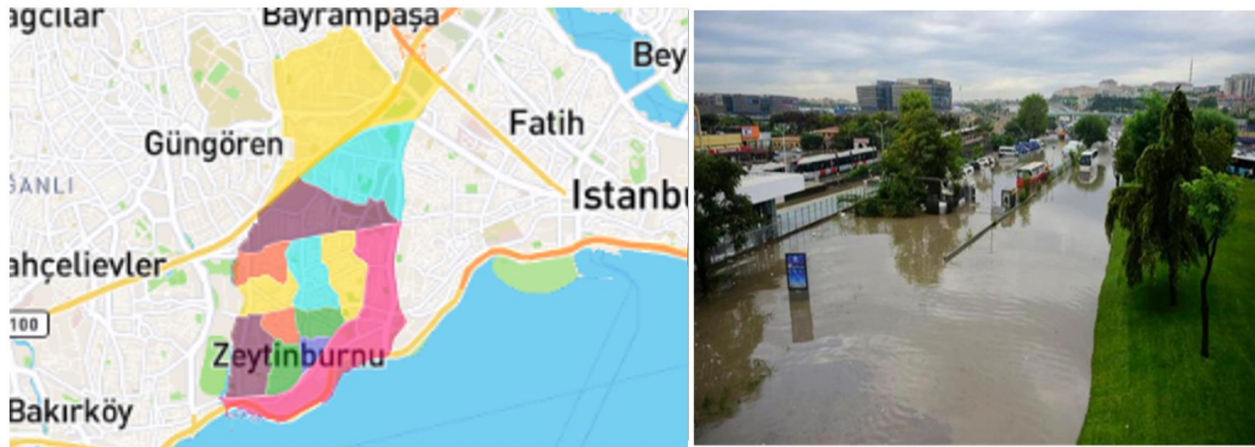


Figure 5. The map and a flood view from Zeytinburnu

Absolute dependence on flood protection structures can never be sufficient for mitigation of flood risks. So, effective use of standard hazard mapping based on possible risk scenarios, vulnerability analysis and risk zones for whole basin areas should be ensured before any further actions within zones.

7.6. Başakşehir District

Başakşehir is situated in the European portion of İstanbul. Sazlıdere Dam reservoir is to the northwest. It is surrounded by other some other low income districts of İstanbul, such as Eyüp, Sultangazi, Esenler, Bağcılar, Küçükçekmece, Avcılar, Esenyurt and Arnavutköy.

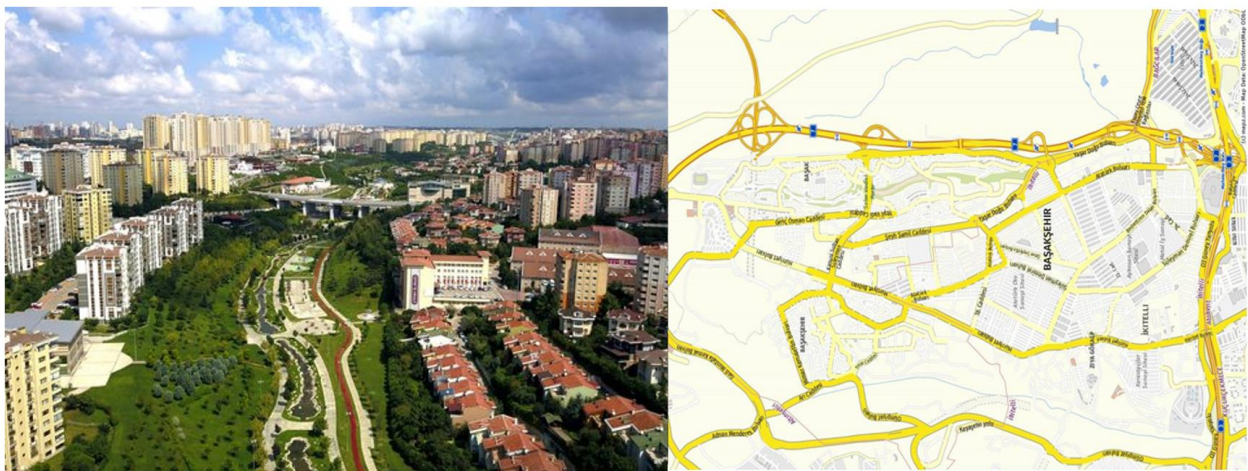


Figure 6. View and the map of the main roads in Başakşehir

- The area is characterized by wide streets and tall buildings, so that the temporary evacuation areas are available, but there is still a need for areas for evacuation during disasters, which are close to hospitals, health centers and government buildings.
- The area needs to build public buildings (bazaars), which are investment buildings on normal days but can be used for disaster accommodation instead of tents and temporary prefabricated buildings.
- Distribution of health centers and small hospitals to all areas, and not rely on large hospitals only.

8. Conclusions

A comprehensive strategy should be implemented to overwhelm all the problems mentioned above, whose selected steps can be given as follows:

1. Study the assessments and standards established in other developed countries, for example (America, Japan, Italy, Spain ...),
2. Compare and approach laws in other countries with the laws and situations studied in Türkiye in general and in İstanbul in particular,
3. Planning DRR Strategies, without repeating the former mistakes.

After reviewing the studies, previous reports, research, academic studies and reports of international companies such as AFAD, JAICA, it is clear that everyone did a part of what we are looking at here in the study, but we did not find who surrounds all the details we have listed that start from architecture and planning to the disaster response processes.

Hence, it is important to link these issues together and to draw new guidance on this problem to mitigate disaster risk as much as possible.

a) Report Conclusion in Urban Planning Level

- The need to provide areas free of construction, whose function is to gather the population in the event of disasters, does not increase the radius of the area, which is serving this arena of 500 m, and the size of the density of the surrounding residential areas.
- Provide wide roads linking the residential areas with the squares of the assembly and with public service buildings such as hospitals and fire stations.
- The issuance of new building laws and requirements to reduce the high population density, in addition to reconsidering the system of continuous construction and replace it with separate buildings.

b) Report Conclusion in Architecture Level

- Evaluation of the status of public buildings with high daily use and follow-up of their suitability for disaster response both architecturally and constructively.
- Establish clear new rules and regulations for all types of buildings that take into account escape and rescue situations during disasters.
- Increasing the number of earthquake-resistant public buildings currently allocated to public services that can be used as shelters and disaster refugees camp (public bazaar buildings in some modern areas for example).

c) Community Level

Main Characteristics of Community Based Disaster Management Implementation of Community Based Disaster Management points to the following essential features.

- The community has a central role in long term and short term disaster management. The focus of attention in disaster management must be the local community
- Disaster risk or vulnerability reduction is the foundation of The primary content of disaster management activities, which revolves around reducing vulnerable conditions and the root causes of vulnerability.
- Community as a key resource in disaster risk reduction. The community is the key actor as well as the primary beneficiary of disaster risk reduction. Within the community, priority attention is given to the conditions of the most vulnerable as well as to their mobilization in the disaster risk reduction.

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