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A study on the adequacy of gathering areas as urban spaces

Kentsel mekân olarak toplanma alanlarının yeterlilikleri üzerine bir araştırma

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Abstract

Türkiye is located in a geography of the world that can be classified as a “high risk” in terms of earthquakes. During and after an earthquake, people feel the need to leave the structures they are in and reach open areas to protect themselves and feel safe. In addition to contributing to the city in a social, psychological, economic and aesthetic sense, these areas should be increased in number and quality, as they are used in accordance with the needs of people for the purpose of escaping from the earthquake disaster, shelter, housing. The open areas scattered throughout the city have been designated as disaster and emergency gathering areas according to the fact that they meet some of the standards mentioned in this study. The main question here is whether the urban open and green space system used as ’gathering areas' is in sufficient and appropriate conditions to respond to the needs after the earthquake and shorten the return to normalcy process. This study was designed to raise awareness of students about the use of urban spaces after the earthquake that occurred on February 6, 2023 and to reveal the level of gathering areas around them. Within the scope of the Urban Design course, students who are in different provinces due to online education were asked for information about the closest gathering area to them, including the distance of their places of residence to the gathering areas, the size of the gathering areas and their current use. In this context, the data related to the collection areas were collected from the students and discussed with the relevant literature. As a result, suggestions were made about the issues that should be taken into account when planning and designing the assembly area.

Özet

Türkiye depremler bakımından dünyanın “yüksek riskli” olarak nitelenebilecek bir coğrafyasında bulunmaktadır. Deprem anında ve sonrasında insanlar, bulundukları yapıları terk ederek kendilerini koruma altına almak, güvende hissetmek için açık alanlara ulaşma ihtiyacı duymaktadır. Bu alanların sosyal, psikolojik ekonomik ve estetik anlamda kente katkı sağlamasının yanında, deprem felaketinden kaçma, sığınma, barınma amaçlı olarak da insanların ihtiyaçları doğrultusunda kullanıldığı için sayı ve nitelik olarak artırılması gerekmektedir. Kent içerisine dağılmış durumda olan açık alanlar bu çalışmada bahsedilen bazı standartları taşıması durumuna göre afet ve acil durum toplanma alanı olarak belirlenmiştir. Buradaki temel soru, ‘toplanma alanları’ olarak kullanılan kentsel açık ve yeşil alan sisteminin deprem sonrasında ihtiyaçlara cevap veren, normale dönme sürecini kısaltacak yeterli ve uygun koşullarda olup olmadığıdır. Bu çalışma 6 Şubat 2023’te meydana gelen deprem sonrasında öğrencileri kentsel mekânların kullanımı konusunda bilinçlendirmek ve çevrelerinde bulunan toplanma alanlarının ne düzeyde olduğunu ortaya koymak için tasarlanmıştır. Kentsel Tasarım dersi kapsamında çevrimiçi eğitim sebebiyle farklı illerde olan öğrencilerden kendilerine en yakın olan toplanma alanı ile ilgili ikamet ettikleri yerlerin toplanma alanlarına olan uzaklığı, toplanma alanlarının büyüklüğü ve mevcuttaki kullanımını içeren bilgiler istenmiştir. Bu kapsamda öğrencilerden toplanma alanlarına ilişkin veriler toplanıp ilgili literatür ile tartışılmıştır. Sonuç olarak ise toplanma alanı planlanırken ve tasarlanırken dikkat edilmesi gereken hususlarla ilgili önerilerde bulunulmuştur.

INTRODUCTION

Türkiye is a country in which various disasters tend to occur commonly due to its geological structure, tectonic formation, and topographic and climatic characteristics (Anonymous 2011, Gökçe and Tetik 2012). Disasters are defined as natural, technological or human-induced events that cause physical, economic and social losses for people and adversely affect communities by halting or disrupting daily life and human activities (Gökçe and Tetik 2012). Gökgöz et al. (2020) defines disasters as natural, technological or human-induced catastrophes that cause damage or loss of life as a result of a major ecological collapse. Earthquakes, landslides, floods, erosion,

rockslides, avalanches and droughts are among the foremost natural disasters that occur in our country (Anonymous 2011). Among natural disasters that occur worldwide, earthquakes have the highest impact in terms of loss of life and property (Anonymous 2011, Gökgöz et al. 2020). Earthquake is defined as the propagation of energy in the form of waves due to cracks or fractures that occur abruptly in the earth's crust and cause a severe tremor above the ground (Anonymous 2011, Komar 2021). Türkiye is located in a part of the world that can be characterized to have a "high risk" for earthquakes. On average, Türkiye suffers from earthquakes every five years, which cause widespread loss of life and property (Benli et al. 2018). Earthquakes occur in almost every region of our country. However, most severe earthquakes mainly occur in three regions (North-Northeast Anatolia, West Anatolia and East-Southeast Anatolia) (Anonymous 2011). As an earthquake country, Türkiye has experienced numerous earthquake disasters that have killed thousands of people and caused serious material losses. The fact that many settlements and industrial areas in our country have been built in risky areas, illegal construction and zoning plans based on faulty site selection have led to an unhealthy urban fabric and negatively affected urban centers and their surroundings (Çavuş 2015).

Emergency Gathering Areas And Their Importance

Development of disaster and emergency management requires past experiences and continuity. In order to adopt a sustainable approach during a crisis and to overcome the crisis with minimal losses, cooperation and coordination between responsible institutions are required (Gerdan and Şen 2020). Earthquakes occur frequently in Türkiye and the timing and location of these disasters are unpredictable. Hence, many issues on both pre-disaster and post-disaster measures regarding disaster management are important points of discussion (Gökgöz et al. 2020). One of these issues is emergency gathering areas. People need to leave the buildings they are in and go out to open areas immediately after an earthquake, and need to stay in these areas for a period of time to avoid damage from aftershocks that may occur (Kırçın et al. 2017, Komar 2021). Some open and green spaces in cities have been designated as Disaster and Emergency Gathering Areas, which serve to eliminate the chaos caused by disasters and emergencies, facilitate the utilization of national facilities for earthquake victims, form a sense of unity, raise public awareness, meet the needs of the public and provide safe housing for a certain human society (Saygılı and Akpınar 2022). Emergency gathering areas are places where people can contact their relatives, and where they are safe, accessible and protected. Assigning gathering areas before the fact and informing people about these areas ensures that the damages resulting from disaster are minimized (Ekin and Sarıkaya 2021).

In many parts of the world, assigning gathering areas is a legal obligation. Disasters and the experiences gained from these disasters have proved the importance of gathering areas (Uyar and Töre 2023). It is very important for earthquake victims to have access to accurate information and to gathering areas. These areas, also called temporary shelter areas, should be located far away from buildings and should be safe from aftershocks (Atalay 2008). These areas should also be risk-free, safely accessible by disaster victims, and should be equipped with infrastructure that can meet basic needs (Maral et al. 2015, Çınar et al. 2018, Mengi and Erdin 2018, Gerdan and Şen 2020).

Standards For Emergency Gathering Areas

Since gathering areas are intended to be also utilized as temporary shelter, their size carries importance. In the report issued by the Japanese International Cooperation Agency (JICA) and Istanbul Metropolitan Municipality (IBB), gathering areas were categorized in 4 groups (JICA and IBB 2002):

- 1st degree gathering areas, with a size of 10.000 m² and above
- 2nd degree gathering areas, with a size of 5.000 – 10.000 m²
- 3rd degree gathering areas, with a size of 1.000 – 5.000 m²
- 4th degree gathering areas, with a size of 100 – 1.000 m² (JICA and IBB 2002).

Due to the fact that people think that open and green spaces spread across residential areas are safer than closed areas in cases of emergency, people move to these areas with great speed after disasters. Open and green spaces, parks, children's playgrounds, recreational areas, sports facility areas, squares, marketplaces, educational and official facility areas are the foremost areas that have the potential to serve as gathering areas (Partigöç 2023). Various important criteria affecting decisions regarding location of the gathering areas are included in the literature. These criteria include ownership of the area, slope, size, climatic characteristics, occupancy-vacancy rate, presence of fault lines, geological formation, hazardous infrastructure, surrounding building quality, road grading and distance to health facilities. Areas used as gathering areas must meet certain standards. These standards are (JICA and IBB 2002, Maral et al. 2015, Çınar et al. 2018, Gerdan and Şen 2020, Palazca 2020, Partigöç 2023):

- Gathering areas should be easily noticed and accessible.
- Gathering areas should be located at a maximum walking distance of 500 m/15 minutes or less.
- Gathering areas should have connections to main roads and alternatives to risky roads should be assessed.
- Gathering areas should be safe areas that people can reach rapidly during and after an earthquake and should not carry any risk of disaster. Thus, areas that are physically, geologically and geographically free from disaster risk should be assigned as gathering areas.
- Gathering areas should be large enough for temporary shelter and equipped to meet basic humanitarian needs such as toilets.
- In case they are in accordance with the standards described above, publicly owned lands should be considered as priority candidates for gathering areas. If public buildings are designated as gathering areas, especially in earthquake zones, it should be considered whether they are structurally safe.
- The existence and usefulness of existing green spaces, playgrounds and parks, public buildings with indoor areas such as schools or mosques that can be used as gathering areas in the region/neighborhood should be evaluated.
- Gathering areas should be located at an adequate proximity to coordination and control centers and should be able to provide protection against hazards and threats.
- Gathering areas should be connected to urban infrastructure (such as electricity, sewerage and water) networks.
- Gathering areas should be suitable for further expansion and ground surveys of these areas should be carried out beforehand.
- The prevailing wind direction of gathering areas should be considered, and these areas should be at least 3 m above the water basin and have a slope of 2%-6%.

The critical functions that gathering areas can assume after a disaster vary according to the size, function and location of these areas. Gathering areas can serve a range of functions varying from a gathering and temporary shelter spaces for people of a certain neighborhood unit to a long-term logistics, shelter and living space that can serve a city. Worldwide reports on disasters and post-earthquake circumstances state that "the existence of adequately sized and adaptable open spaces away from buildings is of great importance during and after earthquakes" (Godschalk 2003). While urban open spaces serve as green spaces (parks, gardens, recreation areas), public spaces (roads, squares, parking lots), private spaces (privately owned pen and green spaces) in daily life (Swanick 2003, Pollak 2006), they also serve as temporary homes for thousands of people who need shelter for days, weeks, sometimes months after an earthquake (Allan and Bryant 2010).

Open green spaces, to which people getting out of their homes or dangerous areas during and after disasters go to, have a vital importance in residential areas. Due to their social, psychological, economic and aesthetic contributions to cities, as well as their service as refuge

and shelter after earthquakes, these areas should be increased in number and their quality should be improved (Onay et al. 2023). The main issue to be discussed is whether the urban pen and green spaces system used as 'gathering areas' is adequate and appropriate to respond to post-earthquake needs and hasten the return to normalcy.

MATERIALS AND METHODS

Türkiye is a transcontinental country with most of its territory in Anatolia and a small part in Thrace, the southeastern extension of the Balkan Peninsula. Located between 36°-42° North parallels and 26°-45° East meridians, the country has 81 provinces. Türkiye is an earthquake country. Almost all of Türkiye's territory is located on fault lines. The largest earthquakes in the Republican era of Türkiye happened in Erzincan on December 27, 1939, Marmara on August 17, 1999, Bolu-Düzce on October 12, 1999, and Kahramanmaraş on February 6, 2023 (Şen 2023).

The sample of this study consists of 4th grade undergraduate students studying in Department of Interior Architecture and Environmental Design of Afyon Kocatepe University. The Department of Interior Architecture and Environmental Design is an active department with ongoing educational activities, including daytime education and evening classes. In addition to interior architecture education, courses such as environmental design, ecological design, recreation areas, urban design are also given in the department. Based on the education received by the students and since the gathering areas are also considered within the scope of open green space, a study was conducted with the students continuing their education in the department to raise awareness about the earthquake and the process after it, which is the reality of today, and to reveal the current situation. Students were asked to download the "AFAD Emergency Call" application developed by the Republic of Türkiye Ministry of Interior Disaster and Emergency Management Presidency on their phones, and to show on the map where the gathering areas closest to their residence were located, their current use, the size of the area and the distance between their residences and the gathering area (Figure 1). After the earthquake that occurred on February 6, 2023, universities switched to distance education in accordance with the decision taken by the Council of Higher Education. Since students resided in different cities while the study was being conducted, an evaluation of all across Türkiye was made. 33 students responded to the researcher and the information they provided was validated**.**



Figure 1. Provinces subject to the study

RESULTS AND DISCUSSION

When the literature is examined, it can be seen that the location and the standards required for the gathering areas that serve people to get away from their homes and buildings during and after an earthquake are important. Open and green spaces within cities are areas that can be used as gathering areas since these areas contain no buildings. Examples of a total of 33 points of data randomly collected from students residing in 15 different provinces within the scope of this study are presented in Figure 2 and 3.



Figure 2. Examples of gathering areas

When the examples are examined, it can be seen that the areas determined as gathering areas include parks, school yards, marketplaces, sports halls, and bus stations. The yards and interiors of areas that contain buildings are used during and after earthquakes.



Figure 3. Examples of gathering areas

The visuals obtained from the students, presented above, show their current residences and the closest gathering areas determined by the "AFAD Emergency Call" application developed by the Turkish Ministry of Interior Disaster and Emergency Management Presidency. In addition, information regarding the size of the gathering area, the distance between it and the residence of the relevant student and its current usage were added to the visuals by the students. Information obtained from these visuals are presented in Table 1. The study conducted by JICA and IBB (2002) divides gathering areas into four groups in terms of areal size. In this study, it was observed that 13 of the gathering areas examined were 1st degree gathering areas, 5 of them were 2nd degree gathering areas, 10 of them were 3rd degree gathering areas and 4 of them were 4th degree gathering areas (Table 1).

Table 1. List of gathering areas

No	City	Current usage	Size (m^2)	Distance (m)
1	Kocaeli	Park	26.500	570
2	Kocaeli	Open area	2.021	150
3	Bursa	School	1.500	277
4	Bursa	Park	1.200	400
5	Bursa	Park	1.360	70
6	Konya	Park	80.000	3.300
7	Konya	Fitness center	1.648	450
8	Konya	Park	40.200	600
9	Konya	Park	36.000	750
10	Diyarbakir	Park	115.000	1.000
11	Diyarbakir	Park	25.000	700
12	Eskisehir	Park	8.000	750
13	Istanbul	Park	713	200
14	Istanbul	Park	487	200
15	Istanbul	School	2.590	158
16	Afyonkarahisar	School	14.300	1.800
17	Afyonkarahisar	Park	1.300	175
18	Afyonkarahisar	Park	8.110	279
19	Afyonkarahisar	School	14.300	2.600
20	Afyonkarahisar	School	12.000	850
21	Afyonkarahisar	Fitness center	288.643	650
22	Afyonkarahisar	Fitness center	8.115	1.200
23	Izmir	School	6.050	650
24	Izmir	Park	2.700	500
25	Ankara	Market place	4.890	450
26	Ankara	Park	16.000	650
27	Antalya	School	5.900	1.800
28	Mersin	Park	600	650
29	Mersin	Fitness center	13.960	1.200
30	Duzce	Bus terminal	31.500	1.000
31	Denizli	Park	125.000	1.200
32	Mugla	Park	549	3.000
33	Yozgat	Park	3.500	147

According to information contained in the literature, the maximum walking distance to gathering areas should be 500 m/15 minutes or less. When the samples examined in this study were considered, it was seen that 12 gathering areas were located less than 500 m away from the residence of participants, while 22 were 500 m or more away. Among these samples, the maximum distance from the residence of a participant to a gathering area was 3.300 m and the minimum distance from the residence of a participant to a gathering area was 70 m (Table 1).

Since Türkiye is a country with a high risk for earthquakes, many studies on emergency gathering areas have been conducted in Türkiye. When the literature on the subject was examined, it was seen that Gerdan and Şen (2020), who evaluated the adequacy of the gathering areas in Izmit district of Kocaeli province, reported that most of the gathering areas in this region were inadequate in terms of size. In the study conducted by Saygılı and Akpınar (2022) in Efeler district of Aydın province, it was concluded that all gathering areas in the district were sufficient considering the population of the district. However, when evaluated at a scale of neighborhoods, the researchers concluded that not every neighborhood had a gathering space sufficient for the needs of the said neighborhood. In their study conducted in Gümüşhane province, Şirin and Ocak (2020) determined that the gathering areas identified in the study were not in accordance with international criteria, especially when population is considered. In their study in Istanbul, Uyar

and Töre (2023) reported that there were districts with insufficient gathering areas in proportion to their population, and other districts were found to not have sufficient gathering areas although high damage was expected in these districts. In the research conducted by Maral (2015) on gathering areas in Izmir, it was revealed that assembly and tent city areas were designated according to the current conditions and did not meet international standards. In the study conducted by Öztürk and Kaya (2020) in Istanbul, 43 post-disaster assembly areas determined by the authorized institutions were evaluated in terms of 7 criteria (transportation, land topography, land size, infrastructure, security, proximity to residences and hazard elements). After the findings, it was concluded that the post-disaster assembly areas should be reviewed and necessary corrections should be made. In the study conducted by Öcal and Yıldız (2023), it was aimed to qualitatively and quantitatively analyze the open-green areas, sports fields, official institution locations, which are the gathering areas in the city center during the urban development process of Antakya in the 20-30 years before the earthquake. For this purpose, Geographic Information Systems were used to analyze the Slope Status, Fault Line and Avoidance Distances, Transportation Network Analysis, Bridge Status, Evaluation in terms of population criteria, Landslide/rockfall, Proximity to rivers, Lithology features of the gathering areas. Chen et al. (2017) utilized GIS platform for urban emergency shelter planning and proposed a systematic proposal for emergency settlements in possible disaster situations with the suggestion of local experts and citizens. In this study by Yücel Caymaz and Komar (2021), the use of Ataşehir and Topkapı earthquake parks as pre-earthquake recreation areas and post-disaster parks were examined in terms of space design with on-site observations. As a result of the study, it was determined that, unlike traditional parks, the design of earthquake parks according to land location and suitability, transportation, size and function, infrastructure systems, structural and vegetative design is important for post-disaster use.

In this study, Sarıçam (2019) discussed how open green areas should be planned considering their post-disaster functions, evaluated examples from the world and emphasized the importance of open spaces. In this study by Kart et al. (2023), an Earthquake Information System Mobile Application was designed using Flutter programming language on Android Studio software and the distribution of emergency gathering areas of Konya province on the city was examined using GIS. As a result, it was concluded that 125 assembly areas in Konya province (including districts) can meet the needs according to the criteria evaluated in the study in case of a possible disaster. A general evaluation of the previous studies suggests that the size of the areas to be used as gathering areas is insufficient in proportion to the population and cannot meet the required standards.

CONCLUSION

To date, earthquakes in Türkiye and the resulting physical and psychological health problems and loss of life have confronted people with the reality of earthquakes time and time again. People rush out of buildings at every tremor and look for open spaces that can ensure their safety. It is of utmost importance for people to reach gathering areas during and after earthquakes. However, since people will be in a state of fear and panic due to the disaster, they may have difficulty in perceiving and finding gathering areas. This can make disaster management more difficult as it will cause people to feel more fear or panic. In this study, in which some standards for assembly areas are examined, some of the assembly areas shown to people by the "AFAD Emergency" application are located very close to the person's residence, while some assembly areas are located at a distance outside the standards. However, as seen in the standards given in the studies, the maximum walking distance to the gathering areas should be 500 m/15 minutes or less.

In order to prevent all the aforementioned inadequacies, open and green spaces designated as gathering areas should be increased in number and existing areas should be revised according to standards when possible. This study has revealed the status of the gathering areas located in multiple provinces of Türkiye and their relation to the people who will use them in case of an earthquake. Relevant ministries, municipalities and relevant public institutions and organizations should work on increasing the number of gathering areas, and designing signboards

and tables to direct people from their homes to these areas. In the continuation of this study, data on the accessibility, size, distance, and uses within the gathering areas at the neighborhood or city scale should be collected and analyzed in 15 cities. Deficiencies in these areas should be completed and the use of these areas should be ensured in future disasters.

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