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Evaluation of the Capacity and Sufficiency of Sakura Park in Selçuklu District of Konya Province as a Post-Disaster Assembly Area

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Abstract

After the earthquake disaster experienced by our country, the importance of open and green spaces has once again come to the agenda, just like the Covid-19 outbreak. Green areas are of great importance both because they can be used as assembly areas after disasters and because they can be transformed into temporary accommodation areas. Assembly areas are the areas where the public can assemble safely by preventing misunderstandings that may arise after a disaster and by creating a healthy exchange of information. Assembly areas are safe areas where people can assemble away from dangerous areas until tents and containers are ready after disasters and emergencies. Sakura Park, which became operational in 2023, is very suitable for being a post-earthquake assembly area with its location and design. In the park selected as the study area, a survey was conducted with 166 people selected according to the snowball method to exceed the population size in the central limit theorem on the basis of volunteerism at random times on weekdays and weekends. According to the results of the survey, Sakura Park was found to be very suitable as a post-disaster assembly area because it is located at the intersection of important transportation networks, close to hospitals, provides a plain settlement area, can be used as a support center with the surrounding schools, and has no thorny and poisonous plant material. The assembly capacity of the park is very sufficient considering that the neighboring Ecdat Park and the gardens of the schools can also be organized together.

Key Words: Assembly capacity of parks, *Post-disaster assembly area, Earthquake, Earthquake park, Konya*

Introduction

An earthquake is an event in which sudden vibrations caused by fractures in the earth's crust spread in waves and shake the environments they pass through. Earthquake is a natural phenomenon. Since the formation of the world, it is known that earthquakes have occurred consecutively in seismically active regions and many people and shelters have been destroyed as a result (İşçi, 2008).

Earthquake, which is one of the natural disasters, is synonymous with disaster in our country due to the fear, loss of life and property it causes. Earthquake, in the most comprehensive sense, is a natural event that takes its source from the depths of the earth and causes the earth's surface to shake with sudden vibrations caused by fractures in the earth's crust (Bilen and Polat, 2022).

Defined in terms of magnitude, it obeys a power law size distribution given by log N = a - bM , where N is the number of earthquakes greater than or equal to magnitude M and a and b are constants. The parameter a describes the total number of earthquakes and the parameter b, often referred to as the b value, describes the relative size distribution of earthquakes (Scholz, 2015).

They pose special risks to life safety because they are unpredictable, can occur in a sequence or series (e.g. a mainshock with hundreds to thousands of aftershocks, double earthquakes, etc.), and are temporally and spatially variable events that can vary in intensity. Even smaller magnitude earthquakes (M4.5+) can produce tremors significant enough to cause damage. This is particularly true in places with poor land-use planning and construction practices, weak building codes and standards, as well as aging or fragile building stock (McBride et al., 2022).

In our country, which is located in the earthquake zone, many earthquakes have occurred in which structural damages have reached serious dimensions and millions of lives have been lost. Especially with the recent earthquakes, it has been seen that our buildings do not provide the targeted strength, thus causing loss of life and property (Garip and Eren, 2022).

A country like Turkey is a natural laboratory for earth sciences, covering one of the most seismically active regions of the earth. Due to the complex plate interaction between Arabia, Eurasia and Africa, different fault systems exist in and around Anatolia.

The North Anatolian Fault System (NAFS) and the East Anatolian Fault System (EAFS) are the main strike-slip fault belts in Turkey. These fault systems facilitate the westward escape of the Anatolian microplate. Normal

fault systems dominate Western and Central Anatolia due to the north-south extension regime in the Aegean (Oduoye et al. ,2023).

In our country, buildings are generally composed of reinforced concrete structures and most of these buildings in the epicenter areas of earthquakes have collapsed and caused destruction. The performance of reinforced concrete buildings in recent earthquakes in Turkey is discussed. The failure modes include foundation collapse, soft floors, strong beams and weak columns, lack of column restraint, poor detailing practices and non-structural damage (Arslan and Korkmaz, 2007).

Earthquake Assembly Areas; Because the nature of earthquakes is unknown, there is often no advance warning and no time for evacuation to prevent damage, in which case emergency shelter placement often becomes a post-earthquake problem. Therefore, pre-disaster planning and preparation is critical to ensure a coordinated response in the siting of emergency shelters after a major earthquake. Gathering areas need to be identified (Aman and Aytaç, 2022). Assembly areas are safe areas that people can reach urgently during and after disasters and do not carry any risk in terms of disasters. For this reason, they should be selected from areas that are physically, geologically and geographically free from disaster risk and should be equipped to meet basic human needs such as toilets. Gathering areas are also centers where many activities are carried out during and after disasters such as informing individuals exposed to disasters, coordination with aid teams, and directing them to temporary shelter areas (Gerdan and Şen, 2019). Understanding the size of evacuees along specific routes after an earthquake can also help emergency managers understand population demand and capacity issues in pre-designated assembly areas. Having an idea of whether a assembly area will evacuate 100 or 1000 people will help emergency managers develop realistic response plans to help survivors and direct relief personnel (Wood et al. 2016).

Earthquake Assembly Areas Standards;

Distance and accessibility: Accessibility is a flexible, slippery and broad term. It is often defined as a measure of how close two places are to each other. Distance to building sites should be taken into account when identifying gathering areas. These areas should not be too close to buildings and not too far from walking distance. They should be as close as possible to the boundary of the evacuation area and accessible. Areas within 0-500 m walking distance should be considered.

Main road connections: Connections of gathering areas to main roads and alternatives to risky roads should be evaluated.

Multifunctionality and utilization: Multifunctionality and multi-use is a key strategy for making places more earthquake-sensitive. It promotes a culture of adaptability and helps build more resilient neighborhoods. The availability and usefulness of existing green spaces, playgrounds and parks, and public buildings with enclosed spaces such as schools or mosques that can be used as gathering spaces in the area/neighborhood should be assessed.

Public lands: Public lands should be considered as priority areas if they contain the features described above. The structural safety of public buildings, especially if they are designated as assembly areas in earthquake zones, should be considered.

Size: The JICA 2002 report recommends 1.5 m2 per person for evacuation areas. According to Tarabanis and Tsionas (1999), the standard is 2 m (Gerdan and Şen, 2019:967).

Responsibilities of Landscape Architects Before Earthquake; Public spaces such as squares, parks and sports fields are crucial for earthquake preparedness. They are the safest places to be during and after an earthquake due to building collapse, falling rubble, fire and gas leaks. Emergency and recovery needs such as evacuation, medical assistance, social gatherings, communication, and distribution of water and food are often taken care of in a city's urban open and green spaces (Alawi et al., 2023). These urban open and green areas (parks, children's playgrounds, recreation areas, sports facility areas, squares, marketplaces, educational and official facility areas) stand out when compared to other land uses. It is clear that the existing land use types and the land use types proposed in the current plans significantly affect the usability of urban open and green areas as first assembly areas (Partigöç, 2023).

Responsibilities of Landscape Architects after Earthquake; It is important to understand how the geological and geomorphological environment will continue to evolve due to earthquakes, and this is particularly important given that future climate change may alter the behavior of landscapes. However, it is necessary to predict how landscapes affected by earthquakes will respond and recover in the future (Congrong et al. 2020).

Open and green spaces can provide many functions in cities, such as park areas, recreation, natural environments, stormwater management. Open and green spaces have another potentially very important function. This is as a safe space during and after earthquakes. In earthquake-prone areas, open and green spaces become the place where people go during and immediately after seismic events. They don't want to be near buildings that could fall on them, so being in an open space often provides temporary safety. However, people often have to spend long periods of time there, potentially having to stay outdoors for days or weeks after an earthquake. An open and green space should be specifically designed for seismic resilience. Post-earthquake

landscape architects have identified six themes that should be considered when designing urban open and green spaces. These are
1-Multifunctionality
2-Connection
3-Site location and suitability
4-Dimension and function
5-Site elements
6-Social resilience (Brown and Corry, 2020).
The act of vegetative design can be part of recovery and resilience in communities. While green infrastructure is not an immediate post-disaster priority, improving and protecting green infrastructure is an important way to strengthen a community's recovery (Miller, 2020).

Materials and Methods

The main material of the research is Sakura Park located in Konya Selçuklu district. On February 6, 2023, the earthquake that affected 10 cities in Turkey, called the disaster of the century, caused a great loss of life and property in these cities and their immediate surroundings. One of the most important needs after the earthquake was earthquake gathering areas. For this reason, assembly areas have gained importance not only in these 10 cities but also throughout the country. With this research, it is aimed to investigate whether Sakura Park in Selçuklu district of Konya province meets the criteria of a gathering area in a possible earthquake. On the basis of volunteerism, a survey was conducted with 166 people using the snowball method in the park at different times on weekdays and weekends.

Results and Discussion

The distribution of the survey participants according to demographic characteristics is given in Tables 1, 2, 3, 4, 5. 65.7% of the participants were between the ages of 15-25, 26.5% between the ages of 26-35, 4.8% between the ages of 36-55, and 1.2% between the ages of 56-65. 25.3% of the participants were married and 74.7% were single. 2.4% of the participants attended secondary school, 7.2% high school, 12% associate's degree, 63.3% bachelor's degree and 12% master's degree. 62.7% of the participants were female and 37.3% were male. In terms of occupational status, 53% of the participants were students, 3.6% were housewives, 14.5% were civil servants, and 28.9% were self-employed.

Table 1. Distribution of participants according to age range

	N	(%)
15-25	112	%65,7
26-35	44	%26,5
36-55	8	%4,8
56-65	2	%1,2

Table 2. Distribution of participants according to marital status

	N	(%)
Married	42	%25,3
Single	124	%74,7

Table 3. Distribution of participants according to educational status

	N	(%)
Middle School	4	%2,4
High School	12	%7,2
Associate Degree	20	%12
License	110	%63,3
Master's Degree	20	%12

Table 4. Distribution of participants according to gender

	N	(%)
Woman	104	%62,7
Man	62	%37,3

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The relationship of the respondents to Sakura Park in the questionnaire study in this research is given in Tables 6,7,8,9,10,11 and 12. Accordingly, 7.2% of the participants are less than 250 m, 8.4% are within 500 m, 25.3% are within 1 km, 13.3% are within 1.5 km, and 45.8% are within 2 km of Sakura Park. 14.5% of the participants visit the park on weekdays and 85.5% on weekends. 4.9% of the participants prefer the park in the morning, 11% in the afternoon, 23.2% in the afternoon, 28% in the evening, and 32.9% at any time. 34.9% of the participants come to the park to get fresh air, 18.1% to relax, 30.1% to take a walk, 6% to let their children play, 10.8% to have a picnic. 22.9% of the participants walk to the park, 36.1% use public transportation, 33.7% use personal vehicles, and 7.2% use bicycles. 7.2% of the participants go to the park alone, 36.1% with their spouse and partner, 28.9% with their work/school social circle, 27.7% with their family/home/living circle. 27.7% of the participants prefer Sakura Park because they feel comfortable, 13.3% because the concept of using the park is interesting, 12% because they use the rubber walking path in the park, 6% because they use the bicycle path in the park, 38.6% because it meets their need for green space, and 2.4% because it is close to their home.

Table 5. Distribution of participants according to their occupations

	N	(%)
Student	88	%53
Housewife	6	%3,6
Officer	24	%14,5
Self-employment	48	%28,9

Table 6. Distribution of participants according to transportation distance to the park

	N	(%)
< 250 m.	12	%7,2
500 m	14	%8,4
1 km	42	%25,3
1,5 km	22	%13,3
2 km	76	%45,8

Table 7. Distribution of participants according to the days they visit the park

	N	(%)
Weekdays	24	%14,5
Weekend	142	%85,5

Table 8. Distribution of participants according to the times they prefer the park

	N	(%)
Morning	8	%4,9
Noon	18	%11
Afternoon	38	%23,2
Evening	46	%28
At any given time	54	%32,9

Table 9. Distribution of participants according to the purpose of choosing the park

	N	(%)
For clean air	58	%34,9
Resting	30	%18,1
For walking	50	%30,1
Play with kids	10	%6
For picnic	18	%10,8

Table 10. Distribution of participants according to the types of transportation they prefer to come to the park

	N	(%)
Walkink	38	%22,9
By public transportation	60	%36,1
With a personal vehicle	56	%33,7
By bike	12	%7,2

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The opinions of the participants regarding the use of Sakura Park after the earthquake through the survey conducted in this research are as follows;
Table 13,14,15,16,17,18,19 and 20. Accordingly, 10.8% of the participants preferred intercity travel, 3.6% preferred shopping centers, 75.9% preferred open and green areas, 8.4% preferred cafeterias/restaurants/tea gardens, and 1.2% preferred sports centers after the earthquake disaster.
51.8% of the participants answered, "definitely yes", 32.5% "yes", 13.3% "undecided", and 2.4% "no" to the idea that Sakura Park can be used as an earthquake assembly area. The participants answered 38.6% definitely yes, 37.3% yes, 21.7% undecided, 2.4% no to the idea that Sakura Park can provide sufficient service as an earthquake assembly area after a possible earthquake.
The participants responded as follows: 2,4% shelter, 30,1% general, 54,2% gathering area, 2,4% medical area, 6% food distribution area, 4,8% disaster administration management area to the idea of which service Sakura Park can provide in the best way. The participants answered 34.9% definitely yes, 38.6% yes, 22.9% undecided, 3.6% no to the idea of Sakura Park's compliance with the criteria of earthquake assembly area.
The participants answered 27.7% definitely yes, 32.5% yes, 28.9% undecided, 10.8% no to the idea that Sakura Park is sufficient as a tenting area. Participants answered 26.5% strongly yes, 36.1% yes, 28.9% undecided, 8.4% no to the idea that Sakura Park is sufficient to meet sanitary needs. Participants answered 26.5% strongly yes, 49.4% yes, 20.5% undecided, 3.6% no to the idea that Sakura Park's proximity to important transportation intersections is sufficient.

Table 11. With whom the participants come to the park

	N	(%)
Single	12	%7,2
With wife/husband	60	%36,1
With work/school social environment	48	%28,9
With family/home/living environment	46	%27,7

Table 12. Distribution of participants according to the reasons for choosing the park

	N	(%)
Because he feels comfortable	46	%27,7
He was interested in the concept of using the park	22	%13,3
For using the rubber walkway in the park	20	%12
For using the bicycle path in the park	10	%6
Because it meets the need for green space	64	%38,6
Because it's close to home.	4	%2,4

Table 13. Distribution of participants according to the activities they preferred after the earthquake disaster

	N	(%)
Intercity travel (Family visit)	18	%10,8
Shopping centers (to relieve stress)	9	%3,6
Open and green spaces (feeling safer in these areas)	126	%75,9
Cafeteria/restaurant/tea garden (Socialization needs)	14	%8,4
Sports centers (Healthy living)	2	%1,2

Table 14. Distribution of participants' agreement with the idea that Sakura Park can be used as an earthquake assembly area

	N	(%)
Absolutely yes	86	%51,8
Yes	54	%32,5
I am undecided	22	%13,3
No	4	%2,4

Table 15. Distribution of participants' agreement with the idea that Sakura Park can provide adequate service as an earthquake gathering area after a possible earthquake

	N	(%)
Absolutely yes	64	%38,6
Yes	62	%37,3
I am undecided	36	%21,7
No	4	%2,4

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Table 16. Distribution of participants according to which service they think Sakura Park can provide in the best way

	N	(%)
Housing	4	%2,4
General	50	%30,1
Assembly area	90	%54,2
Medical field	4	%2,4
Food distribution area	10	%6
AFAD administration management area	8	%4,8

Table 17. Distribution of participants' agreement with the idea that Sakura Park meets the criteria for earthquake assembly area

	N	(%)
Absolutely yes	58	%34,9
Yes	64	%38,6
I am undecided	38	%22,9
No	6	%3,6

Table 18. Distribution of participants' agreement with the idea that Sakura Park is sufficient as a tenting area

	N	(%)
Absolutely yes	46	%27,7
Yes	54	%32,5
I am undecided	48	%28,9
No	18	%10,8

Table 19. Distribution of participants' agreement with the idea that Sakura Park is sufficient to meet sanitary needs

	N	(%)
Absolutely yes	44	%26,5
Yes	60	%36,1
I am undecided	48	%28,9
No	14	%8,4

Table 20. Distribution of respondents' agreement with the idea that Sakura Park's proximity to important transportation intersections is sufficient

	N	(%)
Absolutely yes	44	%26,5
Yes	82	%49,4
I am undecided	34	%20,5
No	6	%3,6

In this study; the capacity and adequacy of Konya Sakura Park as a post-disaster gathering area and the possibilities of utilizing the area after a possible disaster were sought to be answered.

On the basis of volunteerism, a survey was conducted with 166 people according to the snowball method in the park at different hours on weekdays and weekends. According to the results of the surveys, people's need for open and green spaces (because they feel safe in this area) has increased after the earthquake, just like the Covid 19 outbreak.

It has been determined that Sakura Park has a very high possibility of being used as a gathering area after a possible earthquake and that it can provide this service adequately. It has been determined that the park is suitable for the size of the gathering area, as a tenting area and sufficient to meet sanitary needs. Its proximity to important transportation intersections has gained importance.

According to the results of the analysis, it is concluded that people feel the need to be in open and green areas more after the disaster and they consider the existing parks as the most important post-earthquake assembly areas.

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