RESEARCH ARTICLE

# Open and green areas as a gathering area: The case of Küçükçekmece, Istanbul

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Gathering areas are needed for protected against possible risks that may arise during and after the earthquake. Green areas, which have an important role in the organic bond to be established between the ecological, physical, and economic functions before the earthquake, and human health and living space, assume the function of gathering areas after earthquakes and other possible disasters. The research aims to calculate, plan and create sufficient green areas that can be used after a possible earthquake taking into account the risk and disaster management approach. A competency assessment of gathering areas at the level of neighborhoods was made with the proposal of a norm of 2 $m^2$ per capita. As a result of the evaluation, it was observed that norm deficit (area deficit) did not occur in the gathering areas in the neighborhood of Atakent, Beşyol, Fatih, Halkalı Merkez, Istasyon, Söğütlüçeşme, Tevfikbey and Yeşilova.

**Key Words:** *Earthquake; Green areas; Diversity; Ownership*

## INTRODUCTION

Küçükçekmece district, which is selected as a research area is located on the west side of Istanbul Province; it has a location on the Catalca peninsula. Earthquake risk is higher on the European side of Istanbul due to geological features and unskilled construction. Küçükçekmece district is one of the most crowded districts of Istanbul. Küçükçekmece was selected as one of the districts with high earthquake risk by JICA and IBB (2002) [1] as a research area. To meet the green area requirement of the District before the earthquake and to bring the district, which is a residential area, closer to the standards of modern green use, and in the green areas of the district; This research was carried out to serve the planning of the gathering areas to be used as [Emergency Officer (ADG)] and to create open areas that can transport people to the open and green areas to be used as gathering areas and to move them away from the dangerous earthquake zone during the earthquake. Determining the areas to be used for post-disaster gathering in the research is a primary target. The research aims to make an inquiry about how sufficient the potential gathering areas are in the context of creating safe areas within the scope of the stated goal, to identify the insufficiencies and suggestions that exist in the context of access to safe areas in our cities. For this purpose, selection criteria to be used in determining the gathering areas were determined.

The gathering areas of Küçükçekmece district were evaluated according to their location within the settlement, existing usage status and accessibility, connection with road axes, diversity (multi-functionality), ownership, and area size standards.

## MATERIALS AND METHODS

### Search strategy and selection criteria

A literature study was conducted to create the theoretical part of the research. The data of the research area between 1990 and 2000 were obtained from the Ph.D. Thesis titled "Investigation of the Green Area Status of the City of Istanbul" by Aksoy in 2001. The situation between 2000 and 2007 was obtained from Küçükçekmece District Green Corridor Project. The existing green areas of the district have been identified on-site. Küçükçekmece Municipality Park and Gardens Directorate data were used. Istanbul Metropolitan Municipality Web page Interactive Map data was used.

In the study, satellite images of 21 districts of Küçükçekmece district were obtained from the Google Earth Program. 1/1000 scale Base Maps and 1/5000 scale Master Plans were used. 1/25000 scale European Side Micro Zoning Study Slope Map, Geology Map, Groundwater Depth Map, Liquefaction Hazard Map, Landslide Hazard Map, Flooding and Flooding maps prepared by Istanbul municipality Department of Earthquake Risk Management and Urban Improvement in 2007 were used. The data showing the distribution of active green areas belonging to the research area and the population data of Küçükçekmece district based on neighborhoods were determined as non-graphic data to determine the green areas per capita. The main materials of the research consist of quantitative data on Küçükçekmece active green areas. When we look at the functional distribution of the green areas of Küçükçekmece; park areas constitute all active green areas. Park areas are classified as a pocket, small, neighborhood, and district parks according to their area sizes. The methodology of the research is based on examining the quantitative data obtained for the active green areas of Küçükçekmece District within the frame of spatial sufficiency in terms of size and per capita values.

As a result of the research, it has been revealed that active green areas show an unbalanced distribution at the district level in terms of spatial sufficiency possibilities and are insufficient in terms of spatial standards. In the research, Geographical Information System (GIS) was used to minimize errors.

### Open spaces and green areas risk analysis and management of Küçükçekmece district

Open spaces and green areas need a special risk assessment and management methods because of their physical functions, psychological functions, economic and ecological functions as well as the functions of creating safe and accessible evacuation areas when earthquakes and other possible disasters are involved [2].

For this reason, the open and green areas existing in the Küçükçekmece district were evaluated and their sufficiency and needs were determined, and suggestions were made to meet the needs and reduce risks.

**While doing this work:**

- Types of areas to be considered as open and green areas are determined in Küçükçekmece district.
- The distribution of green areas has been made in terms of determining open and green areas at the level of neighborhoods.

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• The sufficiency of open and green areas has been determined.

**Determination of types of areas to be considered as open area and green area**

While the existence and distribution of open and green areas in Küçükçekmece district are examined; parking areas, open car parks, mosques, hospitals, and school gardens are evaluated within the scope of open area and active green area.

**Open area and active green area distribution of Küçükçekmece district**

An inventory has been made to evaluate the sufficiency of the open and active green areas in the Küçükçekmece district. As of 2019, the total amount of green areas at the district level is 1,252,581 m². This figure constitutes the total of active green areas. In the group of active green areas at the district level, children's playgrounds and sports areas are not available and they are located in the park areas 2019 Park areas consist of pocket, small, neighborhood, and district parks.

When the distribution of the active green area types in Küçükçekmece at the neighborhood level, it is seen that the most active green area is in the Fatih neighborhood (450051 m²) and the Atakent neighborhood (390291 m²). When we approach the subject in terms of the amount of green area per capita, it is seen that 1.6 m² of active green areas per capita has fallen throughout the district. The maximum amount of active green areas per capita is seen in Fatih (42.3 m²/person), Atakent (4.1 m²/person), and Halkalı Center (2.2 m²/person) neighborhoods.

It was revealed that 10 m²/person active green area norm was caught in Fatih district and there was no norm gap. Other neighborhoods, on the other hand, are unable to meet the green area norms per capita with the current active green area distribution.

**Evaluation of adequacy status of open space and active green areas of Küçükçekmece district**

Open area distribution in Küçükçekmece district is handled as building gardens and open car parks. The sufficiency of open spaces at the level of neighborhoods has been determined according to the 2 m²/person open area norm. The distribution of existing active green areas is considered as park areas. Because there are no separate children's playgrounds and sports areas in Küçükçekmece district. There are children's playgrounds and sports areas within the park areas. According to the norm of 10 m²/person active green area, Table 1 was created by evaluating the adequacy of green areas.

As a result of the evaluation made according to the proposal open area norm (2 m²/person), it is seen that there is no inadequacy in terms of open areas in Beşyol, Fatih, Halkalı Merkez and Istasyon neighborhoods. As a result of the collective evaluation made in terms of open space and active green areas, it is seen that Fatih district has sufficient area.

Areas where the availability of open areas and active green areas are seen as a very serious problem; Inönü (788.241), Kanarya (774.414), Atakent (664.717), Mehmet Akif (612.827), Halkali Center (606.174), Cumhuriyet (545.564) and Ataturk (485.526) neighborhoods (Table 1).

**TABLE 1**

**Assessment of the sufficiency status of open areas and green areas needed at the level of neighborhoods**

| Neighborhood | Population | Building gardens(m²) | OpenCar parks (m²) | Existing open areas (m²) | Existing active green areas (m²) | Total of existing open and active green areas (m²) | Active green areas norm (10 m²/ person) | Heard of needed active green areas (m²) | Suggestion open space norm (2 m²/ person) | Heard of needed open spaces (m²) | Heard of needed open and active green areas (m²) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Atakent | 95636 | 92624 | - | 92624 | 390291 | 482915 | 10 | 566069 | 2 | 98648 | 664717 |
| Atatürk | 42171 | 14749 | - | 14749 | 5777 | 20526 | 10 | 415933 | 2 | 69593 | 485526 |
| Beşyol | 3890 | 12368 | - | 12368 | 3992 | 16360 | 10 | 34908 | 2 | - | 34908 |
| Cennet | 29892 | 24490 | - | 24490 | 10559 | 35049 | 10 | 288361 | 2 | 35294 | 323655 |
| Cumhuriyet | 50786 | 14153 | 5507 | 19660 | 44208 | 63868 | 10 | 463652 | 2 | 81912 | 545564 |
| Fatih | 10643 | 11868 | 9829 | 21697 | 450051 | 471748 | 10 | ------- | 2 | - | - |
| Fevzi Çakmak | 25124 | 11660 | 537 | 12197 | 4680 | 16877 | 10 | 246560 | 2 | 38051 | 284611 |
| Gültepe | 30160 | 41558 | 8947 | 50505 | 5097 | 55602 | 10 | 296503 | 2 | 9815 | 306318 |
| Halkalı Merkez | 77648 | 1066477 | 13098 | 1079575 | 170306 | 1249881 | 10 | 606174 | 2 | - | 606174 |
| İnönü | 72454 | 41981 | 1504 | 43485 | 37722 | 81207 | 10 | 686818 | 2 | 101423 | 788241 |
| İstasyon | 39092 | 137940 | - | 137940 | 51111 | 189051 | 10 | 339809 | 2 | - | 339809 |
| Kanarya | 67914 | 35002 | 2313 | 37315 | 3239 | 40554 | 10 | 675901 | 2 | 98513 | 774414 |
| Kartaltepe | 12426 | 3831 | - | 3831 | 8276 | 12107 | 10 | 115984 | 2 | 21021 | 137005 |
| Kemalpaşa | 14256 | 19229 | 2977 | 22206 | 1111 | 23317 | 10 | 141449 | 2 | 6306 | 147755 |
| Mehmet Akif | 52258 | 10648 | - | 10648 | 3621 | 14269 | 10 | 518959 | 2 | 93868 | 612827 |
| Söğütlü Çeşme | 32744 | 65293 | - | 65293 | 31525 | 96818 | 10 | 295915 | 2 | 195 | 296110 |
| Sultan Murat | 14052 | - | - | - | - | - | 10 | 140520 | 2 | 28104 | 168624 |
| Tevfik Bey | 36408 | 41015 | 14220 | 55235 | 15776 | 71011 | 10 | 348304 | 2 | 17581 | 365885 |
| Yarımburgaz | 9867 | 5534 | - | 5534 | 1800 | 7334 | 10 | 96870 | 2 | 14200 | 111070 |
| Yeni Mahalle | 19831 | 13432 | - | 13432 | 8248 | 21680 | 10 | 190062 | 2 | 26230 | 216292 |
| Yeşilova | 33064 | 9835 | 1085 | 10920 | 5191 | 16111 | 10 | 325449 | 2 | 55208 | 380657 |
| Küçükçekmece Total | 770316 | 1673687 | 60017 | 1733704 | 1252581 | 2986285 | 10 | 6450579 | 2 | - | 6450579 |

**Evaluation of open space and green area for gathering areas after possible earthquake disaster gathering areas**

Escape and gathering areas are very important for people who are affected by earthquakes and other possible disasters [3]. Gathering areas are safe areas that people need to reach urgently during and after earthquakes and other possible disasters, without any risk of earthquakes and other possible disasters [4]. The gathering areas are savior spaces as using emergency access, aerial access, storage and distribution of rescue materials, and rescuing places with their use as a temporary tent area for shelter [5].

According to AFAD (2018) [6], gathering areas are sheltered areas such as the park where those affected by the disaster will be gathered. Green areas, which have an important role in the organic bond to be established between the ecological, physical, and economic functions before the earthquake, and human health and living space, assume the function of gathering areas after earthquakes and other possible disasters [7]. Open areas and green areas after disasters are places where life starts again with another expression where emergency needs, especially security, are met, interventions can be made, and urban services are shifted [8].

**Site selection criteria for gathering areas**

Within the scope of the research JICA, FEMA, UNHCR, The Sphere Project, SHELTER CENTER, AFAD [1,9-13] all the criteria determined by the study were examined. As a result of the examinations, it was seen that most of the planning works for the placement of emergency shelter areas were carried out according to the standards set by organizations such as The Sphere Project, UNDRO and UN OCHA. The locations of the gathering areas that will be needed immediately and after earthquakes and other disasters must be selected in line with particular criteria. For this reason, all the criteria in the studies conducted have been analyzed taking into account.

Within the scope of the research, it was aimed to determine the planning criteria of the gathering areas and to determine the gathering areas spatially by evaluating the existing open and active green areas in the 21 neighborhood of the Küçükçekmece district of Istanbul.

**Urban risks**

While creating the gathering areas planning criteria; urban risks (geological-geotechnical structure, technical infrastructure, proximity to hazardous uses, risks arising from urban fabric and building stock) should be taken into account. While determining the planning criteria for the gathering of the areas; urban risks (geological-geotechnical structure, technical infrastructure status, proximity to hazardous uses, risks arising from urban fabric and building stock) should be taken into account (AFAD, 2006).

Micro zoning, geological survey, or geological-geotechnical survey studies are carried out to prevent possible risks and minimize losses for places with high-risk rates in an earthquake and other possible disaster situations. The "Settlement Conformity Assessment" studies that emerge as a result of the synthesis of the studies conducted are guiding the plan decisions and constitute an important database in the formation of the location selection criteria of the gathering areas [14,15]. The areas chosen as the gathering area should be places that do not have risk in terms of ground [14].

If the active green areas and open areas in the coastal areas are applied to the filling areas, these areas are not preferred for the gathering area due to the weak ground structure. It is also the places that are not suitable for use as a gathering area in the fault line area. Technical infrastructure such as natural gas, water network, and high voltage lines constitutes great sources of danger for the building and its immediate surroundings in an earthquake and other possible disaster situations [16]. The fact that the open area and green areas on the technical infrastructure areas are not planned as a gathering area is necessary because of the high-risk rate that may arise during and after the earthquake [17]. Such facilities may cause explosions in the event of an earthquake and other possible disasters, leading to other risks JICA (2002) [1].

Therefore, risk reduction methods and tools should be recommended for all situations, considering all possible risk groups. Such areas, which have an explosion hazard during and after an earthquake and other possible disasters and are therefore unsafe, should not be preferred in the selection of the assembly areas. Depending on the density of building stocks in the city and the possibility of a collapse in the event of an earthquake, differences arise in determining the needs of open and green area. How safe an area depends not only on the nature of the uses in its immediate environment but also on its structural features? The gathering areas should be at a distance of 350 m from the damaged building units depending on the density of building stock and the possibility of demolition [18].

Considering the urban risks to be created on open areas and green areas in connection with the earthquake, each open and green area should not be considered as a safe gathering area.

**Standards in determining the gathering areas**

Five factors are taken into account when establishing the criteria for determining the gathering areas [7,1,19]:

**Accessibility:** The distance to the building areas should be taken into consideration in the selection of the location of the gathering areas. The maximum walking distance that each individual can easily reach as the distance from the building islands to the assembly areas should be 500 m/15 minutes (0-500 m walking distance) and less. As well as the diversity and adequacy of the gathering areas, comfortable access of the public to these areas is also very important. Walking distance from the house to the gathering areas is accepted as 15 minutes or less. The reason that the walking distance is 15 minutes or less is that this distance refers to the minimum distance as a mental and physical limit [7,20].

**Connection with road axle:** Connections of the gathering areas with road axles should be established and the continuity of the gathering areas should be ensured. Connections of the gathering areas with the main arteries should be established (taking into account the roads at risk of closure) and their continuity with other gathering areas should be ensured. Open and green areas are used for temporary health services, food distribution, storage of future relief materials, and other technical equipment as gathering areas during or after an earthquake. For this reason, open and green areas, which have very important roles in ensuring the continuation of vital activities after the earthquake, should be provided with the main transportation network and barriers to prevent access to these areas should not be allowed IBB (2003) [21].

**Diversity:** When the gathering areas are analyzed according to the criteria of diversity (multi-functionality); active green areas (children's playgrounds, sports fields, park areas-pocket parks, small parks, neighborhood parks, district parks, city parks), building gardens (school gardens, mosque and hospital gardens) that make up the diversity open and green areas; empty spaces and open car parks can be suggested as gathering areas.

**Ownership:** Public lands should be primarily preferred. The private properties of empty spaces and open car parks can be preferred by taking into account the accessibility and availability, along with the continuity and area size created by road axes and other gathering areas. Structures such as public schools and mosques can also be used as a gathering area if they are seismically sufficient JICA (2002) [1].

**Size:** In the JICA (2002) [1] report, it has been suggested that the places expressed as "Pre-Evacuation Area" should be in each neighborhood unit with a minimum gross minimum of 1.5 $m^2$/person. In their studies, it has been proposed to determine the net usable area per capita in the gathering areas on a building island basis and at least 2 $m^2$ [7,19].

**Creation of gathering areas in Küçükçekmece district**

**Planning criteria of gathering areas:** Six factors were taken into account while creating planning criteria for Küçükçekmece district gathering areas.

**Diversity:** When the gathering areas of Küçükçekmece district are examined according to the diversity criteria; The open spaces and green areas that make up the diversity are active green areas (parking areas), building gardens (hospital, school, mosque gardens), and open car parks. The most diverse neighborhoods are Fatih, Halkalı Merkez, İnönü, İstasyon, and Kanarya districts (Supplementary Table 1).

As the second step of diversity analysis, the suggested gathering areas for each neighborhood unit are discussed in number. The highest gathering areas in terms of numbers are in Halkalı Merkez (36 pieces), İnönü (29 pieces), Atakent (28 pieces), Tevfik Bey (25 pieces), Fatih and Cennet (16 pieces),

and İstasyon (15 pieces). While the least number of gathering areas are in Kartaltepe, Yarımburgaz (3), Beşyol (4), Fevzi Çakmak, and Kemalpaşa (5) neighborhoods, there are no gathering areas in Sultan Murat District.

**Adequacy:** While conducting the qualification analysis, the norm of 2 m² per person recommended for gathering areas was taken into consideration. When we look at the whole of Küçükçekmece district; Cennet, Cumhuriyet, Fevziçakmak, Gültepe, Atatürk, Mehmet Akif, İnönü, Kanarya, Kartaltepe, Kemalpaşa, Sultan Murat, Yarimburgaz, Yenimahalle and Yeşilova districts where Atakent, Beşyol, Fatih, Halkalı Merkez, İstasyon, Söğütlüçeşme and Tevfikbey districts have the qualification level It is observed that it is insufficient and there is a gap in norms at the neighborhood level (Table 2).

It is understood that the gathering areas of Küçükçekmece district are sufficient according to the proposed 2 m²/person norm.

Accessibility: The variety and adequacy of the gathering areas are as important as the easy access of the public to these areas. Walking distance from home to gathering areas has been accepted as 15 minutes or less. The walking distance is 15 minutes or less because it expresses the minimum distance as a mental and physical limit.

**Connection with road axle:** The connection of the gathering areas with the road axles was established and the continuity of the gathering areas was ensured. The location of gathering areas in areas close to road areas with a risk of blockage has been achieved.

**Ownership:** Public lands have been preferred primarily in the choice of places to be used for gathering areas in Küçükçekmece district. The private (private) owners of the open car parks were preferred considering the accessibility, usability, continuity, and spatial size they create with road axles and other gathering areas.

**Size:** The gathering areas in the Küçükçekmece district are divided into 4 degrees according to their size (Table 3).

**TABLE 3**

**Numerical distribution of gathering areas at the level of neighborhoods**

| Neighborhood | Number | Population | Area (m²) | m²/person | Norm | Norm gap (m²/person) |
|---|---|---|---|---|---|---|
| Atakent | 28 | 95636 | 482.915 | 5,0 | 2 | - |
| Beşyol | 4 | 3890 | 16360 | 4,2 | 2 | - |
| Cennet | 16 | 29892 | 35048 | 1,2 | 2 | 0,8 |
| Cumhuriyet | 11 | 50786 | 63868 | 1,3 | 2 | 0,7 |
| Fatih | 16 | 10643 | 471748 | 44,3 | 2 | - |
| Fevzi Çakmak | 5 | 25124 | 16877 | 0,7 | 2 | 1,3 |
| Gültepe | 13 | 30160 | 55594 | 1,8 | 2 | 0,2 |
| Halkalı Merkez | 36 | 77648 | 1251066 | 16,11 | 2 | - |
| Atatürk | 8 | 42171 | 20526 | 0,5 | 2 | 1,5 |
| Mehmet Akif | 7 | 52258 | 14269 | 0,3 | 2 | 1,7 |
| İnönü | 29 | 72454 | 81207 | 1,1 | 2 | 0,9 |
| İstasyon | 15 | 39092 | 189051 | 4,8 | 2 | - |
| Kanarya | 12 | 67914 | 40554 | 0,6 | 2 | 1,4 |
| Kartaltepe | 3 | 12426 | 12107 | 1,0 | 2 | 1,0 |
| Kemalpaşa | 5 | 14256 | 23317 | 1,6 | 2 | 0,4 |
| Söğütlü Çeşme | 11 | 32744 | 96818 | 3,0 | 2 | - |
| Sultan Murat | - | 14052 | - | - | 2 | 2 |
| Tevfik Bey | 25 | 36408 | 71018 | 2 | 2 | - |
| Yarımburgaz | 3 | 9867 | 7334 | 0,7 | 2 | 1,3 |
| Yeni Mahalle | 11 | 19831 | 21680 | 1,1 | 2 | 0,9 |
| Yeşilova | 7 | 33064 | 16111 | 0,5 | 2 | 1,5 |
| Küçükçekmece | 259 | 770316 | 2.987.468 | 3,9 | 2 | - |

**TABLE 3**

**Distribution of the gathering areas by area sizes**

| | 1st degree | | 2nd degree | | 3rd degree | | 4th degree | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Neighborhood | Area (m²) | Number | Area (m²) | Number | Area (m²) | Number | Area (m²) | Adet | Area (m²) | Number |
| Atakent | 401643 | 13 | 64938 | 9 | 15732 | 5 | 602 | 1 | 482915 | 28 |
| Atatürk | - | - | 8844 | 1 | 10306 | 5 | 1376 | 2 | 20526 | 8 |
| Beşyol | - | - | 9620 | 1 | 6740 | 3 | - | - | 16360 | 4 |
| Cennet | - | - | 19242 | 3 | 15806 | 7 | - | - | 35048 | 10 |
| Cumhuriyet | 39063 | 2 | 7289 | 1 | 16743 | 7 | 773 | 1 | 63868 | 11 |
| Fatih | 439234 | 3 | 12530 | 2 | 17837 | 8 | 2147 | 3 | 471748 | 16 |
| Fevzi Çakmak | 10504 | 1 | - | - | 5836 | 3 | 537 | 1 | 16877 | 5 |
| Gültepe | - | - | 36105 | 5 | 17750 | 6 | 1739 | 2 | 55594 | 13 |
| Halkalı Merkez | 1143617 | 7 | 74214 | 11 | 28455 | 12 | 4780 | 6 | 1251066 | 36 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| İnönü | - | - | 28510 | 5 | 47934 | 17 | 4763 | 7 | 81207 | 29 |
| İstasyon | 139846 | 4 | 28865 | 4 | 19842 | 6 | 498 | 1 | 189051 | 15 |
| Kanarya | 11648 | 1 | 15369 | 2 | 11413 | 5 | 2124 | 4 | 40554 | 12 |
| Kartaltepe | - | - | 8066 | 1 | 3831 | 1 | 210 | 1 | 12107 | 3 |
| Kemalpaşa | 13372 | 1 | 5857 | 1 | 3781 | 2 | 307 | 1 | 23317 | 5 |
| Mehmet Akif | - | - | 6462 | 1 | 6723 | 4 | 1084 | 2 | 14269 | 7 |
| Söğütlüçeşme | 72897 | 4 | 8745 | 1 | 14400 | 5 | 776 | 1 | 96818 | 11 |
| Sultan Murat | - | - | - | - | - | - | - | - | - | - |
| Tevfikbey | 11394 | 1 | 25661 | 4 | 30310 | 13 | 3653 | 7 | 71018 | 25 |
| Yarımburgaz | - | - | - | - | 7334 | 3 | - | - | 7334 | 3 |
| Yeni Mahalle | - | - | 6551 | 1 | 12142 | 6 | 2987 | 4 | 21680 | 11 |
| Yeşilova | - | - | 6895 | 1 | 7180 | 3 | 2036 | 3 | 16111 | 7 |
| Küçükçekmece | 2283218 | 37 | 373763 | 54 | 300103 | 121 | 30392 | 47 | 2987468 | 259 |

1st-degree gathering areas: 10.000 m² and above

2nd-degree gathering areas: between 5000-10.000 m²

3rd-degree gathering areas: between 1000 and 5000 m²

4th-degree gathering areas: between 100 and 1000 m²

## RESULTS AND DISCUSSION

During and after earthquakes and other possible disasters, people need gathering areas for up to 72 hours. The first 72 hours of emergency aid to be made by rescuing people represents the critical period. Within the scope of this research, the planning criteria of the gathering areas that people can reach and use urgently in the first 72 hours, which is considered to be the most critical period after earthquakes and other possible disasters, has been developed in the example of Küçükçekmece district. Planning criteria urban risks, building collapse danger, closed area housing, distance to dangerous structures, property, infrastructure, tsunami danger, flood and flooding hazard, geological structure, liquefaction hazard, groundwater level, slope, landslide hazard, accessibility, and proximity to health facilities It was created for Küçükçekmece District under six headings. These six headings consist of diversity, competence, accessibility, connection with road axes, ownership, and areal size. Within the scope of the research, a gathering area plan was created by evaluating the existing open areas and active green areas in 21 neighborhoods of Küçükçekmece District of Istanbul Province.

Küçükçekmece is one of the most crowded districts of Istanbul Province; it was chosen as a research area because it was identified as one of the districts with high earthquake risk in the studies conducted by IBB and JICA (2002). Open area and active green area analysis were performed in the research area and a total of 115 building gardens including 73 school gardens, 31 mosque gardens, 11 hospital gardens, and 26 open car parks; identified as a potential open area. At the same time, a total of 118 park areas, including 87 pocket parks, 20 small parks, 5 neighborhood parks, and 6 district parks, have been identified as potential active green areas. In Küçükçekmece district, 259 gathering areas have been identified as potential areas, including 141 open areas and 118 active green areas.

The danger of buildings collapse near assembly areas poses a threat to people. For this reason, it has been evaluated whether the buildings near the gathering areas are in danger of collapse. Particular attention has been paid to the fact that the floor heights of the buildings close to the places chosen as gathering areas are not too high and that they are seismically resistant. If there is a risky situation of the existing building near an open area or green area chosen as the gathering area, strengthening works should be carried out. Building gardens are preferred because they contain a closed area that will provide bioclimatic comfort for people in microclimatic conditions. While determining the gathering areas, the primary selection was made from public lands. In urban renewal and urban transformation projects and implementations, open areas and green areas, which have vital importance in emergency conditions, should be sufficiently close and wide to 'residential' areas, in continuity and should be planned as areas that can be easily accessed and inspected. It should become necessary to evaluate whether the spatial distribution of open spaces and green areas to be used in emergency conditions is sufficient in terms of proximity and width to the areas with high-risk levels and need more in an emergency environment and to eliminate the deficiencies through planning. Comprehensive projects should be carried out and implemented in subjects such as providing the recreational game and sports needs of the public in sufficient amounts, developing the opportunities to benefit from the climate-improving functions of green areas, ensuring the continuity of vehicle traffic, alternative walking and bicycle paths. For these reasons, it is necessary to take a collective approach to the management and management of open spaces and green areas, and to make new regulations on ownership, maintenance and inspection to develop comprehensive service capacities in the system IBB (2003) [20-26].

To ensure a balanced distribution of green areas in the district of Küçükçekmece, neighborhood-level analyzes have been made. As of 2019, there is an active green area of 1252581 m² in Küçükçekmece District and there is 1.6 m² active green area per person. With the amendments made in the regulation dated 1985 of the Ministry of Public Works and Settlement in the Official Gazette dated September 2, 1999, and numbered 23804, an active green area of 10 m² per person was proposed. The amount of active green areas available per person in the Küçükçekmece district does not comply with the green area standards, or even reach this rate.

The functional distribution of green areas is important in terms of gathering the demands of different age groups. Park areas constitute all of the active green areas of Küçükçekmece district. There are also children's playgrounds and sports areas within the park areas. Independent children's playground and sports areas are not available in Küçükçekmece District. As can be understood from the values stated above in Küçükçekmece District, the functional distribution of the existing active green areas is not in line with the standards in terms of gathering the recreational needs of the age groups. In the district of Küçükçekmece, with the norm proposal of a 2 m² gathering area per person, the adequacy assessment of the gathering areas at the level of the neighborhoods has been made.

As a result of the evaluation, it was observed that the norm gap (area gap) did not occur in the gathering areas in Atakent, Beşyol, Fatih, Halkalı Merkez, İstasyon, Söğütlüçeşme, Tevfikbey and Yeşilova districts. 259 gathering areas have been proposed in Küçükçekmece district and they constitute an area of 2.987.468 m². It is seen that there is no norm deficit (area deficit) at the district level, based on the suggestion of a 2 m² open area per person.

## CONCLUSION

In the Küçükçekmece district, attention has been paid to the fact that the gathering areas are safe areas against building damage (therefore very small parks among risky residences are not preferred), there are no dangerous facilities around them, and the location of the gathering area is easily noticed by the people living in the neighborhood. In Küçükçekmece district, attention has been paid to ensure easy accessibility to assembly areas where assembly, temporary shelter, and emergency response can be provided after an earthquake and other possible natural disasters. As a result, we can say that for green areas, which are a part of urban landscape planning and urban planning, to assume a dominant and decisive function in the urban sense with the use and transformation of green areas before and after the

earthquake, green areas should be considered as a design input starting from the planning scale.

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## AUTHOR CONTRIBUTIONS

"The author contributed to the study conception and design. Material preparation, data collection, and analysis were performed by the author. The first draft of the manuscript was written by the author and the author commented on previous versions of the manuscript. The author read and approved the final manuscript."

## REFERENCES

1. Japanese International Cooperation Agency (JICA) and Istanbul Metropolitan Municipality (IBB). 2002. Republic of Turkey Istanbul Provincial Seismic Micro-zoning Inns of Disaster Prevention / Mitigation Basic Plan Study Final Report Volume V, Istanbul, Turkey.
2. Selitsaniotis I, Nikolaou K. Planning for the upgrading and increasing of urban green in the city of Larissa, Greece. J Environ Prot Ecol. 2009; 10(2):394-400.
3. Anhorn J, Khazai B. Open space suitability analysis for emergency shelter after an earthquake. Nat Hazards Earth Syst Sci. 2015; 15(4):789-803.
4. Chunyan ZH, Wenping RE, Yifeng YI, et al. The planning of green spaces to prevent and avoid urban disasters in Dujiangyan. IJSSST. 2016; 17(46).
5. Aman DD, Aytac G. Public green space and disaster relief: the scope for effective policies in Istanbul. J Environ Prot Ecol. 2018; 19(3):1047-1053.
6. Afad (2018) Turkey Earthquake Hazard Map.
7. Aksoy Y, Turan AÇ, Atalay H. Examination the sufficiency of Istanbul Fatih district's green area using values before and after marmara earthquake. Uludağ University. J Coll Eng. 2009; 14(2).
8. Kirçin P, Çabuk S, Aksoy K, et al. A Research on increasing the possibility of using green areas as post-disaster assembly areas in Turkey. DSE. 2018; 4(1):22-31.
9. FEMA. Emergency temporary group housing site selection guidelines—minimizing environmental/historic/safety problems.
10. UNHCR. 2007. Handbook for Emergencies.
11. The Sphere Project. 2011. Humanitarian Charter and Minimum Standards in Humanitarian Response.
12. SHELTER CENTER. 2012. Transitional Shelter Guidelines.
13. AFAD. 2015. Directive on Establishment, Management and Operation of Temporary Accommodation Centers.
14. Mersin O, Şahin N. 2009. Disaster Management in Izmir since 1999. Proceedings of Izmir Disaster Risk Reduction Symposium.
15. Durgun E. 2007. Disaster Sensitive Planning Approach and Integration of Earth Science Data into the Plan, Chamber of Geological Engineers, File 53, News Bulletin 3.
16. Şekerci H, Abay HA. 2011. Analysis Examples of Earthquake Reliability of Electrical Energy System in the World and in Our Country, Electrical Installation National Congress, TMMOB, Chamber of Electrical Engineers, İzmir.
17. Toprak S, Taşkın F, Koç AC, et al. Evaluation of Earthquake Performance of Infrastructure Systems with Geographical Information Systems, Kocaeli 2005 Earthquake Symposium Book. 2005: 1042-1049.
18. Balamir M. 2007. Disaster Policy, Risk and Planning, TMMOB Disaster Symposium Book, 31-43, Ankara.
19. Tarabanis K, Tsionas I. Using Network analyses for emergency planning in case of earthquake, transactions in Gıs.
20. Çınar AK, Akgün Y, Maral H. Analyzing the planning criteria for emergency assembly points and temporary shelter areas: Case of İzmir-Karşıyaka. J Plan Lit. 2018; 28(2):179-200.
21. IBB (Istanbul Metropolitan Municipality) (IDMP). 2003. Earthquake Master Plan for Istanbul, Planning and Zoning Department, Ground and Earthquake Investigation Directorate.
22. Aksoy Y. The Determination of exciting green area situation Istanbul. Unpublished doctoral thesis, Istanbul Technical University. 2001.
23. Aksoy Y, Aygün B, Turan ÇA, et al. An evaluation of the current and proposed green areas prior to and post earthquake period within the auspices of the risk and disaster management program for the küçükçekmece. Sub-District, Contractor Istanbul Municipality, Sub-Contractor BİMTAŞ, Project by Bahçeşehir University. 2007.
24. Kahyaoğlu B. 2016. Tekirdağ Cıty of Natural Dısasters and Educatıon Plannıng a Study on the Park. Master Thesis, Namık Kemal University Graduate School of Natural and Applied Sciences, Tekirdağ.
25. UNDRO (United Nations Disater Relief Coordinator). 1979. Natural Disasters and Vulnerability Analysis in Report of Expert Group Gathering, 9-12, Geneva: UNDRO.
26. UN OCHA. 2008. Disaster preparedness for effective response: guidance and indicator package for implementing priority five of the Hyogo Framework, United Nations, New York and Geneva.