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Urban open spaces as recreational areas and emergency shelters: Lessons from the Malatya earthquake

Public open spaces (POSs) played an important role as gathering areas during the 2023 earthquake in Turkey. However, challenges arose after the earthquake because POSs struggled to fulfil their recreational functions and could not meet the daily needs of the population. This study evaluates the performance of and changes to six POSs in Malatya after the earthquake and suggests strategies for integrating sustainability principles into seismic protection plans. The post-occupancy evaluation method was used, including field analysis, semi-structured interviews with sixty municipal experts, and a survey with 240 users. The results show that POSs faced problems such as insufficient infrastructure, limited space for camps, and issues related to safety and maintenance during the earthquake. After the earthquake, most POSs had not regained their recreational identity, with some transforming toward commercial use, occupation by new users, and changes in land use. The study concludes that earthquake resilience depends not only on the size, accessibility, and location of a POS, but also on the area's capacity for rapid maintenance and its multifunctionality, which ensure its vitality after a disaster. Planning recommendations include integrating disaster preparedness into city planning and facilitating post-disaster restoration.

Keywords: public open spaces (POSs), earthquake resilience, post-disaster recovery, Malatya, Turkey

1 Introduction

Earthquakes are natural phenomena that cannot be prevented. However, their destructive effects can be significantly reduced through effective urban planning. By integrating disaster risk reduction strategies into planning, experts can create more resilient cities and minimize the devastating impacts of earthquakes (León & March, 2016). This approach is highlighted in international frameworks such as the Hyogo Framework for Action, the 2030 Agenda for Sustainable Development, and the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). The United Nations International Strategy for Disaster Reduction also emphasizes the role of urban design solutions in strengthening city resilience (UNISDR, 2017). Therefore, all urban elements – including streets, buildings, infrastructure, and green spaces – must be considered in disaster-resilient planning. In this context, public open spaces (POSs) are critical assets, providing opportunities to integrate disaster management with everyday urban life.

POSs form the structural backbone of cities and are key elements for disaster resilience (Koren & Rus, 2019). After earthquakes, people instinctively seek refuge in open areas, turning them into gathering points for safety and essential services (Godschalk, 2003). These spaces can serve as temporary shelters and support the distribution of relief supplies, medical care, and basic goods (Johnson, 2007; Mengi & Erdin, 2018). They also provide a platform for community interaction and social support, promoting collective recovery (Allan et al., 2013). In societies with strong earthquake memory, repeated aftershocks often reinforce the preference for staying outdoors (Atalay, 2008). Historical cases further illustrate this role: following the 1906 San Francisco earthquake (Law, 2018), parks hosted temporary camps; in Mexico City, open spaces became vital after the 1985 earthquake (Rodríguez et al., 2007); and in China the 2008 Wenchuan earthquake highlighted parks as recovery centres (Xiao & Tang, 2013). However, without effective emergency planning, evacuation and aid delivery may be disrupted, causing significant losses (Allan et al., 2013). Similarly, after the 2010 Chile earthquake, sports fields and local parks were transformed into temporary camps. These examples confirm that parks, playgrounds, and sports facilities should be strategically designed as dual-purpose spaces, supporting both daily urban functions and emergency needs.

Despite the importance of POSs, land is scarce in cities, and open spaces already bear environmental, social, and recreational responsibilities. They cannot be reserved solely for disaster use (French, 2017). Urban green spaces support biodiversity, purify air and water, filter wind and noise, regulate microclimates (Jayakody et al., 2016), and promote psychological well-being, social cohesion, and economic vitality (Kozamernik et al., 2024). However, when repurposed as shelters during disasters, the functions of POSs often deteriorate.

The literature shows that spaces designed primarily for emergency roles risk losing their daily appeal if they are not carefully maintained (Koren & Rus, 2019). Recent research highlights this tension. Yücel and Komar (2021) compared "earthquake parks", assessing design criteria for recreation versus disaster use. Çavuş and Perçin (2021) examined how post-disaster parks equipped with urban furniture could adapt effectively, and they proposed design improvements. Ünkaracalar and Aycı (2023) evaluated Turkish parks after the February 2023 earthquakes, showing variations in flexibility and adaptability. Research on temporary use of urban spaces in Koper demonstrates that, although such uses can activate underutilized areas, they may also undermine the long-term recreational identity of parks (Cotič & Uršič, 2024). Baylan et al. (2025) investigated how displaced survivors used green spaces for social attachment and psychosocial recovery. Collectively, these studies underline the need to integrate disaster management and urban planning to ensure resilience and continuity of functions (Song et al., 2017; Akar et al., 2024).

POSs are widely recognized as safe and suitable for gathering and shelter during earthquakes (Coburn & Spence, 2002). However, their dual role remains unresolved: from a disaster management perspective they must provide shelter capacity, and from an urban planning perspective they must sustain social, recreational, and ecological functions. In practice, many POSs are poorly prepared to serve both roles simultaneously (Šamić-Musemić & Zagora, 2021; Dinç & Gök, 2024; Anhorn & Khazai 2015; Alawi et al., 2023; Şahin et al., 2022). Similarly, this research address three key questions: 1) How did the intensity of use change after the earthquake? 2) How did types of activities shift? 3) What problems were experienced during the earthquake (sheltering phase) and after the earthquake (recovery phase)?

Turkey's geographical position along the Alpine–Himalayan seismic belt, combined with complex topography, makes it highly vulnerable to earthquakes (Bayrak et al., 2015; Gerdan & Özdemir, 2017; Onay, 2024). On 6 February 2023, two powerful earthquakes (M_w 7.7 and 7.8) struck Kahramanmaraş, affecting eleven provinces and claiming more than sixty thousand lives (AFAD, 2023). Widespread destruction disrupted daily life, forcing open spaces to serve as emergency shelters. This disaster therefore provided a unique opportunity to study the transformation of POSs under extreme conditions.

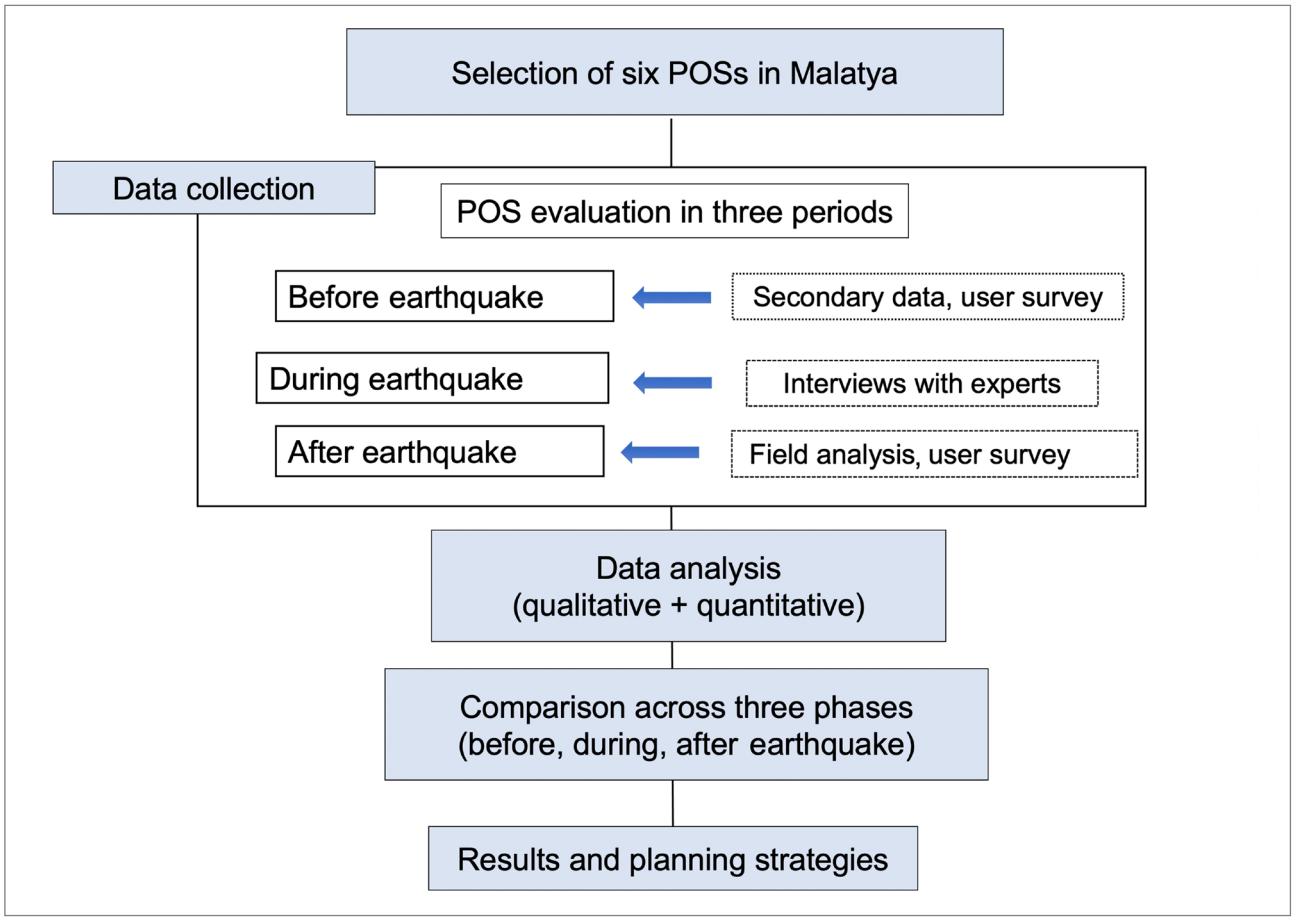

Figure 1: Flowchart of the research methodology (illustration: authors).

The primary aim of this study is to investigate the use of POSs in Malatya after the 2023 earthquake, focusing on their capacity to meet recreational needs and support daily life. The research analyses six major POSs in Malatya – one of the most severely affected cities – focusing on their functions before the earthquake, during the first 72 hours, and after the earthquake. Despite being designated by the Disaster and Emergency Management Authority (Turkish: *Afet ve Acil Durum Yönetimi Başkanlığı*, AFAD) as earthquake assembly areas, most POSs were not fully prepared for emergency sheltering. The findings will support planners and decisionmakers in creating earthquake-resilient POSs that can both reduce disaster impacts and sustain long-term urban recovery.

2 Materials and methods

This study used a post-occupancy evaluation (POE) approach to assess the functionality of six POSs in Malatya before, during, and after the 2023 earthquake. POE was chosen because it allows a comprehensive evaluation of how POSs function under real user conditions, particularly when exposed to unexpected stress such as natural disasters (Preiser & Vischer, 2005). The methodology combined on-site analysis, semi-structured interviews with officials, and a user survey to examine the physical, administrative, and social aspects of the POSs during and after the earthquake (Figure 1).

2.1 Study area

The province of Malatya, located in the western part of the Eastern Anatolia Region, is characterized by a harsh climate, with hot, dry summers and cold, rainy winters. The province extends along a north–south axis with a slight slope. The city of Malatya has a population of 807,947, approximately 78% of whom reside in the Battalgazi and Yeşilyurt districts. The overall population density is sixty-six people per km^2. Due to its mountainous terrain and active geological structure, the region is highly prone to seismic activity (Şahin, 2022).

Malatya was among the cities most severely affected by the February 2023 earthquakes in Turkey. Immediately after the disaster, the city experienced significant chaos. Many residents sought refuge in camp-like areas, tents set up in front of their homes, or public parks. Ongoing aftershocks prevented people from re-entering even structurally intact buildings (Türkmen

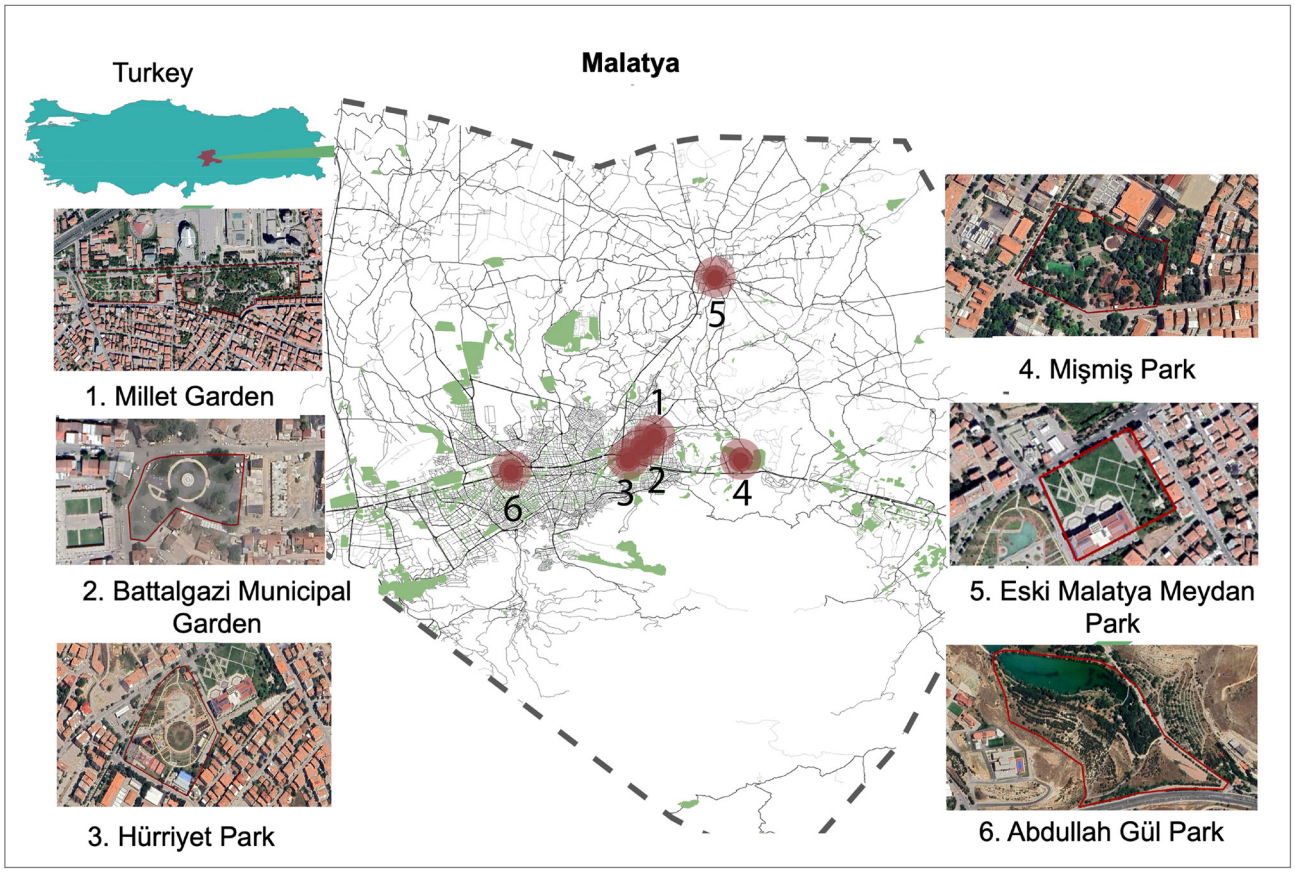

Figure 2: Location of the six POSs selected for this study in Malatya, Turkey (illustration: authors).

et al., 2023). During this emergency sheltering phase, serious challenges emerged, including delays in distribution of tents and relief supplies, as well as limited access to clean water, toilets, and bathing. In this study, the roles and functions of POSs during the earthquake in Malatya are analysed in line with the research objectives.

As shown in Figure 2, six major POSs in Malatya were selected for the analysis: Millet Garden, Battalgazi Municipal Garden, Hürriyet Park, Mişmiş Park, Eski Malatya Meydan Park, and Abdullah Gül Park. The general features and land uses of each POS are presented below.

Millet Garden covers 40,651 m^2. The park includes an enclosed parking lot in the lower section, a pond directly opposite the main entrance, and a seasonal plant parterre in the water area. There are also children's playgrounds, sports fields, a play pool, an amphitheatre, social facilities, hiking trails, an orchard, and aromatic medicinal gardens. A social centre of the Municipality of Malatya is also located in this area.

Battalgazi Municipal Garden is connected to the surrounding road axes. With an area of 32,844 m^2, it includes an enclosed parking lot, an ornamental pool directly opposite the main entrance with roses of various colours and scents, two libraries, a tea house, five pergolas, and walking paths. Solar panels and a rainwater storage system are installed on the roof of the community building.

Hürriyet Park covers 39,650 m^2 and has three entrances on the east, west, and north sides. The facilities include a parking lot, sports fields, a state registry office, a public library, cafés and restaurants, community social facilities, a children's playground, running tracks, a pond, walking paths, and an exercise area.

Mişmiş Park covers 400,020 m^2. It is a recreational area far from the city centre. There is a security post and access control at the entrance and exit. Walking paths provide uninterrupted access throughout the area, and there are picnic areas on the lake shore and in the park. A restaurant, a café, a market, a prayer room, children's playground, and toilets are all easily accessible. The park has a parking lot, and vehicles are not permitted in the picnic areas.

Eski Malatya Meydan Park covers 19,850 m^2. The park is located in the old market centre of Malatya and was restored by the Municipality of Battalgazi for conservation purposes. The

square features trees, various other plants, and large concrete areas. There is a pool in the centre and a pergola with fountains on the sides of the park.

Abdullah Gül Park covers 135,756 m^2. It is conveniently located near the Malatya municipal building and the Malatya Park Shopping Centre. The park features shops, a walking path, cafés, gazebos, benches, a children's playground, a restaurant, an area with sports equipment that can be used as a sports field, ornamental pools with fountains, and a smoke-free picnic area.

These POSs were chosen because they are heavily used by residents and were later designated by the Disaster and Emergency Management Authority (AFAD, 2022) as official earthquake assembly and shelter areas. This evaluation therefore provides valuable insights for administrators and urban planners, supporting more informed decision-making. It allows an assessment of both the immediate performance of POSs during the disaster and their long-term suitability as evacuation or protected areas.

2.2 Data collection

2.2.1 Field analysis

Field analysis provided an objective assessment of physical conditions, facilities, and environmental quality of each selected area for this research. To evaluate both the pre-earthquake conditions (using municipal archives and previous images) and the current state more than a year after the disaster, the researchers conducted field analysis between March 2023 and February 2024. Using geo-referenced photos and structured observation forms, each of the six POSs was inspected with an emphasis on accessibility, vegetation, infrastructure, and cleanliness. Playgrounds, toilets, walkways, and green areas were documented. Using geographic information system (GIS) and municipal planning data, more than five hundred photos and field notes were collected and validated. By demonstrating how the POSs changed from their pre-disaster state to their current post-earthquake condition, this comparative analysis helped identify and understand the functional and physical changes that occurred. Thus, it generated descriptive data on physical damage, loss of functionality, and changes in maintenance.

2.2.2 Semi-structured interviews with local officials

Professional knowledge of operation of the POSs during the event was obtained. Between April and June 2023, while the earthquake response was ongoing, the researchers individually conducted semi-structured interviews with sixty local officials (ten per site) from the municipalities of Yeşilyurt, Battalgazi, and Malatya. These included civil engineers, architects, landscape architects, agricultural engineers, and urban planners. They provided information on how the six POSs were used, maintained, and changed during the earthquake. Each session lasted around thirty to forty-five minutes and was documented using computerized summaries and handwritten notes. The interview transcripts were then coded thematically.

2.2. User survey

The purpose of the survey was to assess how the six POSs were used, perceived, and maintained before and after the 2023 earthquake. Organizing the survey by POS allowed respondents to evaluate each location individually. Using on-site convenience sampling in the six POSs, the researchers conducted the survey in person by orally administering it between September and December 2023. For each POS, participants were asked to rate three sections: the frequency of their visits before and after the earthquake (ranging from daily to rarely) to capture shifts in user behaviour, types of activities they engaged in before and after the earthquake (such as walking, resting, socializing, playing sports, or using the space as a thoroughfare), and the main issues noticed after the disaster, including urgent repair needs, loss of recreational functions, cleanliness problems, and challenges to restoration due to damage. Responses were collected through multiple-choice and five-point Likert scale questions, complemented by open-ended comments.

There were 240 participants in total, forty in each POS, and each interview lasted between ten and fifteen minutes. Convenience sampling was used to select participants, who were local residents that used or visited the POS and were available and willing to answer questions on-site. To ensure diversity, the researcher specifically selected people of all ages and both sexes, especially those that had visited the locations both before and after the earthquake. Respondents gave their verbal consent after being informed of the study's academic and private nature, and all data were stored in password-protected digital files. The collected data were then analysed comparatively to identify trends in changes to user behaviour, visit frequency, and perceived problems across the six POSs.

2.2.4 Data analysis

Each item of data collected from field observations, surveys, and interviews was manually recorded on paper before being digitally converted for systematic analysis. The quantitative data from the user survey was organized in Microsoft Excel to produce descriptive tables and comparative visualizations showing conditions before and after the earthquake. The qualitative materials, categorized and organized in Microsoft Word, included responses to open-ended questions, interview transcripts, and photos.

Figure 3: Views of selected POSs in Malatya after the 2023 earthquake: a) container settlement in Eski Malatya Meydan Park; b) large-scale tent settlement in Battalgazi Municipal Garden; c) container complexes in Millet Garden; d) kiosks and informal commercial activity in Abdullah Gül Park; e) damaged playground in Mişmiş Park; and f) informal market activities in Eski Malatya Meydan Park (photo: authors).

The data collected were analysed and used to compare the selected POSs. The sites were assessed mainly for functionality, maintenance and management, infrastructure and facilities, security, size, location, and user satisfaction before, during, and after the earthquake. These factors have already been emphasized in earthquake recovery in previous research (Yücel & Komar, 2021; Gökgöz et al., 2020; Madureira et al., 2018; Kabisch et al., 2015; Chiesura, 2004; León & March, 2016; Johnson, 2007; Jayakody et al., 2016).

3 Results

3.1 Field analysis (function and condition of the POSs)

Before the earthquake, the public frequently used Millet Garden as a recreational space both day and night, and as a social hub due to its proximity to the Municipality of Battalgazi and the city centre. Field visits after the earthquake revealed that the park has been converted into a commercial area dominated by container units. Green spaces and playgrounds have disappeared, replaced by small trading stalls. The infrastructure and restrooms have been damaged, lighting is inadequate, and hygiene issues are widespread. The site no longer functions as a social park but rather as a temporary commercial hub.

Battalgazi Municipal Garden was aesthetically pleasing before the earthquake due to its rich vegetation, floral landscaping, and shaded areas. After the earthquake, the landscaped area was replaced by a restaurant and bakery. These new developments have reduced the green space and altered the park's original character. Although some pavement repairs have been carried out, plant maintenance is minimal, and the garden now primarily serves brief or practical visits rather than leisure activities.

Before the earthquake, Hürriyet Park was a popular spot for socializing, walking, and family time, particularly on weekends. After a period of disuse following the earthquake, the park has gradually become active again. Cafés and restaurants have reopened, but the area is now mainly used as a thoroughfare. Some vegetation has survived, but playgrounds and other amenities show signs of deterioration.

Mişmiş Park, once a multiuse green space serving various purposes, has lost most of its recreational functions. After the earthquake, playgrounds and lawns were damaged, and social gatherings ceased. Temporary structures now occupy parts of the park, and, although some natural vegetation remains, the area has become quiet and underutilized, mainly frequented by a small number of locals and volunteers.

Before the earthquake, Eski Malatya Meydan Park was a meeting and transition point with significant pedestrian traffic due to its proximity to the bus terminal and Malatya's ancient core. After the earthquake, it was transformed into a container market and temporary housing area. Pavements are broken, and the space has become overcrowded and disorganized. It has lost its original identity and is now mostly used as a thoroughfare for pedestrians and temporary residents.

Abdullah Gül Park was once a prominent social and sports venue, especially at night. It has been turned into a dense area filled with container shops and temporary market stalls. Playgrounds and green spaces have been damaged, and infrastructure has weakened. The park's recreational purpose has declined, now mainly serving short-term visitors.

The field study showed that all six POSs in Malatya underwent major changes following the 2023 earthquake. Gradually, many of these areas lost their recreational purpose and were converted into temporary commercial spaces, such as container shops and kiosks. Figure 3 illustrates some of these physical and functional changes, highlighting the reduction in recreational value and the shift to emergency and informal uses.

3.2 Interviews

Millet Garden was chosen as a gathering point due to its central location and easy accessibility. Relief supplies and food were delivered directly to the area, and tents and containers were set up throughout the park. However, the space was insufficient for the number of people arriving, resulting in overcrowding and poor organization.

Battalgazi Municipal Garden served as an evacuation and aid distribution centre, benefiting from its proximity to the city centre. Most of the park was filled with tents, and food, clothing, and shelter were provided. Nevertheless, the site was too small to accommodate all evacuees. Local officials noted a lack of preparedness and inadequate maintenance and repairs during and after the crisis.

Although small, Hürriyet Park became a temporary shelter due to its accessibility from the city centre. It provided initial shelter and social services through a municipal facility on site. However, during the earthquake, it lacked sufficient seating, shade, toilets, and utilities.

Mişmiş Park, the largest open space at a safe distance from buildings, served as a major hub for containers and storage during the earthquake. Much of the area was converted into shelters where basic needs were met, including food distribution, children's activities, and aid packages. However, sanitation, lighting, and infrastructure were inadequate. Despite the park's size, the number of tents and containers was insufficient.

Eski Malatya Meydan Park hosted tents and distributed essential aid. However, damage to infrastructure and vehicle congestion limited its usability. The tents and containers were small and inadequate. Although it was a central aid hub, hygiene issues persisted.

Abdullah Gül Park accommodated tents and aid distribution during the earthquake due to its central location and open layout. Local officials reported security checks and infrastructure assessments during its use. Despite its size, the park faced challenges related to infrastructure and security.

Although these sites initially functioned as shelters, aid distribution points, or container settlements, problems with sanitation, safety, and damaged infrastructure hindered their overall effectiveness. A shortage of personnel and lack of prior preparation also limited their efficiency.

3.3 User survey

Of the 240 respondents, 35% were female and 65% were male. Seventy percent were married, and the majority had a university education. Sixty participants had personally used the parks as shelter or gathering spaces during the February 2023 earthquake.

3.3.1 Intensity and frequency of use

The respondents were asked about the frequency of visiting the area before and after the earthquake. The options ranged from once a day to infrequent visits. The results are shown in Figure 4. It is evident that the earthquake has affected the use of the POSs selected for this research.

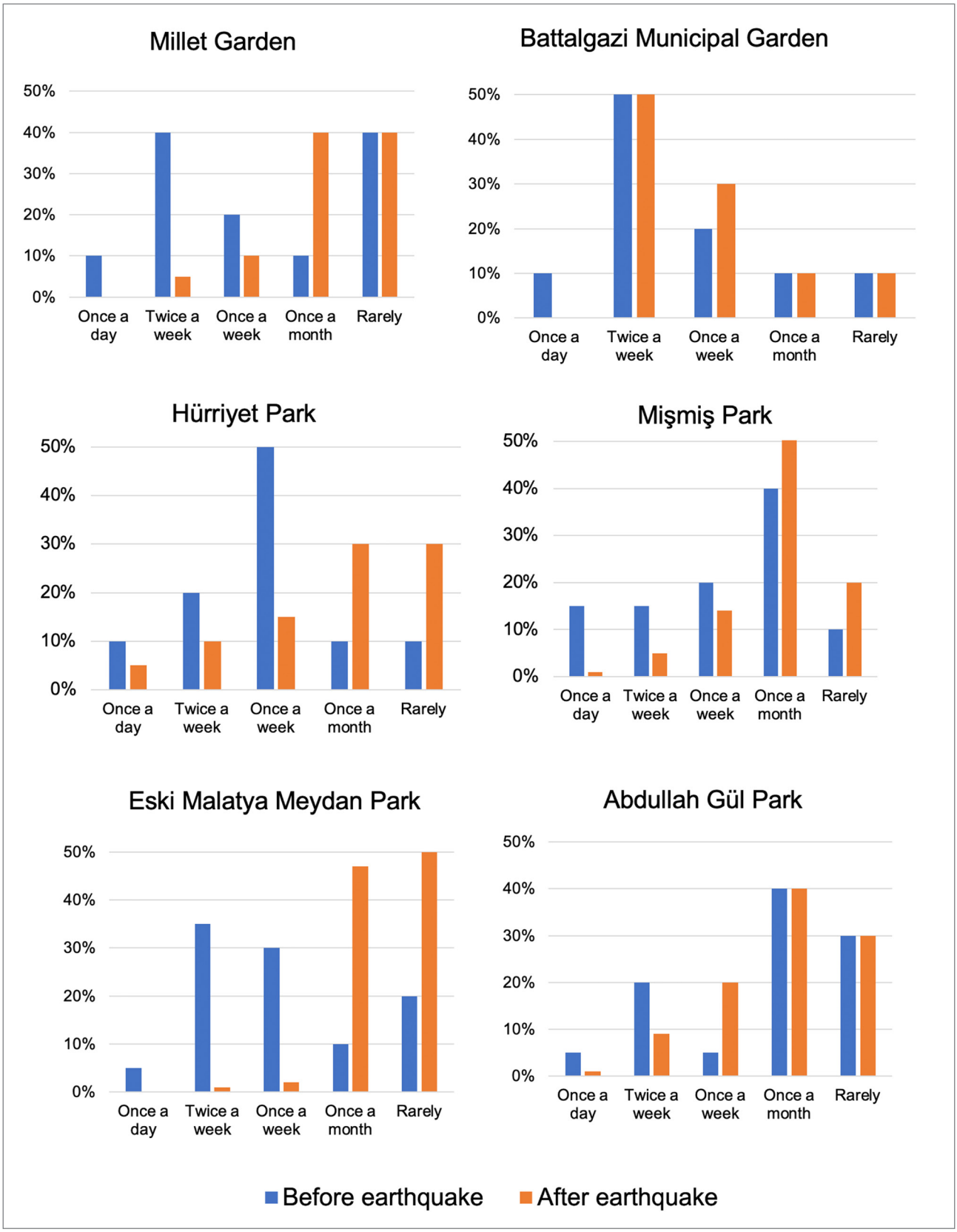

Figure 4: Comparison of the intensity and frequency of use in six POSs based on the survey (illustration: authors).

Before the earthquake, all the POSs were more frequently used. Many respondents visited Millet Garden, Hürriyet Park, and Eski Malatya Meydan Park twice a week or once a week, showing that these spaces were actively used for social and recreational purposes. Similarly, Battalgazi Municipal Garden recorded a strong concentration of visits twice a week, indicating its role as a regular gathering place. Abdullah Gül Park also attracted regular weekly visits, and Mişmiş Park showed a balanced distribution across daily, weekly, and occasional use.

After the earthquake, a noticeable shift occurred in visiting patterns. In Millet Garden, Hürriyet Park, and Eski Malatya Meydan Park, frequent visits declined sharply, with users instead reporting visits once a month or rarely, suggesting reduced accessibility, safety, or attractiveness in these areas. Battalgazi Municipal Garden showed less disruption because visits twice a week remained high, indicating its continued importance. Abdullah Gül Park shifted slightly toward less frequent visits (once a month), although usage did not collapse entirely. In contrast, Mişmiş Park saw an increase in monthly use, making it a more prominent space after the disaster. This pattern suggests that, although most parks lost their role as everyday social spaces, Mişmiş Park and, to some extent, Abdullah Gül Park gained or retained significance, highlighting variations in how POSs were perceived in the post-disaster context.

3.3.2 Types of activities

The next key question in the survey examined how the functions of the areas changed after the earthquake, aiming to understand the disaster's impact on their usage. Five main activities were considered: walking, meeting friends, resting and eating, play and sports, and using the space as a thoroughfare. As shown in Figure 5, there are clear differences in how POSs were used during the two periods. A comparative analysis reveals significant changes in POS usage after the earthquake, with two main trends: a sharp increase in using the POSs as thoroughfares and a notable decline in social activities.

Across the six POSs, activities were varied and balanced before the earthquake, reflecting diverse recreational uses. Millet Garden primarily served as a thoroughfare (about 45%) but also supported walking, socializing, and resting, highlighting its central location and accessibility. Battalgazi Municipal Garden offered a well-rounded mix of uses, especially meeting friends, walking, and resting, making it a key social spot. Hürriyet Park was primarily used for walking and social interaction, with many visitors coming for leisure and socializing. Mişmiş Park, the largest, had a multipurpose role, with walking, eating, sports, and social activities fairly evenly distributed. Eski Malatya Meydan Park primarily served as a thoroughfare, although some walking and social activities took place. Abdullah Gül Park had the most diverse user profile, supporting all five activities fairly evenly. Overall, before the earthquake, these POSs were lively recreational and social areas, with activities distributed among walking, resting, playing, and meeting friends. Thoroughfare use was present but was not dominant, except in Millet Garden and Eski Malatya Meydan Park.

After the earthquake, the functional use of all POSs shifted mainly to circulation and transit, with social and recreational activities significantly reduced. In Millet Garden, pathway use increased to about 60%, and socializing and resting declined because the area was transformed into a containerized trade centre rather than a leisure spot. Battalgazi Municipal Garden retained relatively more social functions, such as meeting friends and resting, compared to other POSs, likely due to its proximity to institutions that helped maintain community use. Hürriyet Park became primarily used as a thoroughfare (around 40%), losing much of its recreational character, which corresponds to its small size and role as a central connector. Mişmiş Park experienced the most significant change: thoroughfare use rose to about 55%, whereas sports and leisure activities almost disappeared, directly due to its conversion into a container and aid distribution area. Eski Malatya Meydan Park shifted almost entirely to thoroughfare use (about 60%), losing its cultural and social functions. Abdullah Gül Park, despite its large size, also became dominated by thoroughfare use (around 55%), although some activities continued, indicating only partial resilience.

3.3.3 Current issues (after the earthquake)

Respondents were asked about the current problems they observed in the POSs following the earthquake. The question was a closed multiple-choice question. Respondents were asked to select one or more issues from four predefined options, which were derived deductively from field observations and related literature on post-disaster public space assessment (e.g., Jayakody et al., 2016; León & March, 2016; Johnson, 2007). These options included 1) urgent repairs, including visible structural or surface damage requiring immediate maintenance; 2) loss of recreational function, or the inability of the area to support leisure or social activities due to damage or displacement of facilities; 3) cleanliness and hygiene, covering sanitation problems, waste accumulation, insufficient maintenance, and lack of basic facilities such as litter bins, toilets, and cleaning services after the earthquake; and 4) difficulty of restoration due to widespread damage, referring to major, long-term reconstruction problems caused by serious structural and infrastructural destruction, which required large-scale recovery efforts beyond regular maintenance. As shown in Figure 6, valid responses were coded numerically and analysed quantitatively in Microsoft Excel, calculating the percentage

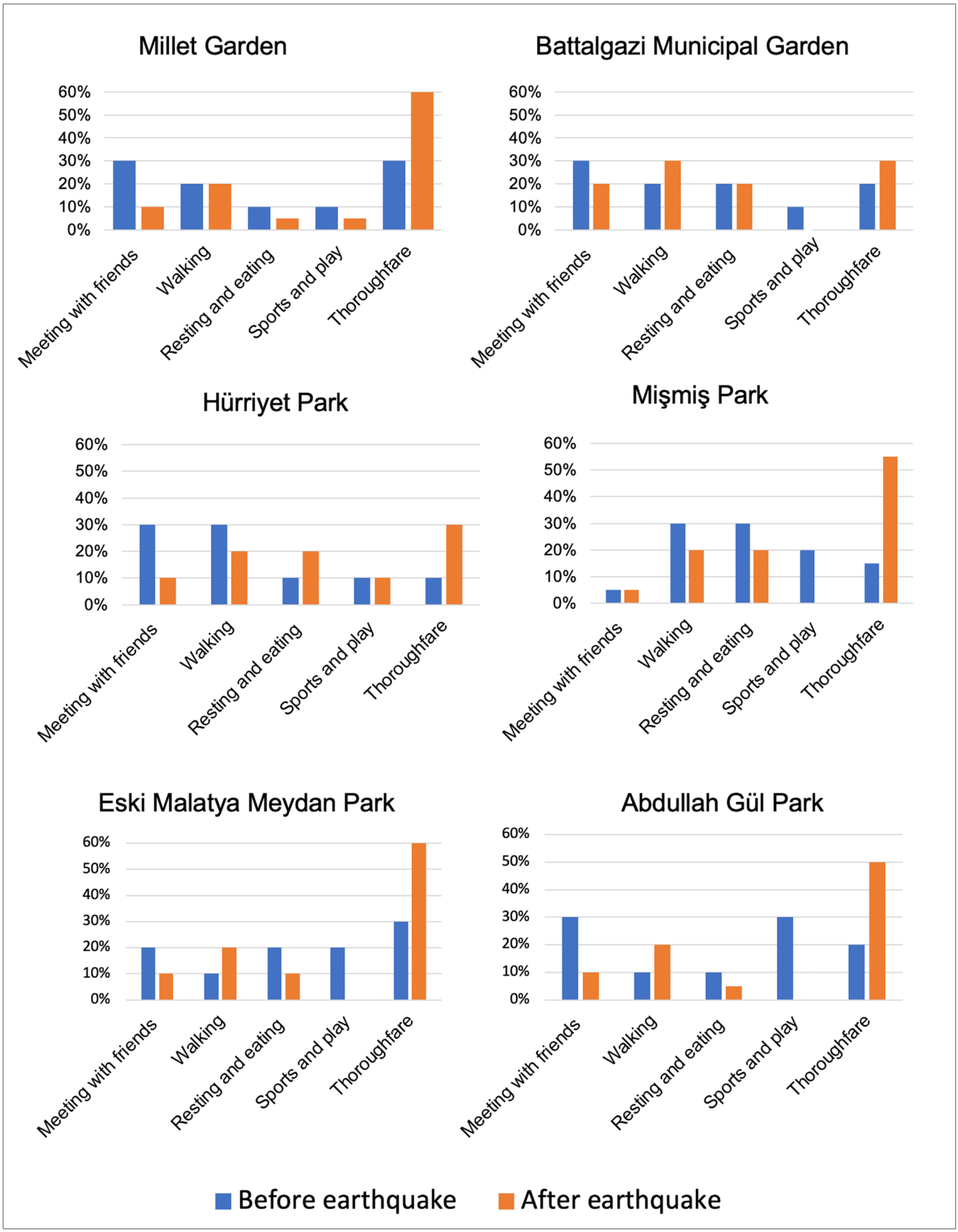

Figure 5: Analysis of activity types in the six POSs before and after the 2023 earthquake (illustration: authors). Forty participants were surveyed for each POS, for a total of 240 respondents.

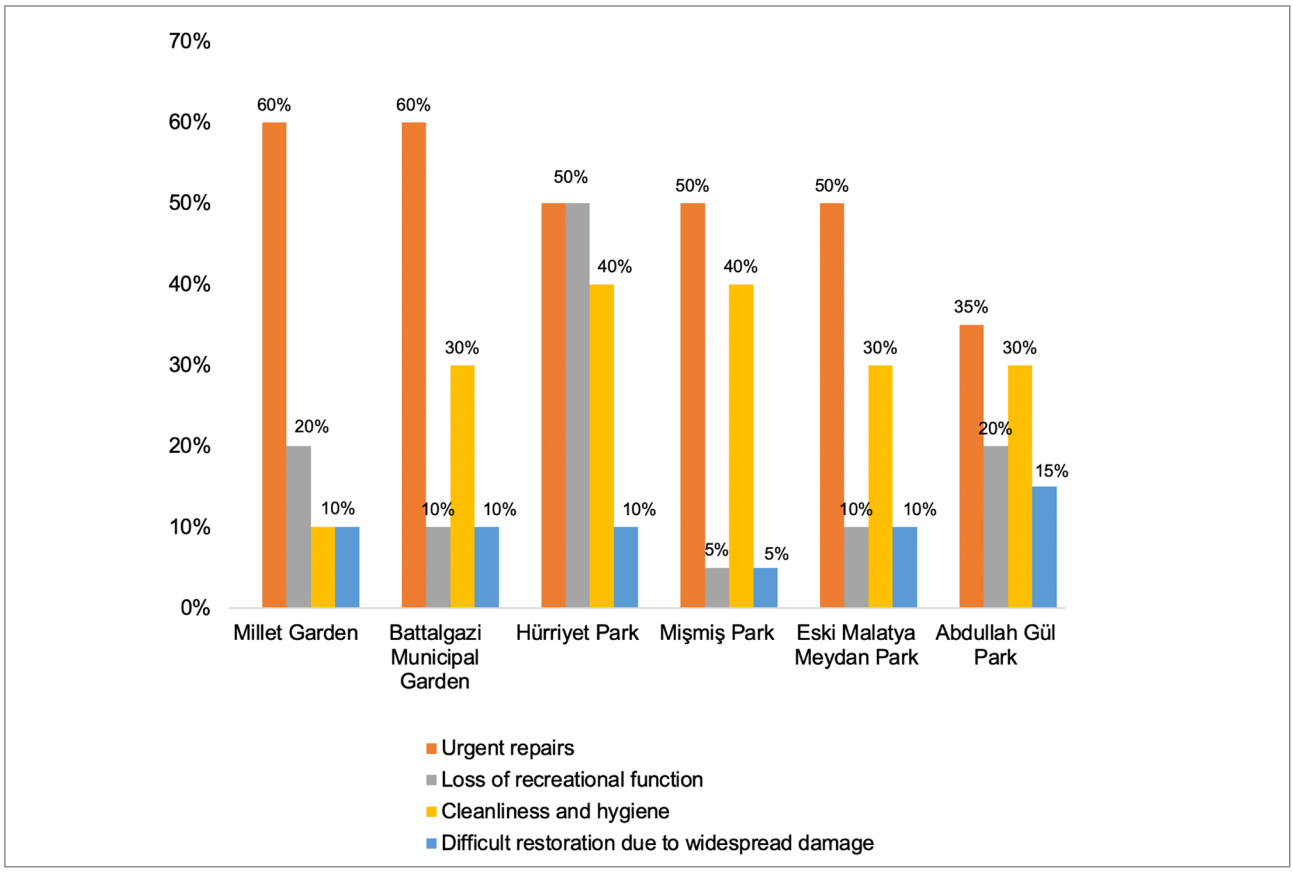

Figure 6: Users' perspectives on current issues in the six POSs according to the survey (illustration: authors). Forty participants were surveyed for each POS, for a total of 240 respondents.

of selections for each factor and comparing them across the six POSs.

The most common issue across all POSs was the immediate need for urgent repairs to infrastructure, such as benches, paths, fences, and lighting, after the earthquake. This problem was most acute in Millet Garden, Battalgazi Municipal Garden, Hürriyet Park, Mişmiş Park, and Eski Malatya Meydan Park, where 50% to 60% of users mentioned it. Although Abdullah Gül Park had a lower percentage, urgent repairs were still the most frequently reported problem there.

Many users across all POSs felt that these areas had lost their recreational function. This issue was most notable in Hürriyet Park and Mişmiş Park, with 40% of users citing it. This agrees with the data presented in Figure 5, which indicate a shift away from activities such as playing and resting.

Although concerns about cleanliness and hygiene were present in all six POSs, this was less prominent compared to urgent repairs or loss of recreational function. Abdullah Gül Park had the highest percentage of users mentioning cleanliness issues, followed by Millet Garden and Battalgazi Municipal Garden.

As seen in Figure 6, difficulty of restoration due to widespread damage was the least commonly reported problem but was still noted at all sites. Abdullah Gül Park had the highest percentage (15%) of users that found it difficult to restore the area. Millet Garden, Battalgazi Municipal Garden, and Hürriyet Park each had 10% of users reporting this issue.

Thus, although all six POSs suffered from an urgent need for repair, the specific secondary problems varied. Some areas faced more significant cleanliness challenges, whereas for others the primary issue was the complete loss of their recreational function.

Following the earthquake, each POS faced distinct challenges and underwent transformations shaped by the interplay of their physical conditions, management strategies, and user behaviours. Millet Garden ceased to function as a recreational area and was repurposed into a commercial zone, Battalgazi Municipal Garden shifted from a landscaped public space to a service-oriented area, Hürriyet Park rapidly regained its pre-disaster role due to its symbolic significance and central location, Mişmiş Park initially served as a crucial gathering point but later lost its cultural and recreational functions, Mey-

dan Park became a low-density corridor mainly frequented by temporary and non-local users, including vendors and residents of nearby temporary housing, and Abdullah Gül Park sustained considerable damage accompanied by a change in its user demographics.

4 Discussion

Analysis of field observations, interview data, and survey findings indicates that the most critical determinants influencing these outcomes were the quality of infrastructure, accessibility of location, and capacity of pre-disaster management. These integrated results substantiate the hypothesis that POSs with robust maintenance, central positioning, and symbolic importance tend to recover more quickly and retain their social value after disasters.

After the earthquake, all six POSs were primarily converted from leisure destinations into transit corridors. Movement through these spaces became the main activity, and their social, cultural, and recreational uses declined significantly. At the same time, the research findings show variations influenced by location, size, and infrastructure within each POS. Central POSs, such as Hürriyet, maintained their function as community hubs, whereas larger areas like Mişmiş Park, despite their considerable capacity, saw a decline in recreational and cultural use, serving mainly as thoroughfares. The park's extensive use for storage and containers, along with heavy vehicular traffic and temporary structures, caused significant damage to the ground, playgrounds, and green spaces. Due to inadequate repair and maintenance, the park could not regain its previous recreational role.

Previous research has highlighted that the resilience of POSs is influenced more by factors such as accessibility and maintenance than by size alone (Foški et al., 2024; Onay, 2024). Empirical field analysis supports this view, showing that park performance after the earthquake was not determined solely by spatial extent. For example, although Mişmiş Park and Abdullah Gül Park cover large areas, their ability to serve users effectively was reduced due to damaged infrastructure, deteriorated surfaces, and inadequate maintenance. In contrast, Hürriyet Park, a smaller park in a central location, continued to function as a communal gathering space because of better accessibility and more prompt municipal cleaning and repair. These observations suggest that POSs are highly adaptive yet vulnerable components of urban resilience infrastructure.

Persistent challenges identified through field analysis and user surveys after the earthquake included issues related to hygiene, security, and damaged infrastructure. Hygiene problems were related to broken sewage systems, insufficient cleaning, and a lack of temporary sanitation facilities such as toilets and showers at the sites after the earthquake. Security concerns were linked to inadequate lighting, lack of personnel, and unrestricted access. Infrastructure deficiencies included broken benches, damaged pavements, and limited waste collection. Overall, these conditions, confirmed by user evaluations, reduced satisfaction with POSs and delayed the resumption of normal recreational activities.

Based on the results obtained in this research, some key planning recommendations are suggested for POSs, particularly in earthquake-prone cities. First, POSs should use adaptive design by including multifunctional spaces that can quickly switch between recreational and emergency uses. Using modular paving, open lawns, and wide pedestrian paths can support temporary camping and container placement during crises. In addition, incorporating removable street furniture and lighting improves spatial flexibility while reducing long-term damage to the landscape. In this study, for example, Mişmiş Park initially functioned well as an emergency centre due to its large open area and flat ground, which made it easy to quickly set up tents and containers. Modular infrastructure and removable street furniture may help prevent ongoing damage to the ground, highlighting the need for flexible and adaptable design strategies in park planning.

Second, it is essential to use resilient earthquake-resistant materials in playgrounds and seating areas to prevent total infrastructure failure. Underground utilities such as water, electricity, and drainage should be designed with accessible maintenance points to allow quick repairs after seismic events. Emphasizing soil stabilization is also important to prevent surface deformation caused by heavy foot or vehicle traffic during emergencies. The example of Abdullah Gül Park, examined in this study, shows the significant damage to playground and seating areas due to the use of fragile materials. Pavement cracked under the weight of heavy vehicles used for aid distribution.

Third, it is essential to maintain a diverse mix of native drought- and stress-tolerant plants that can survive periods of neglect. Implementing a phased replanting and soil restoration plan is necessary to improve ecological health. Preserving mature tree canopies is particularly important because they provide natural shade, which benefits both relief efforts and recreational activities. The example of Battalgazi Municipal Garden showed that the POS lost much of its greenery when a temporary restaurant replaced the planted areas. The lack of a replanting plan and drought-resistant species reduced the site's ecological resilience.

Fourth, inadequate spatial planning can result in uncontrolled commercial encroachment. The open spaces of Millet Garden and Abdullah Gül Park, lacking designated emergency zones, were taken over by spontaneous container markets. In contrast, Hürriyet Park preserved its social function due to its compact layout, clearly defined pedestrian paths, and convenient access from the city centre. This aligns with the findings of Tatlić et al. (2024), who highlight accessibility as a crucial aspect of urban resilience. Emergency access routes should be planned to avoid disrupting recreational paths during normal use. Applying universal design principles – such as wide entrances, ramps, and sufficient lighting – improves both evacuation safety and everyday comfort. Maintaining open sightlines is also essential for safety and social visibility, helping reduce the sense of insecurity often felt after disasters.

Finally, maintenance and community engagement must be considered. After the disaster, Eski Malatya Meydan Park was gradually neglected and eventually turned into a street mainly used by transient residents. Its revival was hindered by the lack of a coordinated maintenance plan and community participation programs. In contrast, local initiatives at Hürriyet Park, such as reopening cafés and small cleaning tasks, helped restore user engagement, highlighting the importance of local involvement in post-disaster recovery. Developing a comprehensive maintenance plan that addresses both routine operations and emergency response situations is essential. In addition, it is crucial to train community organizations and municipal government to manage the transition after a disaster.

5 Conclusion

The findings confirm that POSs in earthquake-prone urban environments must serve a dual function: meeting everyday recreational needs and acting as critical infrastructure for emergency response. However, these roles often conflict. When disaster management and urban planning are conducted separately, POSs risk degradation or commercialization after crises, as seen in Millet Garden and Abdullah Gül Park. An integrated approach that incorporates flexibility, durability, and multifunctionality into design principles can ensure that open spaces remain dynamic and resilient components of the urban landscape.

In this study, POSs faced numerous challenges, including inadequate infrastructure, poor sanitation, and management problems, despite providing essential shelter and support functions immediately after the earthquake. Most POSs had not fully returned to recreational use six months after the earthquake; some had shifted to commercial purposes, and both security and user satisfaction had declined. These findings show that resilience relies on several factors, such as timely maintenance, robust infrastructure, and accessibility. This research offers new insights into the design and management of POSs to support both everyday use and emergency functions, bridging the gap between disaster management and urban planning.

The study underscores the need for systematic planning approaches that balance accessibility and safety, facilitate post-disaster repair, and integrate disaster preparedness into park design. A limitation of this study is its focus on six POSs in a single city, which may restrict the generalizability of the results. However, it provides valuable recommendations for planners and policymakers working in earthquake-prone urban environments, as well as a solid foundation for future comparative research.

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