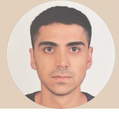
MIDDLE EAST TECHNICAL UNIVERSITY
DEPARTMENT OF CITY AND REGIONAL PLANNING
MASTER OF CITY PLANNING | MCP 501 CITY PLANNING STUDIO

COMMUNITY RESILIENCE FOR POST TRAUMA RECOVERY
THE CASE OF ANTAKYA
TEMPORARY LIVING AREAS

TUNÇ ALP KASIM
INSTRUCTORS: PROF. DR. SERAP KAYASÜ,
DR. PINAR ÇOBANYILMAZ, RES. ASST. DENIZ CAN



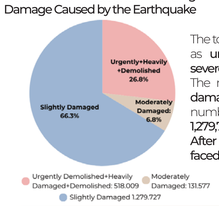
0.1 OVERVIEW

On February 6, 2023, two earthquakes of magnitude Mw7.7 and Mw7.6 occurred with epicenters in Pazarcık and Elbistan districts of Kahramanmaraş. On February 20, 2023, an earthquake with a magnitude of Mw 6.4 occurred with the epicenter in Yayladağı, Hatay. **February 6 earthquakes affected 13.5 million people in 10 provinces.**
Together with those who did not report, **the number of people who moved from the earthquake zone to other cities is estimated to have exceeded 2 million.**
Number of people who lost their lives in the Kahramanmaras-based earthquakes reached 50,500 as of April 14.
(BBC, 2023)

FEBRUARY 6 EARTHQUAKE AND HOUSING CRISIS

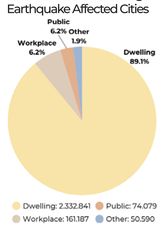
According to the Total Number of Buildings in Earthquake Affected Provinces, the number of buildings in residential use is 2,332,84 and this constitutes 89.1% of the total number of buildings in the relevant provinces.

Detection of Residential Building Damage Caused by the Earthquake



The total number of dwellings categorized as **urgently demolished, collapsed or severely damaged is 518,009.**
The number of houses with **moderate damage was estimated as 131,577** and the number of houses with **minor damage as 1,279,727.**
After the earthquake, 2,273,551 people faced housing problems.

Total Number of Buildings in Earthquake Affected Cities



(ÇŞİDB, 2023)

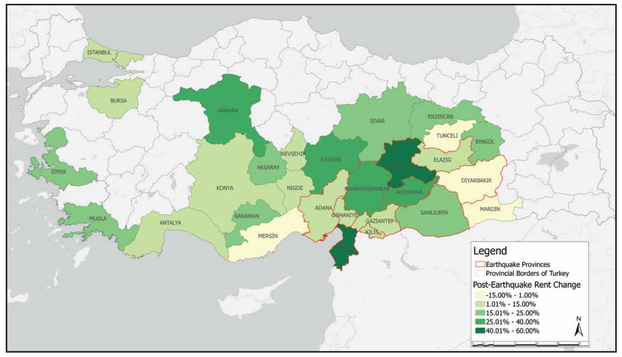
In the post-earthquake period until February 22, prices of houses for sale and rents of houses for rent increased by 14% and 17%, respectively.
In earthquake-affected provinces, the number of housing stock waiting to be sold decreased by 53% and the number of housing stock waiting to be rented decreased by 59%.

Residential Property Price and Rental Price Changes Before and After the Earthquake

	February 2023 Expected Price Change	Price Change After Earthquake	Change in Housing Stock Available for Sale	February 2023 Expected Rent Change	Post-Earthquake Rent Change	Change in Housing Stock Available for Lease
Earthquake Provinces	8%	14%	-53%	4%	17%	-59%
Surrounding Provinces	8%	7%	-8%	6%	4%	-49%
Metropolitan Cities	10%	11%	19%	9%	14%	0%

In Hatay, one of the provinces most affected by the earthquake, the stock of houses for sale fell by 85% and the stock of houses for rent fell by 93%, while prices of houses for sale increased by 16% and rents by 56%.
In Malatya, the stock of houses for sale fell by 93% and the stock of houses for rent fell by 95%, while prices of houses for sale increased by 33% and rents by 41%. (Endeksa, 2023)

Changes in Rental Value in Earthquake Affected, Surrounding and Metropolitan Cities After the Earthquake



Among the neighboring cities, Kayseri (29%) and Erzincan (24%) saw the highest post-earthquake price increases. The greatest impact of the earthquake on rental prices in metropolitan cities was seen in Ankara with a 26% increase. (Endeksa, 2023)

0.2 RESEARCH STRUCTURE

PROBLEM DEFITINION

The February 6 earthquakes affected 13.5 million people in 10 provinces. 430,529 houses in Hatay were damaged, sparking a housing crisis.
After the disaster, the remaining household population from damaged and demolished houses tried to settle in temporary living areas. Different solutions have been offered by authorized institutions, non-governmental organizations, international organizations and local organizations to meet the need for shelter, and although temporary shelter facilities have certain standards, a common standard for temporary living areas has not been developed in the field.

RESEARCH QUESTIONS

How should the design standards, site selection and management dimension of temporary living areas built after disasters be structured?
How can community resilience be enhanced in temporary living areas by using nature-based solutions?

AIM

The aim of the project is to investigate the compliance of temporary living areas developed for the shelter problem that emerged in the February 6 earthquake and to produce strategies to increase community resilience until permanent housing supply is provided with nature-based solutions.

0.3 CONCEPTUAL FRAMEWORK

COMMUNITY RESILIENCE

Community resilience is the capability to respond to expected hazards, adapt to changing situations, and endure and recover quickly from disruptions. Activities such as disaster preparedness, including prevention, protection, mitigation, response and recovery, are important steps towards resilience. (NIST,2024)

Dimensons of Community Resilience

Resilience of a community encompasses all of the resources and assets available in the community. These community dimensions are also referred to as "capitals." The concept of community capitals is grounded in community development and disaster research, and basic forms of capital available in communities include; natural, built (physical), financial (economic), human and cultural, social, and political.

Built (Physical) capital was chosen as the subject of individual study within the scope of the studio. The title Built (Physical) capital was changed to Spatial and used as a wider concept.
Spatial Capital is refers to the structures and networks of infrastructure that make up a community. In addition to residential, commercial, and industrial structures, essential response support facilities, and supporting infrastructure including electricity, transportation, bridges, roads, communication, water, and waste water are all included in this. (NAC,2019)

In the spatial dimension, the subject of the study is temporary living areas during and after the disaster based on the concept of housing.

0.4 TEMPORARY LIVING AREAS

In a disaster when houses are damaged or destroyed, the community searches for alternative shelter until they find a permanent shelter solution. There are four different stages of sheltering after a disaster.
Emergency Shelter, Temporary Shelter, Temporary Housing, Permanent Housing.

Emergency Shelter

Often used for one night to a few days during the disaster and can take the shape of a public shelter, a friend's house, or a shelter below a plastic sheet. Cause of the brief duration of the stay dont require the need for meal preparation or ongoing medical care.

Temporary Shelter

Includes shelter in the form of tents or mass shelters that are used for a few weeks after the disaster, as well as the provision of food, water and medical treatment.

Temporary Housing

Despite families still living in temporary housing, there is potential for a return to the daily activities of home life, as well as a return to employment and education. A small shanty, a prefabricated house or a rented apartment can be used.

Permanent Housing

Return to the old house after reconstruction or move to a new house where people can live permanently.

(Quarantelli, 1995 as cited Johnson, 2007)

PAST PRACTICES

The 3 past practice examples analyzed are 1999 Marmara, Turkey / 1995 Kobe, Japan and 1985 Mexico City earthquakes and temporary living space examples. The three cases experienced the earthquake disaster in urban areas.

Summary of the Earthquake, Damage and Homeless Situation of Selected Practices

Earthquake	Date	Magnitude	Housing Units Uninhabitable	Homeless	Total Population of Affected District/City/Region	Proportion of Homeless
Marmara	17 Aug. and 12 Nov. 1999	7.4; 7.2	93,618	300,000+	2.3 million in region	13%
Great Hanshin	17 Jan. 1995	7.2	247,000	316,000	3.5 million in region	9%
Mexico City	17 Sep. 1985	8.1	76,000– 180,000	30,000–200,000	3 million in district; 24 million in Mexico City	1%–6.6% in district

(Johnson, 2007)

Marmara, 1999

In 1999, two earthquakes hit eastern Turkey, leaving over 18,000 dead and 300,000 homeless. The government responded with a three-step reconstruction plan: temporary tents, prefabricated housing, and permanent housing. Over 40,000 temporary units were built by mid-2000. Homeowners moved to permanent housing in 2002, while tenants and migrants remained until the government dismantled settlements between 2003 and 2005, leaving residual infrastructure.

Great Hanshin, 1995

After disaster, Japanese prefecture built 48,300 temporary housing units for 100,000 people, facing delays due to material challenges. These 20–30m² houses were designed for communal care of elderly residents. Most were placed in suburbs or on an island, causing loneliness-related issues. The program extended to three years due to a housing shortage, with 45% still occupied. However, it faced criticism for social and economic polarization, as families had to be in temporary housing to qualify for permanent rehousing, excluding others from public support. The permanent housing model separated low-income households from more well-off ones.

Mexico City, 1985

The 1985 earthquake in Mexico City damaged public housing and tenements, prompting the formation of the National Reconstruction Commission (NRC) with World Bank support. NRC managed programs for 88,000 permanent housing units and temporary solutions. Some families relied on community groups despite formal programs. Temporary housing, including basic prefabricated units, was strategically placed in affected communities, facilitating social ties and work proximity. The NRC integrated both temporary and permanent housing, informing families of long-term plans from the start. Temporary dwellings were basic, serving as short-term solutions during permanent housing reconstruction.

Summary of the Temporary Housing Project of Selected Practices

Earthquake	Number of Units Built	Time for Construction Activities	Type	Size	Average Family Size	Cost (USD)	Lead Organisation	Strategic Planning
Marmara	40,621	8 Months	Mostly prefabs	30m²	4.6	5,000	Ministry of Public Works	For procurement
Great Hanshin	48,300	7 months	Prefabs	20-30m²	2.8	28,000	Regional (prefecture) government	For procurement
Mexico City	22,000	-	Prefabs Corugated iron	20m²	10	-	National Reconstruction Commission	None

(Johnson, 2007)

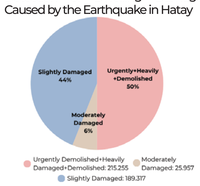
0.5 CASE OF ANTAKYA / HATAY

After the earthquakes, Hatay is the province that suffered the most damage in terms of building damage in the Earthquake Zone. According to the damage assessment conducted by the Ministry of Environment, Urbanisation and Climate Change on March 6, 430,529 dwellings in Hatay were damaged. (ÇŞİDB, 2023).

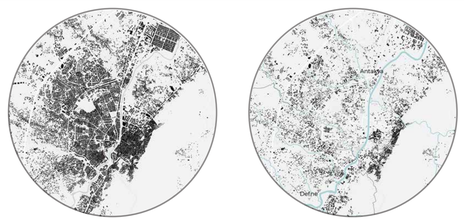
According to Bimtaş Earthquake Assessment Report, **Antakya 35.34% and Defne 12.11% are the two districts most affected by the earthquake in Hatay.**

According Bimtaş Report, 28,188 residential structures were damaged in Ankakya. (Bimtaş,2023).

Detection of Dwelling Damage Caused by the Earthquake in Hatay



Post-Earthquake Building Damage in Antakya and Defne



TEMPORARY LIVING AREAS IN ANTAKYA / HATAY

Before Earthquake

In the 2021 Hatay Provincial Disaster Risk Reduction Plan, 11 temporary shelter areas for approximately 500,000 people were identified in 8 districts, 3 of which were in Antakya, but these areas were not used for the installation of tents or containers after the disaster. In Antakya, 327,651 people were planned to be temporarily sheltered on 300 hectares, but as of 2024, there were still no temporary housing areas in the identified areas. (Bimtaş,2023)

After Earthquake

Tent Areas

After disaster, addressing the urgent need for shelter is crucial. Tents are initially preferred due to their quick setup, portability, and foldability.

Formal Tent Areas: These are organized tent zones established by official institutions in specific locations. They typically include basic necessities such as security and mobile hygiene points.
Informal Tent Areas: These are disorganized and individually set up tent areas where at least 5 tent units are grouped together on a local scale. Basic needs areas may not be present in these informal setups.

Tent Areas and Population in Antakya and Defne

Temporary Living Areas	Number of Tent Areas	Number of Tents	Estimated Population
Formal	16	1.788	6.135
Informal	71	2.259	7.974
Sum	87	3.997	14.109

Container Areas

Temporary housing in combination of tents and container units during the initial months following a disaster, with the tents being taken down and the containers being positioned in their place.

Container Areas and Population Antakya & Defne

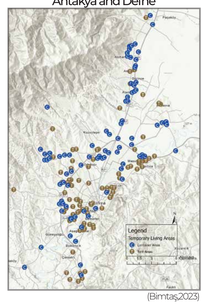
Temporary Living Areas	Number of Container Areas	Number of Container	Estimated Population
Formal	84	21.578	76.170
Informal	14	204	720
Sum	98	21.782	76.890

Eleven months after the earthquake, residents continue to face challenges in both tent and container areas

Problems

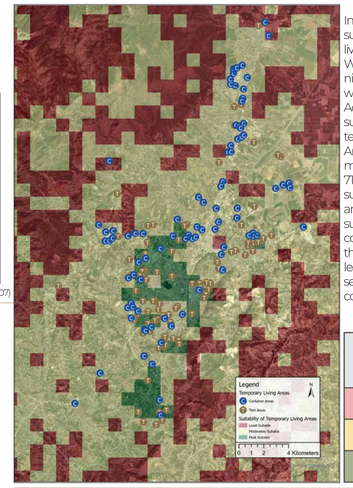
- Failure to meet AFAD standards.
- Insufficient WASH infrastructure.
- Tents and container lacking weatherproofing.
- Prolonged residence in tents.
- Inadequate social facilities.
- Security concerns.
- Proximity to demolition areas.
- Insufficient services for vulnerable groups.

Temporary Living Areas Antakya and Defne



(Bimtaş,2023)

Temporary Living Areas Location Selection Suitability Analysis Antakya & Defne



In the location selection suitability analysis of temporary living areas prepared with the Weighted Overlay method, nine different criteria and weights were calculated.
According to the site selection suitability analysis, 25.40% of the temporary living areas in Antakya and Defne were in the most suitable area category. 71.35% were in moderately suitable areas. 57.47% of the tent areas were located in the most suitable areas and 11.22% of the container areas were located in the most suitable areas.In the least unsuitable areas for site selection, there are 1 tent and 5 container areas.

Criteria	Weightage (%)	Parameter Range	Ranking
Distance to Streams (m)	14	500	1
		250	2
		750	3
		1000	4
		1500	5
		1500+	6
Slope (%)	14	0-5	1
		5-10	2
		10-15	3
		15-20	4
		20+	5
Temperature (C)	14	<11	1
		11-13	2
		13-15	3
		15-17	4
		17+	5
Distance to Debris During Disaster (m)	13	500	1
		1000	2
		1500	3
		2000	4
		2000+	5
Distance to Transportation Network (m)	13	50	1
		250	4
		500	5
		750	2
		1000	3
Distance to Health Facilities (m)	9	500	1
		1000	2
		2000	3
		3000	4
		3000+	5
Distance to Social Facilities (m)	5	500	1
		1000	2
		2000	3
		3000	4
		3000+	5
Distance to Education Facilities (m)	9	500	1
		750	2
		1000	3
		2500	4
		2500+	5
Distance to temporary Markets (m)	9	100	5
		250	4
		500	3
		1000	2
		2000+	1

Suitabilty of Temporary Living Areas	Tent Areas	Container Areas
Least Suitable	1	5
Moderately Suitable	50	82
Most Suitable	36	11

OUTCOMES & POLICIES

Nature Based Solutions

Nature-based solutions harness nature's processes to address environmental, social, and economic challenges sustainably. Rooted in the recognition of ecological limitations, these solutions promote community resilience by drawing inspiration from nature's design and processes. They aim to enhance natural capital, reduce disaster risk, and improve well-being, offering positive responses to societal challenges while meeting environmental, social, and economic objectives. (EC, 2015).

Target 1: **Sustainable & Safe Shelter/Living Areas Solutions**
Objective: Providing safe and resilient temporary shelters for disaster-affected communities.
Strategy 1.1: Pre-approved site selection, concept plans and designs of shelter units that are resistant to earthquakes and secondary disasters, comply with the standards set by AFAD and Professional Chambers, and appeal to different social groups will be developed and implemented.
Strategy 1.2: Support community cooperation to hasten the establishment of shelter units, commercial spaces, green areas and social facilities in temporary living spaces and involve the community in the production process.

Strategy 1.3: Natural materials will be integrated for resilience, shelters will be designed with natural ventilation and lighting to reduce energy use, and natural shading and insulation will be used for thermal comfort.

Target 2: **Healthy and Well-Being Community**
Objective: Ensuring health services and well-being in temporary living areas.
Strategy 2.1: Temporary clinics will be set up in the temporary living spaces to meet medical needs and regularly check mental and physiological health.
Strategy 2.2: Community gardens and green spaces with natural elements will be designed to improve mental and physical health.

Target 3: **Livelihood Recovery and Economic Resilience**
Objective: Supporting the recovery of local economies and livelihoods damaged and stalled by the earthquake.
Strategy 3.1: Enterprises in environmentally friendly sectors aligned with nature-based solutions will be supported and vocational training and skills development programs will be provided to increase employment and ensure economic resilience.

Target 4: **Infrastructure Rehabilitation & WASH**
Objective: Provision of critical infrastructure systems and clean water and sanitation infrastructure for temporary living areas.
Strategy 4.1: Sustainable and environmentally friendly ecological infrastructure solutions such as green roofs, permeable pavements and natural drainage systems will be installed to minimize environmental impact.

Strategy 4.2: WASH infrastructure will be established and public health trainings will be provided to ensure public health and prevent infectious diseases.

Target 5: **Social Cohesion & Governance**
Objective: Strengthening social networks and relationships to create social capital and actively participate in rebuilding processes.
Strategy 5.1: Information will be shared through regular meetings and feedback from individuals in the community.
Strategy 5.2: Sense of collective responsibility will be developed by enabling people to take an active role in local environmental initiatives.

Objective: Ensuring governance by cooperating between local government, NCOs and the community.
Strategy 5.3: Participation of local communities in decision-making processes will be ensured and the establishment of community-based governance structures will be supported to create a participatory environment.
Strategy 5.4: Stakeholder meetings will be organized at regularly scheduled intervals to ensure coordination between institutions and facilitate communication channels.

References
BIMTAŞ, (2023). Kahramanmaraş Depremi Tespit ve Değerlendirme Raporu. İBB / 6 Şubat'taki depremlerde can kaybı 50 bin 500'e yükseldi - BBC News Türkçe. (2023, April 14). BBC News Türkçe. / Endeksa. endeksa.com/tr/2023 / National Academies of Sciences, Engineering, and Medicine 2019. Building and Measuring Community Resilience: Actions for Communities and the Gulf Research Program. Washington, DC: The National Academies Press / Community resilience | NIST. (2024, January 4). NIST. / Johnson C. (2007). Strategic planning for post-disaster temporary housing. Disasters, 31(4), 435–458.
European Commission, Directorate-General for Research and Innovation, Towards an EU research and innovation policy agenda for nature-based solutions & re-naturing cities – Final report of the Horizon 2020 expert group on 'Nature-based solutions and re-naturing cities' – (full version), Publications Office, 2015,