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## Spatial evaluations of İzmir Uzundere neighborhood urban regeneration project

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### Abstract

Population growth in our country, which started in the 1950s and increased due to migration from the village to the city, caused irregular construction, reduction of green areas and pollution. Urban regeneration practice (which can be defined as rehabilitation of some parts of the city, reuse of abandoned areas, improvement of damaged urban areas and interventions to increase the quality of social and cultural life) is an important tool that can be used to create sustainable cities. In this study, It is aimed to determine the benefit of the urban regeneration project and thus to determine whether the urban regeneration project to be implemented contributes to sustainable urbanization in example of “The urban renovation project of İzmir Metropolitan Municipality located in Uzundere Neighborhood of Karabağlar” by remote sensing methods and spatial analysis of zoning plan layouts, measuring land use decisions, the amount of green areas per capita, the change in , CO<sub>2</sub> gas retention.

**Keywords:** Urban Regeneration; Sustainability; Sustainable Urbanization; Carbon holding capacity; Uzundere Urban Regeneration Project

### 1. Introduction

During the period from the 1950s to the present, our country has entered a rapid urbanization process due to the increasing migration and hence population growth. [1]. In recent years, urban Regeneration practices have a great effect on the spatial changes of cities in our country. Urban Regeneration projects organized and planned to be carried out in our country aim to regenerate slum areas with central business areas and protect the 1st and 2nd degree areas to be protected in line with relevant laws and regulations. [2]. Urban Regeneration is also defined as the change of quality or structural change in the whole city or in a special part of the city through the implementation of urban Regeneration projects and strategic plans planned for the city. Thus, a holistic socio-economic, cultural and political Regeneration is aimed in the area to be regenerate, together with both physical and social Regeneration. [3]. When the urban Regeneration projects implemented in our country in line with the relevant laws and regulations are examined, it is understood that there are many and diverse urban Regeneration projects such as urban Regeneration caused by natural disasters, Regeneration of slum areas, Regeneration of [2]. In short; urban Regeneration is considered as a planning tool aimed at increasing the quality of urban life by reducing disaster losses and urban risks of urban areas [4].

Urban Regeneration is extremely important and useful to ensure the security of life and property against a possible natural disaster risk, to increase the living standards and welfare level of the people, to obtain value increase in the real estate sector with regular residential areas, to improve infrastructure services, to make necessary arrangements for wide streets, streets, parking areas, children, elderly and disabled people, to create socially adequate living spaces such as parks and educational facilities [5]. However, not every city in our country has the same urban Regeneration problems. Each city has its own unique problems and available resources to solve these problems. It is imperative that urban Regeneration strategies and policies are identified and associated with these resources. Urban Regeneration

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should not start with demolition and construction, but should start with Regeneration programs for social and economic development, projects that will integrate people from all walks of life in line with the common needs and living standards of city residents [6]. In this study, urban Regeneration studies projected by İzmir Metropolitan Municipality, in the Uzundere Neighborhood of İzmir province, Karabağlar Neighborhood, which suffers from the problems brought about by distorted urbanization, will be examined with a critical perspective. In the study, firstly, the zoning plan sheets of the urban Regeneration project and the zoning plan sheets that were in force before the project were examined and land use changes were determined. Then the change in the total amount of green areas and the amount of green areas per person was examined with the zoning plan change, and finally, how much CO<sub>2</sub> retention increased with the green areas brought into the area by the project is calculated. Thus, it has been discussed whether a more sustainable urban part has been created with the Uzundere Urban Regeneration Project.

## 2. Material and methods

### 2.1. Material

İzmir is one of the cities where slums and illegal construction are intense. Approximately 50% of the residential areas in the city center are slum areas or unqualified areas that have become legitimate as a result of zoning amnesties. In order to make the buildings in these regions safe and to make the neighborhoods healthier where these structures are concentrated; 14 regions have been identified as the Central Urban-Urban Renewal-Rehabilitation program areas in the 1/25000 scale İzmir Urban Zone Master Plan [7].

The main material of this study is the Urban Regeneration Area of Uzundere Neighborhood of Karabağlar Neighborhood, which is one of the urban regeneration regions determined within the scope of the Urban Renewal-Rehabilitation program of İzmir (Figure 1).



**Figure 1** Uzundere Urban Regeneration Area (Google earth)

According to the information received from İzmir Municipality Urban Regeneration 3. Application Unit; Uzundere Neighborhood Urban Renewal Project covers 497 buildings in 32 hectares. The total population living in the project area before the implementation of the urban regeneration project is 1440 people.

The site plan of the Uzundere Neighborhood before the urban transformation project is shown in Figure 2.



**Figure 2** The site plan of the Uzundere Neighborhood before the Urban Transformation Project

The site plan of Uzundere Neighborhood Urban Transformation Project is given in Figure 3.



**Figure 3** The site plan of Uzundere District Urban Transformation Project

According to the information received from İzmir Metropolitan Municipality Urban Regeneration 3. Application Unit; when all stages of the project are completed, according to the zoning plan; approximately 550.000 m<sup>2</sup> construction area, 84 blocks, 3210 residences and 206 commercial areas, in the conditional area; 31 commercial areas, 78 offices and 120 rooms hotels, in the social area; there will be a kindergarten, library, social center, open market area, youth and sports center (Table 1).

**Table 1** Uzundere Urban Regeneration Project Units

<b>Uzundere Urban Regeneration Project</b>									
Housing Area	Zoned	Number of Buildings	of	Number of Houses	of	Number of Commercial Areas	of	Number of Offices	Number of Hotels
		84		3210		206		-	-
Conditional area		-		-		31		78	1(120 rooms)
Total:		84		3210		237		78	1
Social Centers	kindergarten, library, social center, open market area, youth and sports center								

## 2.2. Methods

The study consists of three stages. In the first stage of the study, previously conducted scientific studies on the subject were examined. Spatial impact criteria are determined, which evaluate the success of urban regeneration projects. These criteria are;

- Change in land use types,
- Change in the amount of green areas per person,
- Carbon holding capacity change.

In the second stage of the study; The projected effects of the Uzundere urban regeneration project have been calculated according to the above mentioned criteria.

### 2.2.1. Change in Land Use Types

The effects of change of any land use type in the urban context have been widely discussed and demonstrated in urban studies such as urban planning, transportation, public health and urban economy [8]. According to the studies conducted in recent years; land use type diversity; turned out to be an effective factor in reducing vehicle use, increasing public health and quality of life at the neighborhood level [9]. According to Blighted; The main purpose of increasing diversity in land use types in cities creates cities with better urban environmental conditions and high sustainability [9].

In this study; The land use types and quantities that will occur as a result of the Uzundere Urban Regeneration Project are taken from the Izmir Municipality Urban Regeneration 3rd Implementation Unit. Before the urban regeneration project, land use types and quantities were calculated using satellite photography with the aid of GIS techniques. The borders of Uzundere Neighborhood are drawn with the help of Google Earth Pro and saved in kml. format. Likewise, the satellite image of Uzundere neighborhood dated 6/17/2011 is jpeg from Google Earth. The format has been downloaded uncoordinated. It was transformed into Afine to coordinate the downloaded satellite image. [10]. WGS 84 (World Geodetic System) reference system has been defined for satellite images. The satellite image of the WGS 84 reference system was cut based on the project boundaries. Controlled classification process via cut satellite image has been done by using ArcGIS program with maximum likelihood classifier method. [11]. Five fundamental different classes were used in the classification. These are respectively;

- Residential area,
- Social Facility area,
- Transportation area,
- Industrial area,
- Idle area.

The amount of classified areas has been determined as m<sup>2</sup>.

### 2.2.2. Change in the Amount of Green Areas Per Person

Green areas play an effective role against global climate change by helping to increase the amount of oxygen in the atmosphere. Especially the green areas in the city are important areas in terms of ecological and biological sustainable and livable city formation. [12] According to the land use change calculations, the amount of green areas before and after the urban regeneration project were compared and the change in the amount of green areas per person (AGAPP) for the region was evaluated as follows.

$$AGAPP = \frac{AGA_0}{P_0} - \frac{AGA_1}{P_1}$$

In the above formula; The green area before the urban regeneration project is shown as AGA<sub>0</sub>, the population before the urban regeneration project is shown as P<sub>0</sub>. The green area after the urban regeneration project is shown as AGA<sub>1</sub> and population after the urban regeneration project is shown as P<sub>1</sub>.

### 2.2.3. Carbon Holding Capacity Change

Retention of carbon gas varies according to the characteristics of trees such as species, age and peak diameter. Many different studies have been done on this subject and the method has been developed. One of these methods is the

method developed by Fleming (1988) to estimate the annual carbon holding capacity of trees of different sizes and varieties. [13]. This method uses the following formula:

$$\text{Annual CO}_2 \text{ Gas Retention Amount (ha)} = 8.275 \times 10^{-3} \times \% \text{ Afforested Field}$$

In this study; according to the above formula, the carbon holding capacity change before and after the urban regeneration project was calculated.

At the conclusion stage of the study; with the help of Uzundere urban regeneration project 6/17/2011 satellite image and the information received from the Izmir Metropolitan Municipality Urban Regeneration 3rd Implementation Unit, the change in the land use types predicted before and after the project, change in the amount of green areas per person and carbon holding capacity change was calculated and the success of the Uzundere urban regeneration project based on these criteria.

### 3. Results and discussion

#### 3.1. Land Use Type Change in Uzundere Urban Regeneration Project

In order to calculate the land use type change before the urban regeneration project of Uzundere Neighborhood, the controlled classification method was used with the help of the ArGIS program using the satellite image dated 6/17/2011 (Figure 5).



**Figure 5** Uzundere Urban Regeneration Project Land Use Classification

As a result of the classification process made on the satellite images of Uzundere Neighborhood on 6/17/2011; the residential area has been determined as 40.044 m<sup>2</sup>. Social facilities are; recreation, green area, park 70.009 m<sup>2</sup>; municipal service area, open market place religious facility is 22.051 m<sup>2</sup>. Road, parking area 83.633 m<sup>2</sup>; industry, warehouse areas 33.003 m<sup>2</sup>; the idle area has been calculated as 78,625 m<sup>2</sup> (Table 2).

**Table 2** Land use distribution before Uzundere Neighborhood Urban Regeneration Project

Land use type	Land use subtype	Before Urban Regeneration Project
Residential Area	-	40.044 m <sup>2</sup>
Social Facilities	Recreation, green area, park	70.009 m <sup>2</sup>
	Municipal service area, open market place religious facility	22.051 m <sup>2</sup>
Transportations	Road, parking area	83.633 m <sup>2</sup>
Industrail Area	Industry, warehouse areas	33.003 m <sup>2</sup>
Idle Area	-	78.625 m <sup>2</sup>

According to the information obtained from İzmir Municipality Urban Transformation 3. Application Unit, the land use distribution of Uzundere Urban Regeneration Project; the residential area is 159.223 m<sup>2</sup>; recreation, green area, park 70.964 m<sup>2</sup>; municipal service area, open market place religious facility 11.281 m<sup>2</sup>; road, parking area is 85.898 m<sup>2</sup> (Table 3).

**Table 3** Land use distribution according to Uzundere Neighborhood Urban Regeneration Project

Land use type	After Urban Regeneration Project
Residential Area	159.223 m <sup>2</sup>
Recreation, green area, park	70.964 m <sup>2</sup>
Municipal service area, open market place religious facility	11.281 m <sup>2</sup>
Road, parking area	85.898 m <sup>2</sup>

When Uzundere Urban Regeneration Project is evaluated according to the land use type change; it is seen that the housing area in the project increased by 119.179 m<sup>2</sup>, while recreation, green area and parking areas increased by 955 m<sup>2</sup>. Municipal service area, open market place and religious facility areas in the region decreased by 10,770 m<sup>2</sup>, while road and parking areas increased by 2,265 m<sup>2</sup>. The industry, warehouse and idle areas in Uzundere Neighborhood before the project were eliminated with the urban regeneration project. In the project, 237 commercial houses, 78 offices, 120-room hotel, library, open market place, youth center and sports complex are planned to be built. It is estimated that the effects of increasing the usage types will positively affect the social and economic life of the people living in the region. When the area change in the region is interpreted, the increase in the residential areas is remarkable. Industry, warehouse, idle areas have completely disappeared, municipal service area, open market place and religious facility areas have decreased. It is thought that these areas are mostly used as road parking areas.

### 3.2. Green Area Change in Uzundere Urban Regeneration Project

In order to calculate the amount of green area per person, firstly, the population change for the area was calculated. As mentioned in the Material Section, the total population living in the urban regeneration project area in Uzundere Neighborhood before the project is 1440 people. As a result of the project, the total number of households is planned to be 3210. However, according to TÜİK 2018 data, the average household size of İzmir Province is 2.98 people. Accordingly, it is estimated that the total population of the area will be 9570 after the project is realized (Table 4).

**Table 4** Population of Uzundere Neighborhood Before and After Urban Regeneration Project

Population of Uzundere Neighborhood (person)	
Before URP	1.440
After URP	9.570

According to the Spatial Plans Construction Regulation Annex 2 Table, 10 m<sup>2</sup> green area should be reserved per person. Taking this standard into consideration, the amount of green areas per person before and after the Uzundere Urban Regeneration Project in Table 5 and the amount of green areas that should be according to MPYY were calculated.

**Table 5** The amount of green areas per person before and after the Uzundere Urban Regeneration Project

Population Before URP	1440
Population After URP	9570
Green Area Before URP (m <sup>2</sup> )	70.009
Green areas per person before URP (m <sup>2</sup> )	48,6
Green Area That Must Be According to the Regulation after URP (m <sup>2</sup> )	95700
Green Area After URP (m <sup>2</sup> )	70.964
Green areas per person after URP (m <sup>2</sup> )	7,41

Although the total amount of green area in the project has increased, the population to live in the area has been increased by 8130 people, and the amount of green area per person has been reduced from 48.6 m<sup>2</sup> to 7.41 m<sup>2</sup>. This situation causes the contribution of the change to sustainability to be questioned. An important success of urban regeneration projects is to benefit the city ecosystem and increase the amount of green space. According to the results obtained, Uzundere Urban Regeneration Project is not considered to be successful in this regard. It is estimated that the amount of open green areas could not increase sufficiently due to the high number of open parking areas in the project. In urban regeneration projects, applications such as underground parking lots, building roof gardens on buildings to increase the amount of open green space are some of the alternative design decisions that increase the amount of green space. Uzundere Urban Regeneration Project remains weak in this regard.

### 3.3. Carbon Retention Capacity Change in Uzundere Urban Regeneration Project

Carbon retention capacity before and after Uzundere Neighborhood Urban Regeneration Project is shown in Table 6.

**Table 6** Carbon Retention Capacity Change Before and After the Urban Regeneration Project

Carbon Retention Capacity Change	
Before the Urban Regeneration Project	8275 x 10 <sup>-3</sup> x %21,3 (ha)
After the Urban Regeneration Project	8275 x 10 <sup>-3</sup> x %21,7 (ha)

The carbon holding capacity change in the project was calculated as 3.31 (ha). Since this change is directly related to the amount of green space in the project, it is considered to be an insufficient increase.

## 4. Conclusion

Urban regeneration projects aim to solve these problems and increase the social and environmental life quality of the people living in the region, in areas that have become urban slum physically and socially.

This work, underlines that urban transformation projects should have a positive impact on urbanization. In addition, It has the potential to create an infrastructure for future studies on this subject.

In this study, it is evaluated whether the Urban Regeneration Project of Uzundere Neighborhood in Karabağlar/ İzmir (which is the main material of the study), has reached the target according to the determined indicators.

In the light of the data obtained from the analyzes, Uzundere Urban Regeneration Project; although it is thought that it will provide social-cultural and economic benefits to the people living in the region, and thus to the city, due to the planned social facilities and commercial areas, it is not thought to have the positive impact expected from the urban regeneration projects environmentally and ecologically.

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

The authors do not disclose any conflict of interest.

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