Chapter

An Urban Paradox: Urban Resilience or Human Needs

Nilüfer Kart Aktaş and Nazlı Yıldız Dönmez

Abstract

Nowadays, metropolitan cities experience increasingly environmental problems as well as migration and urbanization pressure. As climate change, earthquake, flood, aridity and the last worldwide pandemic showed how cities are unprepared for these disasters. The ability of cities to cope with these disasters and survive depends on the existence and level of the city's resilience to these disasters. Also, the change and transformation of social structure effects the process of adaptation. Generally, urban citizens with economic power who have to live in crowded cities have created their own living areas in the periphery of cities with the desire to live away from the city and in nature. The population increasing every day due to migration from the city centers, attractiveness of natural life lead to urbanization of natural areas as well as the transformation of landscapes. The aim of this study is to measure the urbanization pressure, which is one of the important factors of landscape changes and to determine the results of the pressure for the important areas for resilience. In the scope this, it is detected the pressure of urbanization on the area and examined the landscape changes between the years of 2000-2020 in Istanbul/Zekeriyakoy. Zekeriyakoy, when it was a village until the 1980s, has been in the process of a radical change especially since 1987 and it has become an important center of attraction especially after the Marmara Earthquake in 1999. Corine Land cover and Google satellite data have been used to detect changes in the research. The main outcome of this study is; the district, which was dominated by agriculture and forest areas until the early 1990s, is now under intense pressure to settle and if the transformation occurs at the same speed, especially agricultural areas will almost disappear. This study is important in terms of how the field has changed in the years and the problems that this change will cause for the future. In this context it can be said that the change, transformation and adaptation expected to occur with the concept of urban resilience cannot be considered separate from human and human welfare.

Keywords: urban resilience, urban change, social change, spatial analysis

1. Introduction

Landscapes have affected by climate changes, land use changes and human-based complexities; and the mosaic structure within the landscape can change. All these changes can occured in different spatial dimensions and frequencies [1]. Changes in land use patterns play an important role especially in the growth of urban areas and in the transformation of land use patterns in rural or urban areas. In addition, important ecosystems such as agricultural areas, forests, coastal

dunes and wetlands are the first and most adversely affected by this change [2–5]. However, these ecosystems are the most important areas that ensure the life cycle of cities and the resilience of cities.

Within used to create resistance against disaster such as flood, climate change and etc., the concept of resilience takes on the meanings of adaptation, change and transformation when it is used in relation to many different problems in the urban area.

UNISDR (2009) defines resilience as: "The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions [6]."

Urban resilience consists on the capacity of a city and its urban systems to absorb the first damages, reduce the impacts arising from. Also, urban resilience, considering all kinds of disasters and disruptions in the systems of a city, is important to make communities more resilient when facing extreme events [7].

Urban resilience refers to the ability of an urban system-and all its constituent socio-ecological and socio-technical networks acrosstemporal and spatial scales-to maintain or rapidly return to desiredfunctions in the face of a disturbance, to adapt to change, and toquickly transform systems that limit current or future adaptivecapacity In this definition, urban resilience is dynamic and offers multiple pathways to resilience (e.g., persistence, transition, and trans-formation). It recognizes the importance of temporal scale, and advocates general adaptability rather than specific adaptedness. The urban system is conceptualized as complex and adaptive, andit is composed of socio-ecological and socio-technical networks that extend across multiple spatial scales [8]. As the concept of life has rich connotations and denotations that involve social, economic and ecological dimensions, along with multilevel interactions between human beings and the environment, the contradiction between supply and demand in daily life, as a collection of multiple pressures and even risks of socio-ecological systems, is an urgent problem of urban resilience [9].

Resilience in terms of cities generally refers to the ability to absorb, adapt and respond to changes in an urban system [10].

Urban systems' are conceptualized as complex, adaptive, emergent ecosystems composed of four subsystems; governance networks, networked material and energy flows, urban infrastructure and form, and socioeconomic dynamics that themselves are multi-scalar, networked and often strongly coupled [8].

The main common point of these definitions is that resilience is a way to improve a strategy/behavior to be able to survive and to adapt against external shifts/impacts. Basically, to construct resilience, the main ingredients are: resource, latitude (redundancy), networks (social and institutional), information, experience, knowledge, diversity and robustness [11].

With the concept of urban resilience, instead of returning to a stable balance point again, it would be more appropriate to talk about a new structure that understands and adapts to the change and transformation that occurs with different effects. In addition to the built environment, the harmony, learning, change and transformation of social structures stand out according to urban problems.

Resilience is not a characteristic that is evenly spread through the urban population. It depends crucially on the socially differentiated capacities of different groups and individuals. Poverty, gender, ethnicity and age have all been documented as contributing to differential vulnerability of social groups in cities to hazards like climate change, earthquake, flood, aridity, through features such as the quality of housing, location and access to services or social networks [12–15].

According to Biggs et al. [19], resilience as the capacity of a social-ecological system to sustain human well-being in the face of change, by persisting and adapting or transforming in response to change. A central challenge in this context is the capacity of social-ecological systems to continue providing key ecosystem services that underpin human well-being in the face of unexpected shocks as well as gradual, ongoing change [16–19].

The science of resilience helps deal with the uncertainties that arise from changes in land cover involving the interactions between environmental, social, and economic ecosystems within a city [20, 21].

In this context, it can be said that the change, transformation and adaptation expected to be achieved with the concept of urban resilience cannot be considered separate from human and human welfare. Although the human beings make the policies and their implementations to ensure urban resilience, the human causes the cities to be in this situation despite these policies. Then it is possible to ask the questions "resilience for whom?" and resillence or human needs.

2. Material and method

2.1 Material

2.1.1 Location of research area

The research area is located within the borders of Sarıyer in Istanbul. Zekeriyaköy, one of the oldest villages of Sarıyer is close to Maden, Bahçeköy, Uskumruköy, Demirciköy and Rumeli Feneri.

1.5% of the Zekeriyaköy-Uskumruköy Region is in the first degree archeological site, 5% is in the second degree archeological site and 93.5% is in the third archeological site.

Zekeriyaköy-Uskumruköy settlements are located in the north of the Istanbul and should be protected with their existing natural values. The region is in the interaction of forest and Bosphorus back view and it has a special position in terms of uses around it (**Figure 1**) [22].

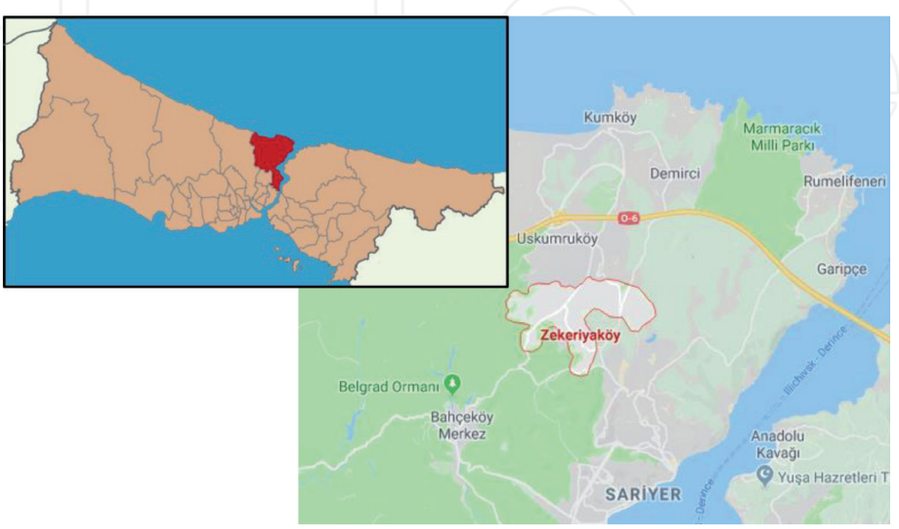

Figure 1.
Location of Zekeriyaköy [23, 24].

2.1.2 Demographic structure

According to the 2019 Address Based Population Registration System (ABPRS) data, the population of Sarıyer District is 342,503 (https://www.nufusu.com/ilce/sariyer_istanbul-nufusu). Zekeriyaköy, which was a forest village until 2012, has started to be a neighborhood. The population in Zekeriyaköy is 18.707 in 2018 [25] (**Table 1**).

There is a rapid increase in the population development of the settlements in the adjacent area of Sarıyer District between 1995 and 1997 and 1997-2000 (**Figure 2**). Especially after the earthquake of 17 August 1999 (due to the solid ground of the settlement, infrastructure and ease of transportation), it has been used as the first residential area by the upper income group.

2.1.3 Socio-cultural structure

As a result of the great wave of immigration caused by the war during the 93 War, several families from Caucasus and Crimea were settled in Zekeriyaköy. In addition to this, migrations have been received from the Black Sea Region [26].

Until the 1980s, it looked like a village and recreation area consisting of 70 houses with 2 floors and a garden but especially since 1987, it has gone through a period of radical change. While Zekeriyakoy began to change rapidly since the 1990s, it became an important center of attraction as a result of the solid ground of the Sarıyer region and the naturalness of the village, especially after the Marmara Earthquake of 1999. The area has turned into a region close to the city center because of the high income group who prefer a quiet environment and expensive villas [22].

In Zekeriyakoy, old residents and new comers live together. These different groups create a multicultural but less interactive social structure. New arrivals in the region are representatives of a different culture with their educational level, professional and economic accumulation, while the inhabitants of the old villages are people engaged in animal husbandry and agriculture, producing according to feudal society characteristics [27].

2.2 Method

In this study, it is aimed to reveal the landscape changes between 2000 and 2019 in Zekeriyakoy. Corine Land cover and Google satellite data have been used to detect changes in the research. Using the Quantum GIS program for transportation lines, the transportation routes have been taken from the data provided by Open Street Map and transferred to ArcGIS environment.

Corine Land Cover data have been used to determine the land changes for the years 2000 - 2006 – 2012 – 2018 and 2019. Corine (Coordination of Information on the Environment) is the land cover/use data generated by computer aided visual interpretation method based on satellite imagery according to the Land Cover/Use Classification set by the European Environment Agency. In the Corine Land Cover, the artificial zones are classified as urban spot areas in the study under the categories 111 and 112 under the urban structure classification and the construction sites under code 133 under the artificial sites. The areas coded with 211 and 222 in the agricultural areas in the section of Corine land cover have been classified as agricultural areas within the scope of the study and the areas coded with 311, 312, 333 in the forest and semi-natural areas have been classified as forest areas. In 2015, Google satellite photo ArcGIS 10 program coordinates the agricultural areas, forest areas and urban stain areas manually. The maps obtained between 2000 and 2019 have overlapped and Spatial Difference and Spatial Intersection analyzes have been performed in GIS environment and physical changes of landscapes have

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Year	2000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Population	7323	8230	11,279	12,528	13,817	14,755	15,750	16,524	17,581	18,457	18,833	18,867	18,707	19,896

Table 1.
Zekeriyaköy Population for the last 19 years.

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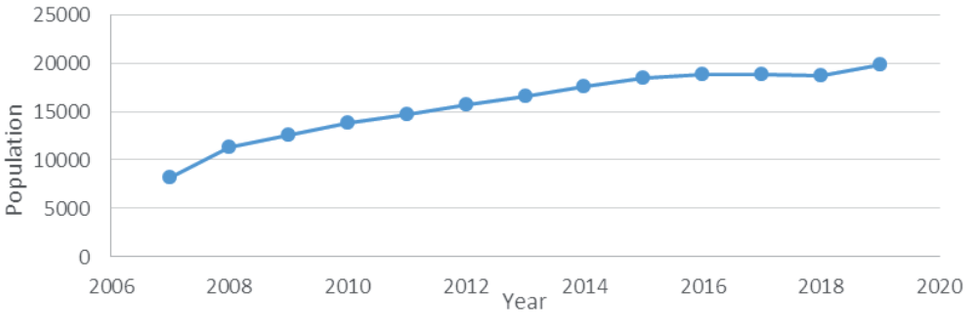

Figure 2.
Population of Zekeriyaköy by Years.

been determined quantitatively and graphs have been created. Density analysis was performed by determining the density of the buildings according to years with the Spatial Analysis Tools - Kender Density in the ARCGIS program.

3. Findings

Within the scope of this study, the land use data for Zekeriyaköy for the years 2000-2019 have been generated. In this study conducted to determine the changes between 2000, 2006, 2012, 2018 and 2019, it is seen that forest areas occupy the largest area.

According to the study in 2000, urban stain areas are 330.6 ha, agricultural areas are 161.4 ha and forest areas are 587.6 ha (**Figures 3** and **4**). According to this, forest areas constitute the highest area with 54% in the spatial distribution, while urban areas constitute 31% and agricultural areas constitute 15% (**Figure 4**).

According to the study in 2006, forest areas are 558.4 ha, urban strain areas are 378.1 ha and agricultural areas are 143.1 ha (**Figures 5** and **6**). According to this, forest areas constitute the highest area with 52% in the spatial distribution, while urban areas constitute 35% and agricultural areas constitute 13%.

According to the study in 2012, urban areas are 423.4 ha, agricultural areas are 97.7 ha and forest areas are 558.5 ha (**Figures 7** and **8**).

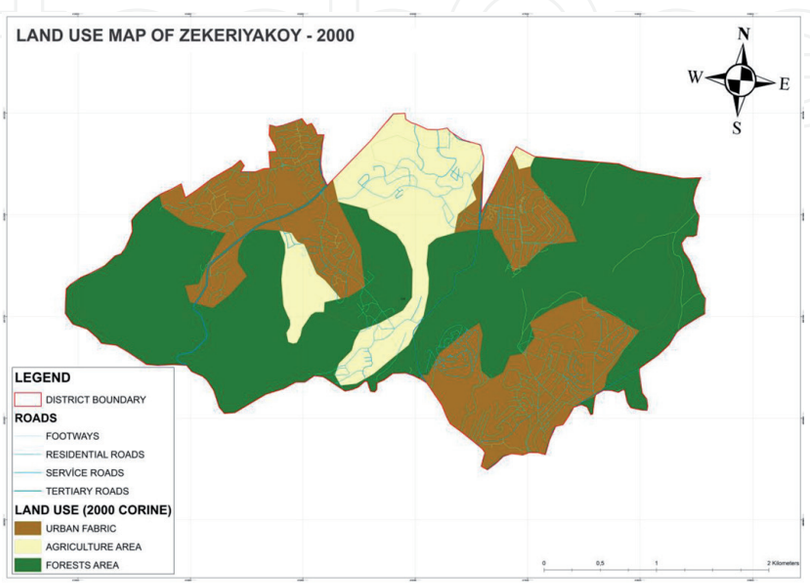

Figure 3.
Land use map in 2000.

According to this, forest areas constitute the highest area with 52% in the spatial distribution, while urban areas constitute 39% and agricultural areas constitute 9%.

According to study in 2018, urban areas are 456 ha, agricultural areas are 97.7 have forest areas are 525.9 ha (**Figures 9** and **10**). According to this, forest areas constitute the highest area with %48,7 in the spatial distribution, while urban areas constitute % 42,23 and agricultural areas constitute %9,05.

According to the study in 2019, urban areas are 478.1 ha, agricultural areas are 72 ha and forest areas are 529.5 ha (**Figures 11** and **12**).

According to this, forest areas constitute the highest area with 49% in the spatial distribution, while urban areas constitute 44% and agricultural areas constitute 7%.

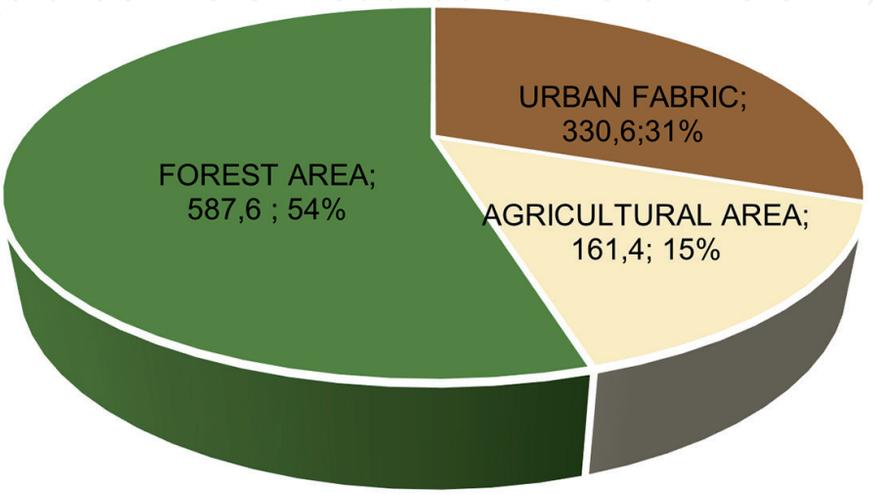

Figure 4.
Distribution of land use in 2000.

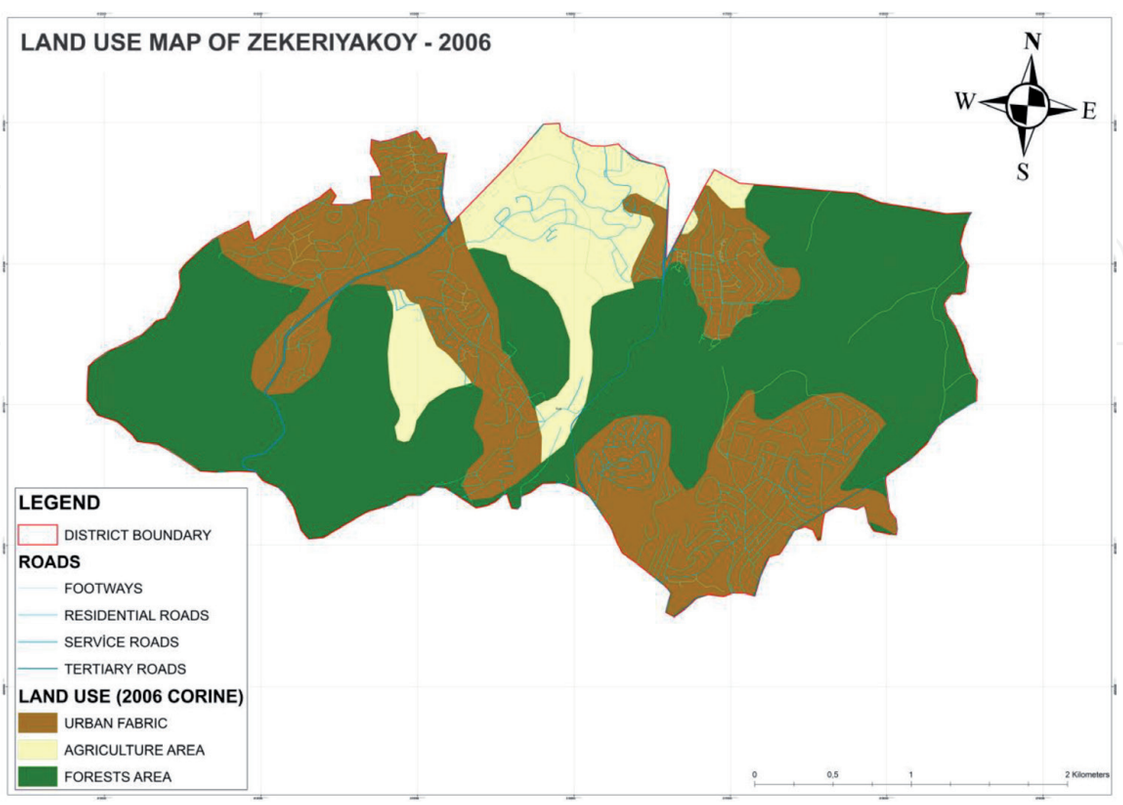

Figure 5.
Land use map in 2006.

4. Conclusion

The changes and regional spreads over the years enable projections about the future of that region. Analyzing, understanding and managing the changes both physical and social are necessary in order to protect and ensure the continuity of areas such as wetlands, agricultural areas, forest areas that have special importance in ensuring urban resilience.

Determination of landscape change, it provides the relationship between landscape structure and process. Any change that will occur will affect the landscape structure and will lead to changes in living environments and to a large extent shrink.

Zekeriyakoy, when it was a village until the 1980s, has been in the process of a radical change especially since 1987 and it has become an important center of

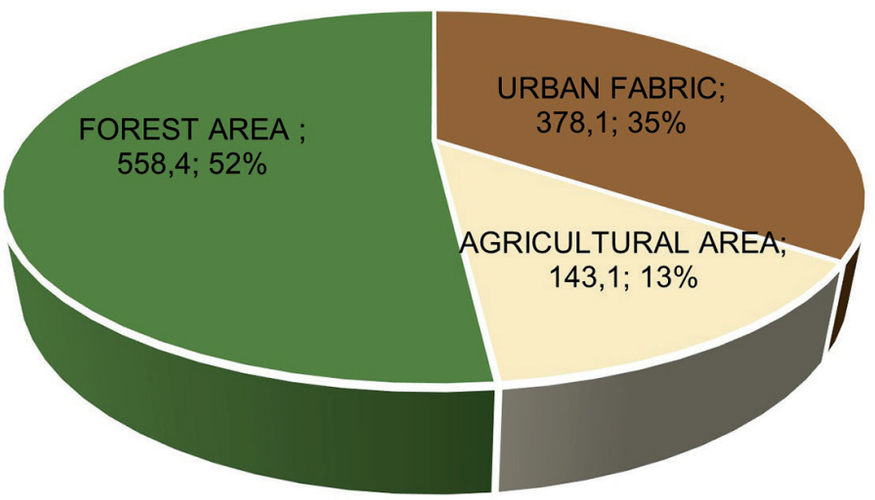

Figure 6.
Distribution of land use in 2006.

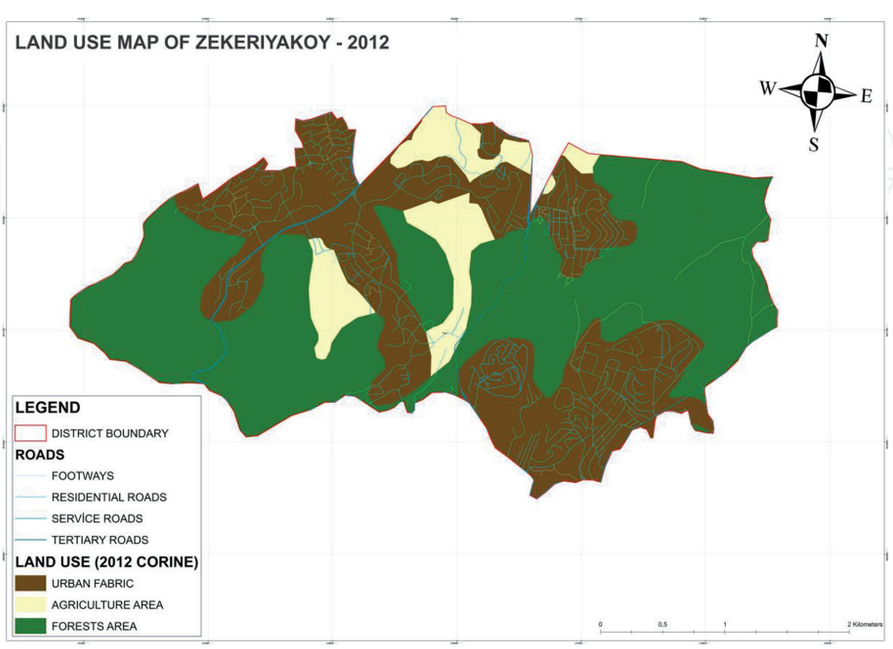

Figure 7.
Land use map in 2012.

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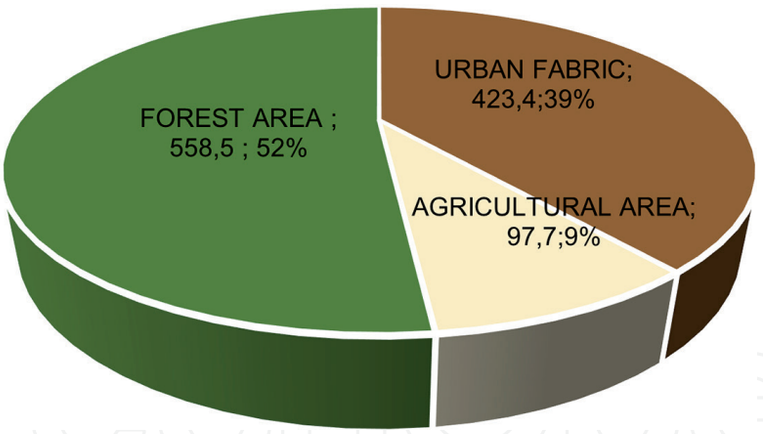

Figure 8.
Distribution of land use in 2012.

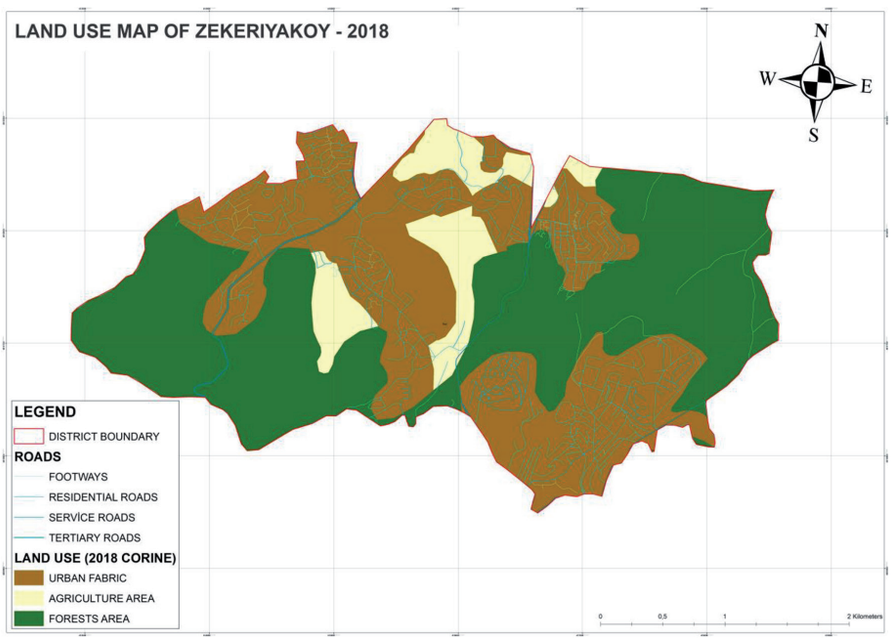

Figure 9.
Land use map in 2018.

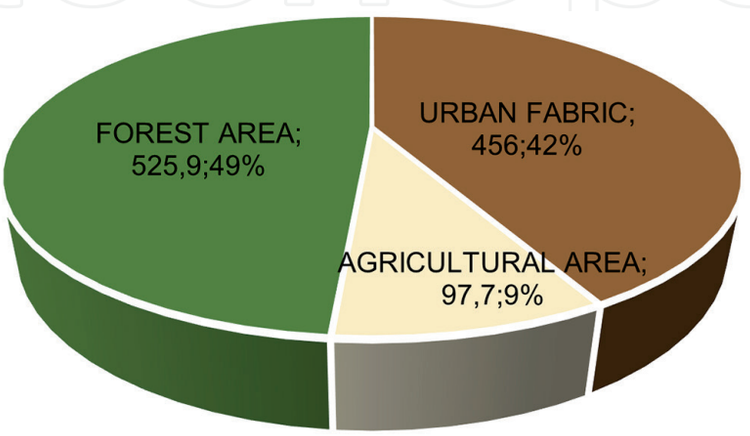

Figure 10.
Distribution of land use in 2018.

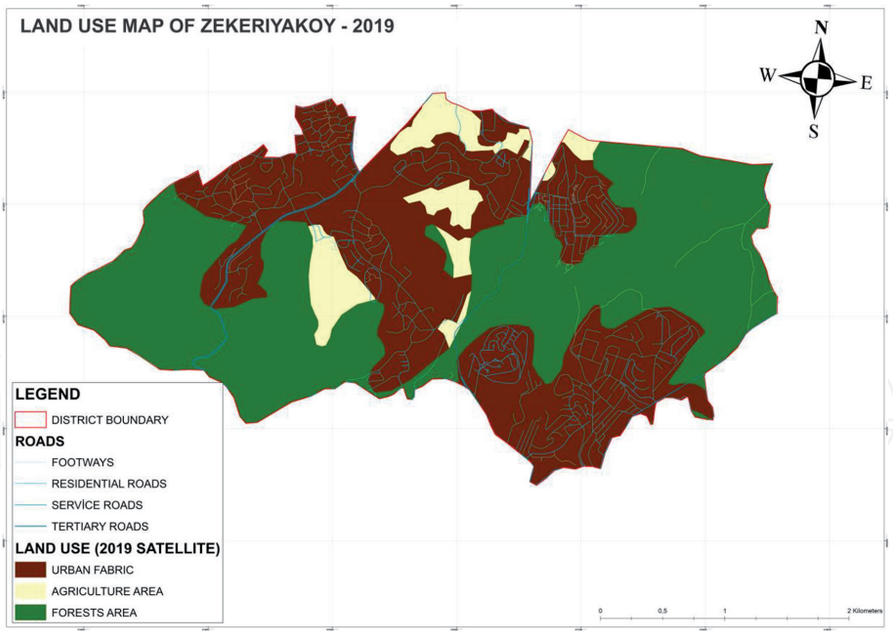

Figure 11.
Land use map in 2019.

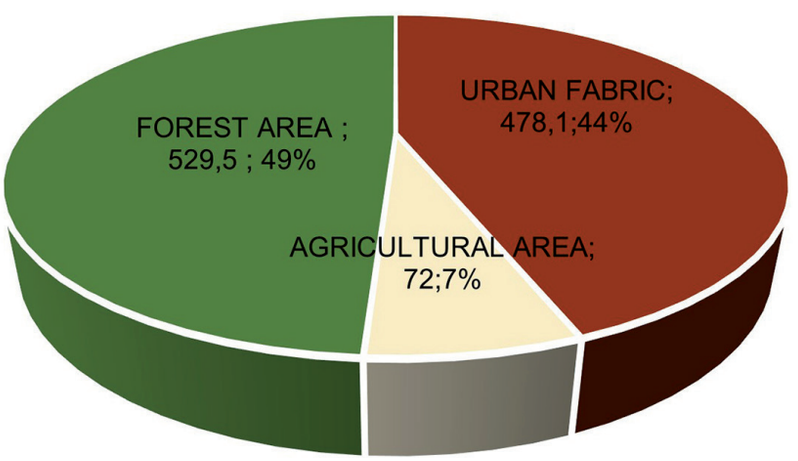

Figure 12.
Distribution of land use in 2019.

attraction especially after the Marmara Earthquake in 1999. Together with the physical change, the greatest change has been experienced in the social structure. The area has become a region where there are sites with expensive villas and preferred by the residents in high-income group who prefer close to the city center and a quiet environment. The earthquake in 1999 played a major role in this change, which has been observed since 2000. Single-storey or 2-storey villas and sites on solid ground have become an attractive living space for high-income groups. Thus, there has been a major change in the socio-economic structure of Zekeriyaköy.

Zekeriyaköy, which entered the rapid urbanization process due to its proximity to the city center and ease of transportation, suffered significant losses in forest and agricultural lands during this period. In particular, urban stains such as residential areas were created instead of agricultural land, and thus a large part of fertile agricultural land became unusable. In approximately 20 years, 89.4 hectares of agriculture and 58.1 hectares of forest area have been lost. The majority of these areas have turned into independent villas and closed sites.

There is a significant amount of change between the years 2000-2019. It is observed that forest areas remain the largest area in this 20-year period of change, while serious reductions are experienced (**Table 2**).

Between 2000 and 2019, the greatest spatial change in landscape changes in Zekeriyaköy occurred in urban stain areas. Urban stain areas increased by 47.5 ha between 2000 and 2016 and the change rate was 14.37%. Between 2006 and 2012, it increased by 45,3 ha and the change rate was 11,98%. Between 2012 and 2018, urban strain area is 32,6 ha and the change rate is 7,69%. Between 2018 and 2019, urban strain area is 22,1 ha and the change rate is 4,85%.

Between 2000 and 2012, agricultural land decreased. The majority of urban stains were spread in agricultural areas. The greatest change in the agricultural fields was experienced between 2006 and 2012. Between 2006 and 2012, agricultural land decreased as 45.4 ha (**Table 3**) (**Figure 13**).

As a result of the studies, urban stains have increased in the last 19 years in Zekeriyaköy as 147.5 ha. 89.4 hectares of this increase was due to the decrease of 58.1 hectares of forest area.

In addition, it is observed that this serious increase in housing problem is very intense in certain regions, but there is a serious risk of spreading to the whole region (**Figure 14**).

This study is important in terms of how the field has changed in 20 years and the problems that this change will cause for the future. It is possible to control the urbanization pressure on the villages close to cities and to protect the identity of the villages or to protect them together with natural landscape areas and to plan them with an integrated approach.

The importance of forest areas and agricultural areas was further understood during the Covid 19 pandemic process. These areas will ensure the resistance of cities to disasters. The study area became an escape area after a major earthquake in Istanbul. However, if the development and population increase continue in the region, the loss of forest and agricultural areas will continue rapidly.

One of the biggest problems of today is the increasing urban population and it has spread metropolises and the surrounding villages, rural areas and cities. Although it is known that agriculture is the struggle to save our future today, agricultural areas are rapidly being transformed into structured areas.

It is necessary to look for answers to questions about who is responsible for this situation or how it can be prevented. Of course, whoever is responsible are not urban people who moved to a safer area after a disaster. The main problem is that the urban does not have a functioning plan and cannot be protected. Nowadays, pandemic and disasters caused by climate change require the preparation and implementation of an emergency action plan. In addition, citizens should be informed about the importance of natural resources such as agricultural areas,

Years	Urban fabric (ha)	Agriculturel area (ha)	Forests area (ha)	Total (ha)
2000	330,6	161,4	587,6	1079,6
2006	378,1	143,1	558,4	1079,6
2012	423,4	97,7	558,5	1079,6
2018	456	97,7	525,9	1079,6
2019	478,1	72	529,5	1079,6

Table 2.
Land cover amounts between 2000 and 2019.

Class	Years	Amount of change	Increase/ decrease	Change rate
Urban fabric	2000-2006	47,5	↑	14,37%
	2006-2012	45,3	↑	11,98%
	2012-2018	32,6	↑	7,69%
	2018-2019	22,1	↑	4,85%
Agricultural area	2000-2006	18,3	↓	11,33%
	2006-2012	45,4	↓	31,73%
	2012-2018	0	—	0%
	2018-2019	25,7	↓	26,31%
Forest area	2000-2006	29,2	↓	4,97%
	2006-2012	0,1	↑	0,01%
	2012-2018	32,6	↓	5,19%
	2018-2019	0	—	0%

Table 3.
Area change rates between 2000 and 2019.

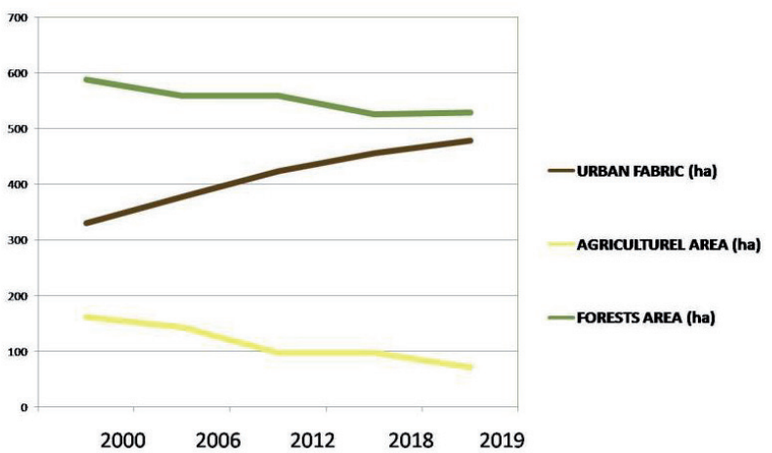

Figure 13.
Distribution of land uses of Zekeriyaköy.

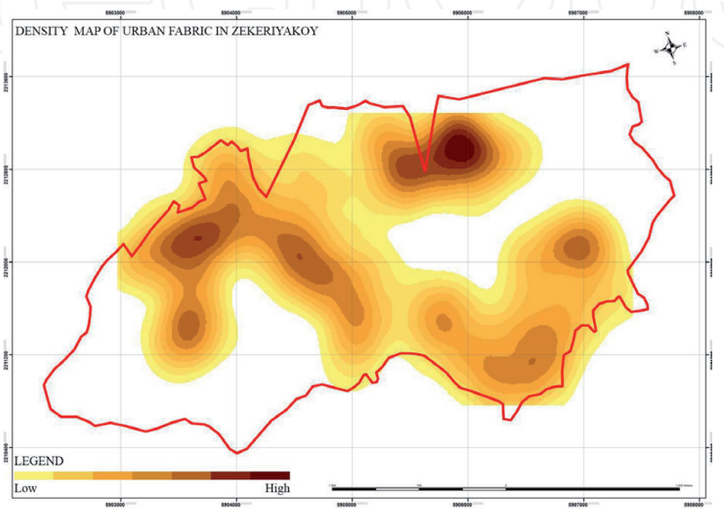

Figure 14.
Distribution of density of urban fabric in Zekeriyaköy in the last 19 years.

forest areas and water resources. The future of the city and its citizen depends on the protection of natural resources and this conservation awareness should be created. It should not be forgotten that the most important need of human is shelter, nutriment and water. This will only be possible by preserving the balance of nature and natural resources.

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