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Article

Spatial transformation of agriculture in urban-rural relations: Torbalı district (İzmir)

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ABSTRACT

In the 19th century, with the development of industrialisation, there has been a process of change and transformation from rural to urban areas. In fact, with industrialisation, the employment opportunities of the city in the fight against poverty have taken their place as one of the main factors accelerating rural-urban migration. Increasing migration and the fact that the city has exceeded its current carrying capacity have created the need for spatial expansion towards the periphery. Globalisation and competition in world markets, which became dominant in the 1980s, have been identified as another important factor that has increased urban-rural occupation.

The aim of this study is to prevent the destruction of agricultural areas, which are of primary importance for vital activities, in the urban-rural relationship and to raise awareness on this issue. Within the scope of the study, Torbalı district of Izmir was selected as the sample area. Geographical Information Systems and plans of Torbalı district at different scales were used as a method. In this direction, the aim is to monitor the impact of urban development trends in Torbalı on agricultural areas in temporal (1990, 2000, 2012, and 2022) and spatial terms. Consequently, it has been established how much of the urban settlement areas in the Torbalı district, particularly the development and pressure on agriculturally important areas, and how much of the agricultural lands have been destroyed by this urbanisation pressure and what kind of land use type they have transformed into. In addition, in light of the data obtained, strategies have been developed to prevent this urbanisation pressure on agricultural land.

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INTRODUCTION

Urbanisation is an important concept that has been on the global agenda in recent years. Although it has many definitions, according to Masek et al. (2000), urbanisation is only one of the many ways in which humans have changed the world's land cover. According to Weber & Puissant (2003), it is defined as a territorial and socio-economic process that causes a transformation in land cover or land use categories. The process of urbanisation, which is directly related to the concentration of population and activities, leads to the formation of urban areas with hundreds of thousands of inhabitants. Urbanisation has an impact on

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the rural and natural environment and increases its impact with rapid population growth, especially in developing countries (Weber & Puissant, 2003). This population increase necessitates change and transformation in existing and new settlement areas together with urban development trends. However, in this process, rural areas are consumed as a solution to the need for urban areas, and production areas that are critical for urban nutrition or food security are destroyed (Yenigül, 2016).

Comparing the urban-rural population ratios in Türkiye over the years: While in the pre-1950 period the population was higher in rural areas, in 1985 the urban-rural population ratio was equal. Looking at the post-1950 population ratios, the fact that the current urban population ratio is around 93.4% is an important indicator that the rural population will disappear in the coming years due to the pressure of urbanisation. In this context, it is inevitable to experience a serious change and transformation process in agricultural areas, which can also be described as rural agriculture in urban-rural integration (Alğın, 2021). In fact, according to TURKSTAT data, the total agricultural area of Türkiye, which was 27,856 thousand hectares in 1990, will decrease to 23,136 thousand hectares in 2020 (BUGEM, 2020), which shows the importance of the situation in question.

Agricultural areas, which have a high return for the performance of vital activities and the national economy (Karataş, 2023), have an important place in the Torbalı district of Izmir, which has fertile soils. In fact, the economy of the Torbalı district is dominated by agriculture and agriculture-based industries. In addition to its fertile agricultural areas, Torbalı is considered to be a district with high potential in terms of agricultural production diversity and quantity (agricultural and animal production) due to its climate, geopolitical location, and industry. The main agricultural products grown in the district, which can produce three crops a year, are tomatoes, leeks, cauliflower, olives, grapes, figs, peaches, and maize (Torbalı Kaymakamlığı, 2023).

In this context, the aim of this study is to address the change-transformation process experienced by agricultural areas, which are of vital importance in the urbanising countryside, after urban growth in a temporal hierarchy, to reveal the spatial and visual results of spatial losses by comparing them with the previous ones, and to infer the basic factors underlying this change and transformation process.

The scope of this study, which deals with agriculture in the urban-rural relationship, is to determine the variables that direct the urban development of the Torbalı district, which is the research sample area, and, in this context, the changes in the agricultural areas of the district between 1990, 2000, 2012, and 2022.

THE PLACE AND IMPORTANCE OF AGRICULTURE IN URBAN-RURAL RELATIONS

Cities are mostly defined as places that are shaped in different time periods, especially in accordance with increasing needs and aspirations. Demographic structure, natural structure, climate, and socio-economic conditions are accepted as variables that direct urban development (Alğın, 2021).

The period dominated by rural areas before industrialisation changed its course with the impact of industrialisation in the 19th century. The industrialisation process that started especially in 1950 led to the dissolution of the rural population and the increase of the urban population (Alğın, 2021). Therefore, the 1950s are accepted as the starting point of rural dissolution in the history of urbanisation and settlement in Türkiye (Özdemir, 2012).

Since the twentieth century, there have been many developments in production, transportation, and communication with the development of technology. As a result of these developments, different forms of spatial organisation have emerged and the existing boundaries of settlement areas have been crossed. This situation has manifested itself in the form of sprawling growth on metropolitan peripheries (Karataş, 2007).

The development of cities over rural areas is an important indicator that cities have chosen the countryside as an expansion (urban development) area (Ceylan & Somuncu, 2018). The development process of urban areas on rural areas is mostly concentrated on agricultural areas, which can also be described as the agriculture of the countryside. This situation not only creates a de-identification of the urban-rural distinction but also causes a serious change and transformation process in agricultural areas.

As part of the study, a number of national and international studies were reviewed in order to understand the process of change and transformation experienced by agricultural areas, which are particularly important in urbanising rural areas, following urban growth. Among these studies:

Gidey et al. (2023) investigated the spatial and temporal patterns of urban and peri-urban spatial growth and its impact on arable land in Shire Indaselassie, Northwest Tigray. Multi-temporal and spectral Landsat satellite imagery was used as input. In addition, a Cellular Automata Markov Chain Model was used to predict the future. At the end of the study, it was found that the arable land decreased by -0.1 km² from 1976 to 2019, as well as the areal growth of the city and its surroundings.

Iddrisu et al. (2023) investigated the pressure of the horizontal expansion of the city of Tamale, Ghana, on the agricultural lands around the city, which are an important source of livelihoods in the region, according to the Sustainable Livelihoods Framework. Household data, Landsat Thematic

Mapper (TM) for 1986, Enhanced Thematic Mapper Plus (ETM+) for 2004, and Landsat 8 Operational Land Imager/ Thermal Infrared Sensor (OLIS/TIRS) for 2019 were used as methods. At the end of the study, it was found that urban expansion provides new employment opportunities in trade and services, but also poses some threats to the main livelihoods of the people living in the region, as it causes a decrease in agricultural land.

In a study by Karaman et al. (2022), which analysed the pressure of urban growth on agricultural land between 2001 and 2021, the Selçuk district of Konya province in Türkiye was selected as the study area. The methods used in the study were remote sensing (RS) and geographic information systems (GIS). The geology and land use capability classes of Selçuklu district were analysed, and it was found that the settlement areas were mainly spread on alluvial and agricultural production areas.

The aim of the study by Martellozzo et al. (2018), which investigates the loss of natural and agricultural areas in Italy, is to redefine planning priorities and create policies that support ecological conservation. To this end, a comparison of land use/cover change (LUCC) projections corresponding to different policy-oriented scenarios was carried out using a combination of multi-criteria analysis and cellular automata modelling (SLEUTH). The results show that the amount of vegetation lost due to urbanisation and agricultural substitution is of high ecological and sustainability value. It was also found that the areas converted to agriculture are of much lower quality and suitability. At the same time, it was found that the planning policies of the past and present do not provide adequate protection for natural landscapes and are inadequate in this respect.

Partigöç (2018) investigates the "spatial changes and transformations of rural areas in the process of urbanisation" through the city of Denizli (Pamukkale and Merkezefendi districts). The research criterion was the "Metropolitanisation Law" numbered 6360, which came into force in 2012. The study, which examines the impact of the law on settlements before and after the law, finds that rural areas (agricultural land, forests, pastures, etc.) in particular are negatively affected after the law.

Masek et al. (2000) analysed urban growth projections in relation to economic and demographic factors. The study used Landsat satellite imagery (1973-1996) and was tested on the Washington DC region. At the end of the study, it was found that the metropolitan area of Washington DC was expanding at a rate of about 22 km² per year. At the same time, comparisons with census data suggest that the physical growth of the urban plan as observed from space can be reasonably related to regional and national economic patterns.

Agriculture is defined as the endeavour/activity undertaken to obtain animal and plant products through the use of soil and seeds (Uzundumlu, 2012). The uncontrolled growth of cities with urbanisation has a negative impact on agricultural livelihoods and disrupts the balance between food supply and demand. Agriculture is a sector that meets the basic nutritional needs necessary for the continuity of people's vital activities, provides resources for industry, and contributes to economic returns and the development process. Therefore, ensuring social food security and agricultural supply security (Tokatlıoğlu et al., 2018) is considered an essential necessity.

Therefore, this study agrees with the research that urban growth/development trends are increasing and that these development trends put pressure on agricultural areas in particular. In addition, it has common features with some of the national and international studies mentioned above on the pressure of urban growth on agricultural areas in terms of spatial comparison. However, it differs from these studies in terms of its approach to the subject, the methodology used, and its original content.

The studies analysed mostly examine the spatial change/ transformation of agricultural areas as a result of urban growth using remote sensing methods and geographical information systems. However, in this study, in addition to geographical information systems, the effects of planning decisions at different scales on agricultural areas are analysed both temporally and spatially. The factors that influence the changes and transformations that occur in agricultural areas, or the variables that are effective in the development of the district, are also analysed. In addition, it is noted that the laws and regulations enacted to protect agricultural areas do not provide sufficient protection in the name of "public interest."

Some Laws and Regulations on Agriculture

In order to make sense of the legal process for the protection of agricultural areas in the urban-rural relationship, this section of the study examines some of the laws and regulations enacted for the protection of agricultural areas and adaptation to the rapid urbanisation process after 1950. The period covering the 1950s and after is the period of the fastest agricultural transformation (Oyan, 2004). Some of the laws and regulations enacted in this period and some important developments related to the period are briefly summarised below.

The period between 1950 and 1960 saw the beginning of the process of adaptation to rapid urbanisation in Turkey. One of the important developments in this period was the establishment of the Ministry of Housing and Settlement in 1958 with Law No. 7116, which was enacted to find solutions to the problems created by rapid and unhealthy urbanisation (Efe, 2003).

In the period 1960-1980, a planning period was adopted to ensure economic and social balance.

- In 1960, the State Planning Organisation (SPO) was established and the preparation of five-year development plans began. Since 1963, attempts have been made to secure agriculture through state intervention through development plans (Eştürk & Ören, 2014).
- The "Gecekondu Law" of 30 July 1966, numbered 775, is the most comprehensive law enacted in the field of gecekondu in order to prevent reconstruction by rehabilitating and liquidating gecekondu and to protect agricultural and public lands (T.C. Resmi Gazete, 1966). This law paved the way for a new construction phenomenon by introducing new concepts such as "local development plan" and "rehabilitation plan" into planning literature (Efe, 2003).
- The "Land Office Law" numbered 1164, which came into force in 1969, created the "General Directorate of Land Office" within the Ministry of Housing and Settlement, in order to allocate land and plots to meet the needs of the State in the areas of housing, industry, tourism, and public spaces, when necessary. However, the content of this law does not include any provision to prevent the misuse of agricultural land (Efe, 2003).
- The "Land and Agrarian Reform Law" No. 1757, passed on 25 June 1973, aimed to "use, protect, improve, develop and maintain the productivity of land and water resources in agriculture according to technical and economic requirements" (T.C. Resmi Gazete, 1973). According to the law, expropriation is based on the "public interest."

In the post-1980 period, the urban-rural opposition began to lose its significance (Tekeli, 2019). In addition, the liberal trend aimed at minimising state intervention in agriculture came to the fore (Eştürk & Ören, 2014). Important developments in this period include the first strategic approach to agriculture in 2004 and the preparation of the Law on Agriculture.

- The "Mass Housing Law" No. 2985, which came into force on 2 March 1984, decided that the areas where mass housing was to be built were to be determined by the governorships in order to meet housing needs (T.C. Resmi Gazete, 1984a). However, there is no provision to prevent the misuse of agricultural land.
- On 22 November 1984, the "Agricultural Reform Law No. 3083 on Land Regulation in Irrigation Areas" was enacted. Article 19 of this law states that agricultural land cannot be used for other purposes unless there are compelling reasons (T.C. Resmi Gazete, 1984b). However, in addition to this, Article 65 (Amended: 12/3/2018-2018/11519 K.) of the implementing regulation of the said Law states that the provisions of the "Soil Conservation and Land Use Law dated 3/7/2005 and numbered 5403" shall be applied to the misuse of agricultural lands in necessary cases (T.C. Resmi Gazete, 1985).
- In 2005, the "Law on Soil Protection and Land Use" No. 5403 came into force. The purpose of the law is to "establish the procedures and principles to ensure the protection and development of soil by preventing its loss and deterioration by natural or artificial means, and to ensure planned land use in accordance with the principle of environmentally sustainable development" (T.C. Resmi Gazete, 2005). The phrase "absolute agricultural land, special crop land, planted agricultural land and irrigated agricultural land cannot be used for purposes other than agricultural production" (Article 13) in the relevant law has a preventive character against the misuse of agricultural land. However, in the continuation of Article 13 of the relevant law:

Provided that there is no alternative area and the Board deems it appropriate:

(a) strategic defence requirements,

(b) temporary settlement needs following natural disasters,

(c) exploration and exploitation of oil and natural gas,

(ç) mining activities for which a decision of public interest has been taken by the competent Ministry,

(d) for plans and investments for which a decision of public interest has been taken by the ministries, the Ministry may approve the applications for non-purpose use of these lands, provided that soil conservation projects are complied with.

The inclusion of this sentence indicates that there may be some exceptions to the off-purpose use of agricultural land. On 31 January 2007, with the entry into force of the "Law on Amendments to the Law on Soil Conservation and Land Use" No. 5578, an additional sentence was added to Article 13 of the said Law No. 5403: "e) Investments in road infrastructure and superstructure activities in the public interest" and the sentence "The Ministry may delegate this authority to the Governorates" (T.C. Resmi Gazete, 2007) was added to the end of the 1st paragraph.

- On 12 November 2012, Law No. 6360 on the Establishment of Metropolitan Municipalities and Twenty-Six Districts in Thirteen Provinces and Amendments to Certain Laws and Decree Laws came into force (T.C. Resmi Gazete, 2012). With this law, the legal personality of approximately 16,500 villages was abolished, and the authority to make decisions regarding agricultural lands, pastures, and coastal areas belonging to these villages was given to metropolitan municipalities (Yenigül, 2016). This situation has led to a blurring of the urban-rural distinction (Tekeli, 2016) and concerns that municipalities focusing on urban development will encourage rural areas to urbanise

(Yenigül, 2016).

- The purpose of the "Regulation on the Protection, Use and Planning of Agricultural Lands" published in the Official Gazette No. 30265 on 9 December 2017, is to determine the procedures and principles for the determination of soil and land assets, classification and development of agricultural lands, permitting off-purpose use in mandatory cases, protection of soil and large plains with high agricultural production power, preparation and implementation of soil protection plans and projects, determination of erosion-sensitive areas, formation, duties and activities of the soil protection board, and planned use of lands in accordance with the principle of environment-first sustainable development (T.C. Resmi Gazete, 2017). In the relevant regulation, in addition to the protection of agricultural lands, it is stated that agricultural lands can be opened to misuse in mandatory cases.

As a result, as seen above, many laws and regulations have been enacted for agriculture. However, when the loss of agricultural land in the urban-rural dichotomy is taken into account, it becomes clear that these laws and regulations are not sufficient to protect agricultural land. In fact, one of the most important planning problems to date is rapid and unhealthy urbanisation.

Law No. 6360, which is particularly important in terms of institutional and administrative structuring and spatial planning processes, has significantly increased the rate of urbanisation throughout Türkiye. Another change with the entry into force of the law is the abolition of the legal personality of towns and villages and the beginning of the characterisation of all settlement units as "cities" (Partigöç, 2018). In this new order, which caused a confusion of meaning between urban and rural, what constitutes the countryside and the future of agricultural areas, characterised as rural agriculture, became a matter of debate.

MATERIAL AND METHODS

Study Area

This study examines the spatial transformation of agriculture in the urban-rural relationship through the Torbalı district of İzmir province.

Torbalı is a district of İzmir province in the Aegean region of Türkiye, built on the Küçük Menderes basin and has very fertile soils. It is bordered by Kemalpaşa to the north, Bayındır to the east, Menderes to the west, and Selçuk to the south (Figure 1).

According to Turkish Statistical Institute (TUIK) data, the population of the district in 2022 is 207,840 people (Figure 2). Its total area is 577 km². The total number of municipalities connected to the district is 60.

The economy of the district is mainly based on agriculture and industry. Torbalı District, which is located on the Izmir-Aydın motorway, is also connected to Ankara via Kemalpaşa Road. It is also a point of attraction for industrial investments due to its easy access to Menderes Airport and Izmir Port.

The Torbalı district has a Mediterranean climate. Summers are hot and dry, and winters are mild and rainy. The fertile soil structure is suitable for growing all kinds of cereals

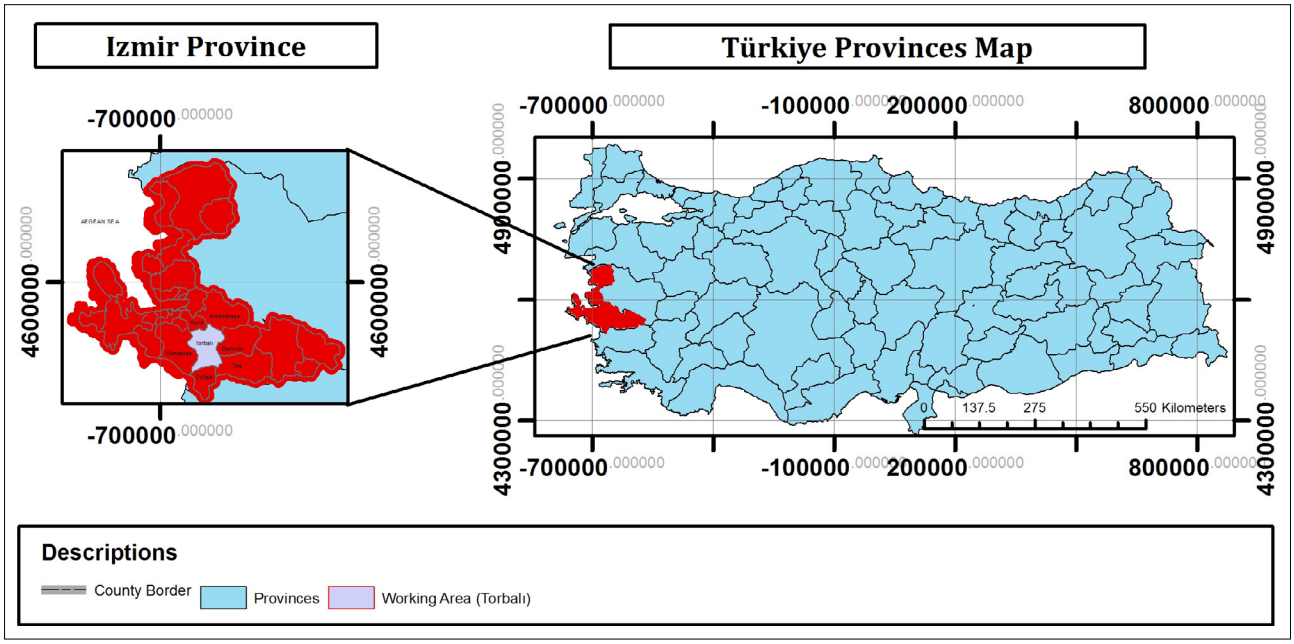

Figure 1. Map of the study area.

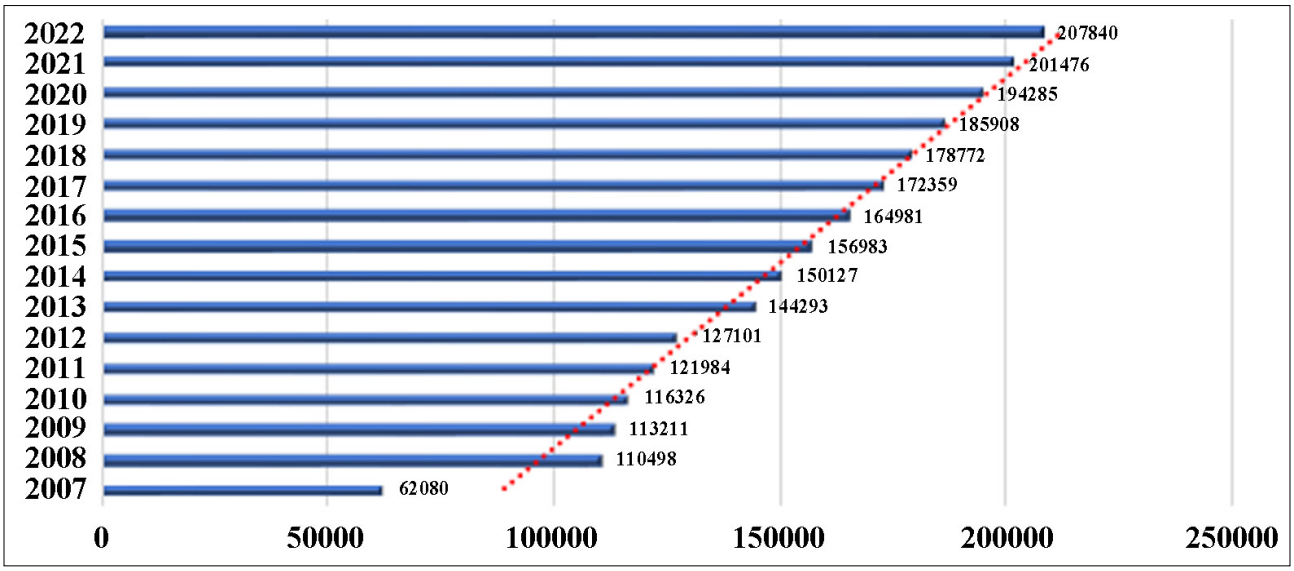

Figure 2. Population growth of Torbalı district by years (TUIK, 2023).

and industrial crops (tobacco, cotton, etc.), vegetables, and fruits.

Methodology

In this study, the pressure of urban development trends on agricultural areas was analysed using both geographic information systems and plans of Torbalı at different scales. Within the scope of the study, firstly, CORINE (Coordination of Information on the Environment) land use data from 1990, 2000, and 2012 and Dynamic World sourced land use data from 2022 were used in order to monitor the direction in which the urban development of the district continues and the areal examination of agriculture in this development in the historical process. These data were re-digitised using ArcGIS software. Thus, a new land use map consisting of four categories—artificial areas, agricultural areas, forest areas, and semi-natural areas—was created. For this four-category land use classification, CORINE land use descriptions were taken into consideration (Figure 3).

These land use data were used to carry out a spatial analysis of the change and transformation process of agricultural areas by comparing the land use capacity produced in the study within the framework of agricultural and forest areas. Finally, all the analyses were overlapped, and a synthesis map of the sample area was produced in order to make temporal and spatial inferences and to discuss the impact of different scales of planning decisions taken for urban development in Torbalı on agricultural areas.

FINDINGS

In the last 35 years, Turkish cities have experienced a great change in the spatial dimension of urban development. As in all cities of the country, İzmir has also experienced this process of change and transformation. The Torbalı district in particular has the most fertile land in the Aegean region. However, in recent years, agricultural land has been opened up for misuse due to unplanned urbanisation and industry (Kurucu & Küçükyılmaz, 2008).

Since 1989, Torbalı has become the largest industrial centre in Izmir. In particular, the fact that Torbalı is located on the İzmir-Aydın motorway and the 45 km double-track railway connecting İzmir and the neighbouring provinces has made the district an important point of attraction for industry. This situation has reached a dimension that increases unemployment and employment deficit as a factor that increases migration to the district over time (Torbalı Ticaret Odası, 2020).

When analysing the urban-rural and total population of Torbalı district for the years 1990, 2000, 2012, and 2022 within the framework of TUIK data, it can be seen that although there has been a decrease in the rural population rate over the years, the rural population rate in 1990 and 2000 is higher than the urban population rate. With Law No. 6360, villages were transformed into districts, and all settlement units were defined as urban, resulting in a significant increase in urban population rates in 2012 and 2022 (Table 1).

One of the reasons for this increase in the district's population is the intensive migration to the district. As a result of the intensive migration to the district, the existing carrying capacity has been exceeded over time, and the demand for new housing has increased. This situation has manifested itself in rapid urbanisation, and the district has continued its urban development by showing an uncontrolled growth trend on agricultural land.

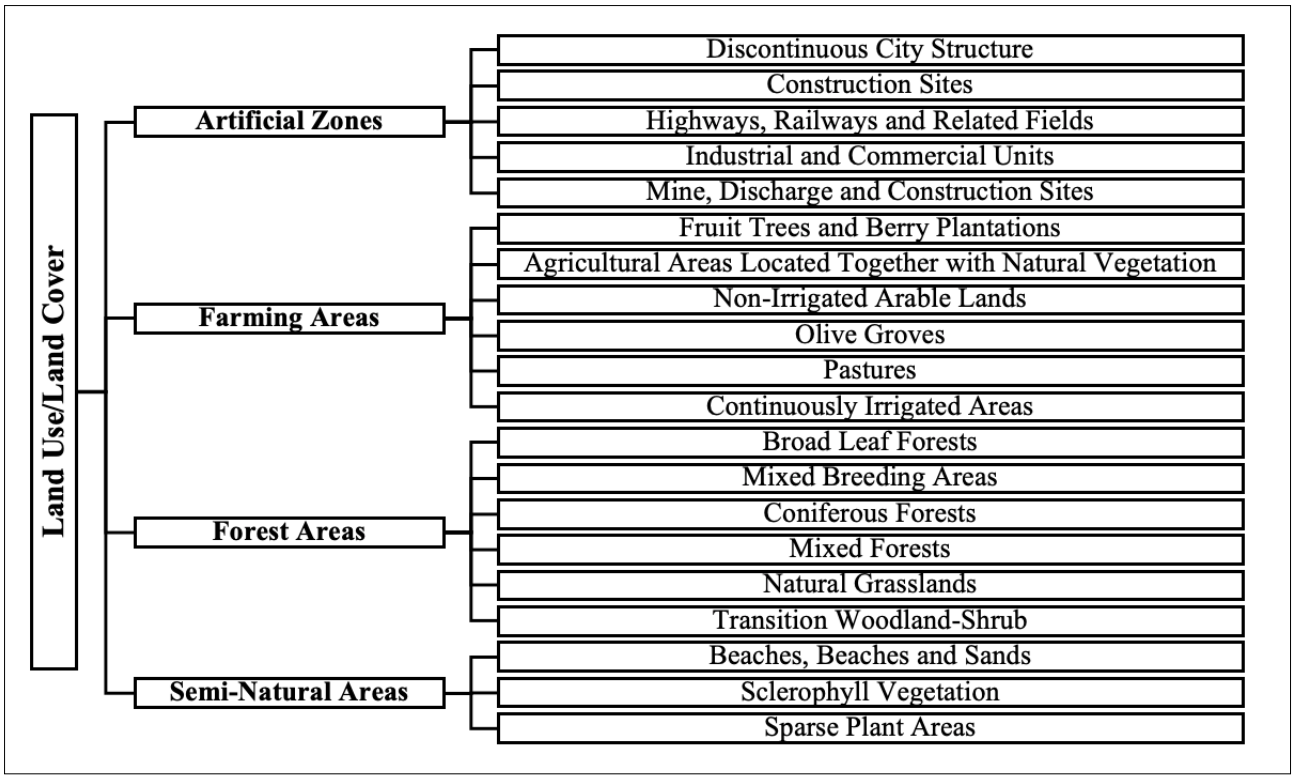

Figure 3. CORINE land cover classes.

Table 1. Urban-Rural and total population of Torbalı district by years (TUIK, 2023)

County Population	1990			2000			2012	2022
	Urban (%)	Rural (%)	Total (Person)	Urban (%)	Rural (%)	Total (Person)	Total (Person)	Total (Person)
Torbalı	29,74	70,26	71.172	40,87	59,13	93.216	138.040	207.840

Torbalı District is located on the alluvial land of the Fetrek River in a rift valley (graben) formed as a result of tectonic activity. Developed on a flat plain, the Torbalı district has suitable conditions for all kinds of agricultural activities. However, the intensive demand for housing in parallel with industrialisation and population growth poses a serious threat to agricultural areas (Kurucu & Küçükyılmaz, 2008).

When analysing the land use change of Torbalı district between 1990 and 2000, it can be observed that Torbalı has continued its urban development mainly towards the periphery and north-west, especially on agricultural areas, as shown in Figure 4.

When analysing the land use change of Torbalı district between 2012 and 2022, it can be seen that Torbalı has continued its urban development in the same direction from the past to the present, as shown in Figure 5. In the historical process, there is a significant decrease in forest areas. In addition to the existing settlements along the transport axis, the tendency of small settlements in agricultural areas to grow over time has reached a dimension that threatens the integrity of agricultural areas.

The settlement area, which was 1,152 ha in 1990, reached 7,247 ha in 2022. In other words, between 1990 and 2022, there was an increase of 84.1% in the settlement areas. At the same time, it should be noted that the agricultural area has decreased over the years. The agricultural area, which amounted to 36,721 hectares in 1990, decreased to 25,593 hectares in 2022. This situation shows that between 1990 and 2022 there was an areal reduction of 43.5% in agricultural areas. In addition to agricultural areas, there was a 6.3% decrease in forest areas between 1990 and 2022. The area of semi-natural areas increased by 49.3% between 1990 and 2022 (Table 2).

When analysing the land use capability of Torbalı District, it can be seen that the existing urban structure is mostly developed on land with I and II class land use capability, i.e. land suitable for tillage agriculture (Figure 6).

If we look at the development of urban settlements on

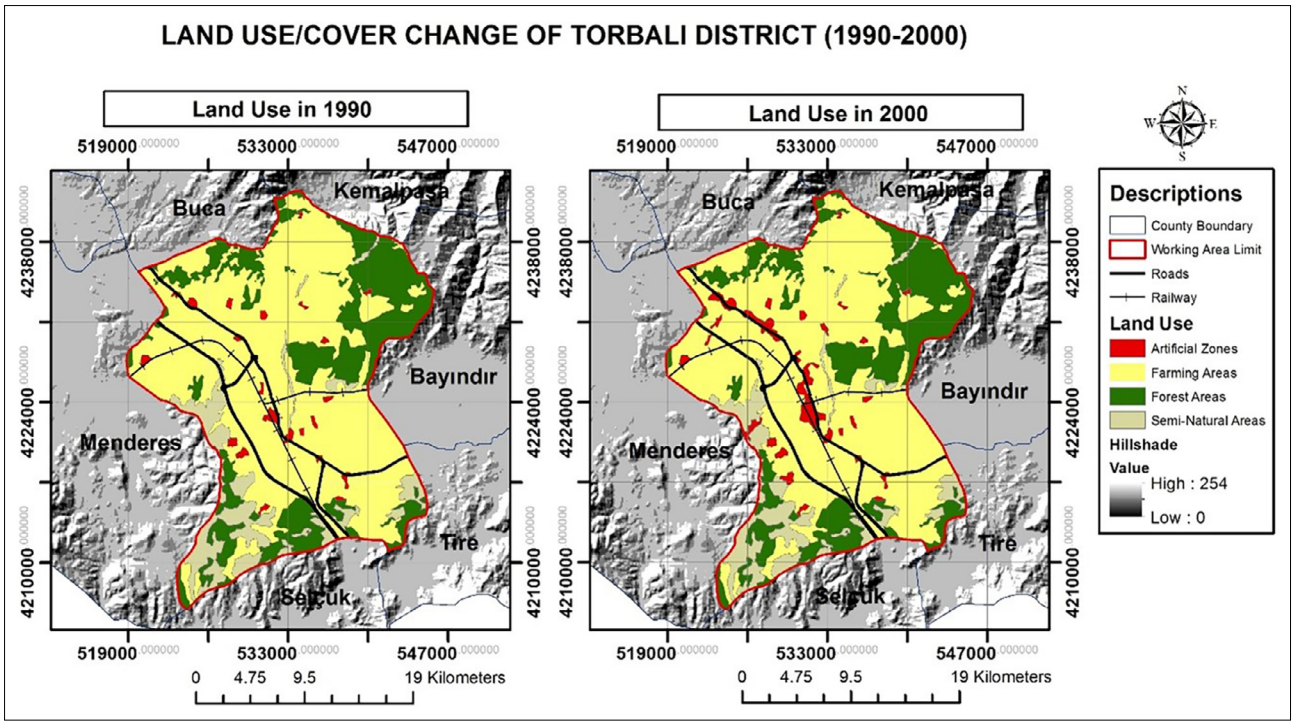

Figure 4. Land use/cover change in Torbalı district (1990-2000).

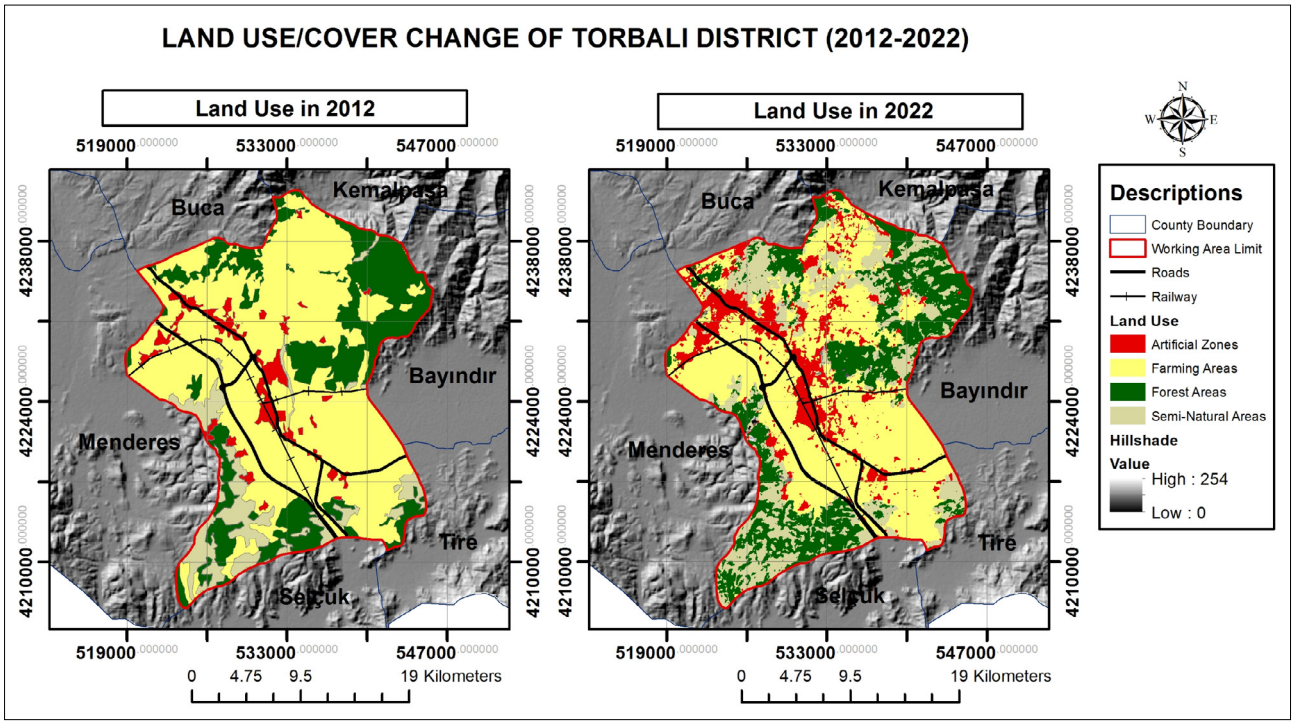

Figure 5. Land use/cover change for Torbalı district (2012-2022).

agricultural and forest areas in Torbalı district according to years, it can be seen that the urban texture that emerged in 1990 and 2000 developed mainly on irrigated agricultural areas in the centre and on dry agricultural areas in the north and northwest. It can be observed that in 2012 and 2022, the urban texture shows a significant increase in area compared to previous years. In this process, the tendency of urban settlement areas to develop on irrigated and dry agricultural areas continues. In addition, the emergence of new settlement areas, as well as the areal growth of existing

Table 2. Land use change in Torbalı district by years

Land Use	1990	2000	2012	2022	1990-2022 Rate of Change (%)
	Area (hectares)				
Artificial Zones	1.152	2.494	3.562	7.247	84,1
Farming areas	36.721	35.673	34.534	25.593	-43,5
Forest Areas	13.734	13.646	13.963	12.921	-6,3
Semi-Natural Areas	5.993	5.787	5.541	11.839	49,3
Total	57.600	57.600	57.600	57.600	---

settlements, is noteworthy (Figure 7).

As can be seen in Figure 8, Class I and II land is mostly used for irrigated agriculture, and Class I and II land in the north and northwest, close to the settlement boundary, is used for dry agriculture. It can be observed that the areas with Class I and II land use capability, which are located along the transport axis from the centre towards Kemalpaşa, are used as olive groves. Olive groves, other orchards, and greenhouses are used on the land with Class III and IV land use capability. Although Class VI, VII, and VIII areas on the map are unsuitable for arable farming, they are mostly used as woodland in the northeast and as woods, bushes, and shrubs in the southwest. The urban development trends in the county from 1990 to 2022 will mainly affect agricultural areas with Class I and II land capability.

When analysing the Ministry of Agriculture and Forestry's CORINE land use data for Torbalı (Figure 9), it can be seen that in addition to the increase in settlement areas, especially since 1990, the industrial areas, especially in the northeast of the settlement areas, tend to develop towards the northwest. As a result of the joint growth of settlements (discontinuous urban structure) and industrial areas (industrial and commercial units, quarry discharge, and construction areas), especially since 2000, there has been a reduction in the area of agricultural land. An analysis of the 2012 land use data shows that irrigated agricultural areas have increased under pressure from housing and industry, especially in the southwest compared to previous years. In other words, it can be observed that the non-irrigated agricultural areas in the southwestern direction of Torbalı district have been replaced by continuously irrigated areas in 2012.

It can be observed that the increasing population, the existing transport axis, and the topography of Torbalı, which tends to continue urban development on agricultural areas, are the guiding factors for this urban growth.

When the İzmir-Manisa Planning Region 1/100,000 Scale

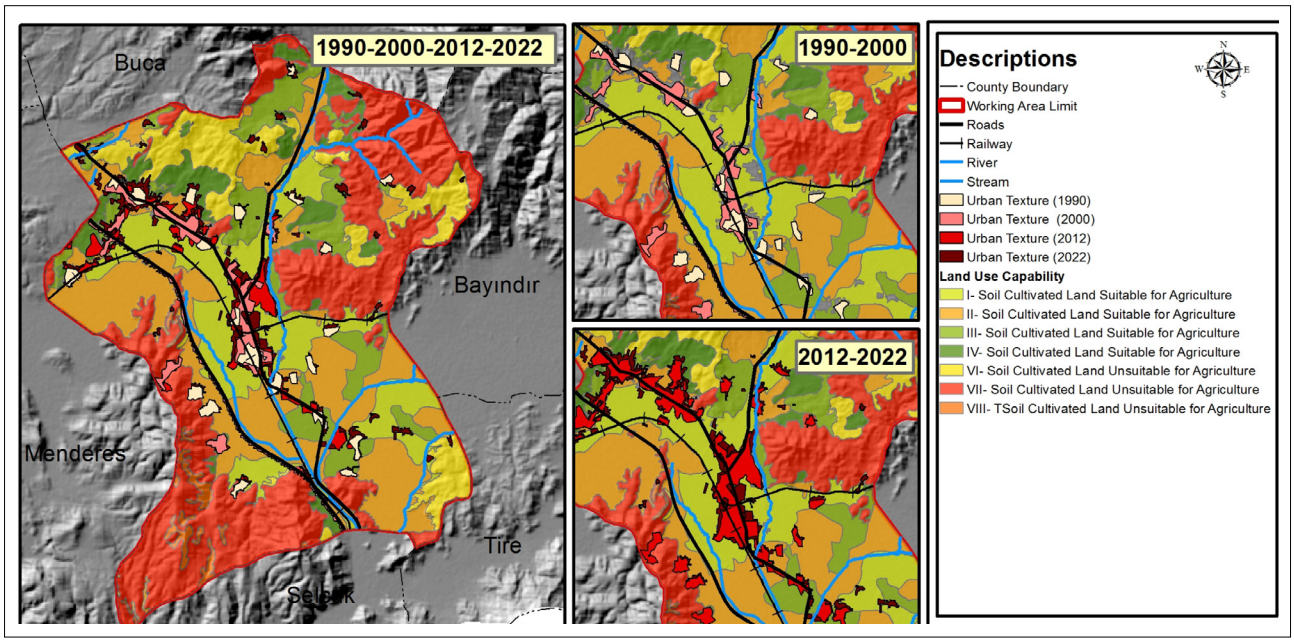

Figure 6. Land Use Capability (LUC) of Torbalı district.

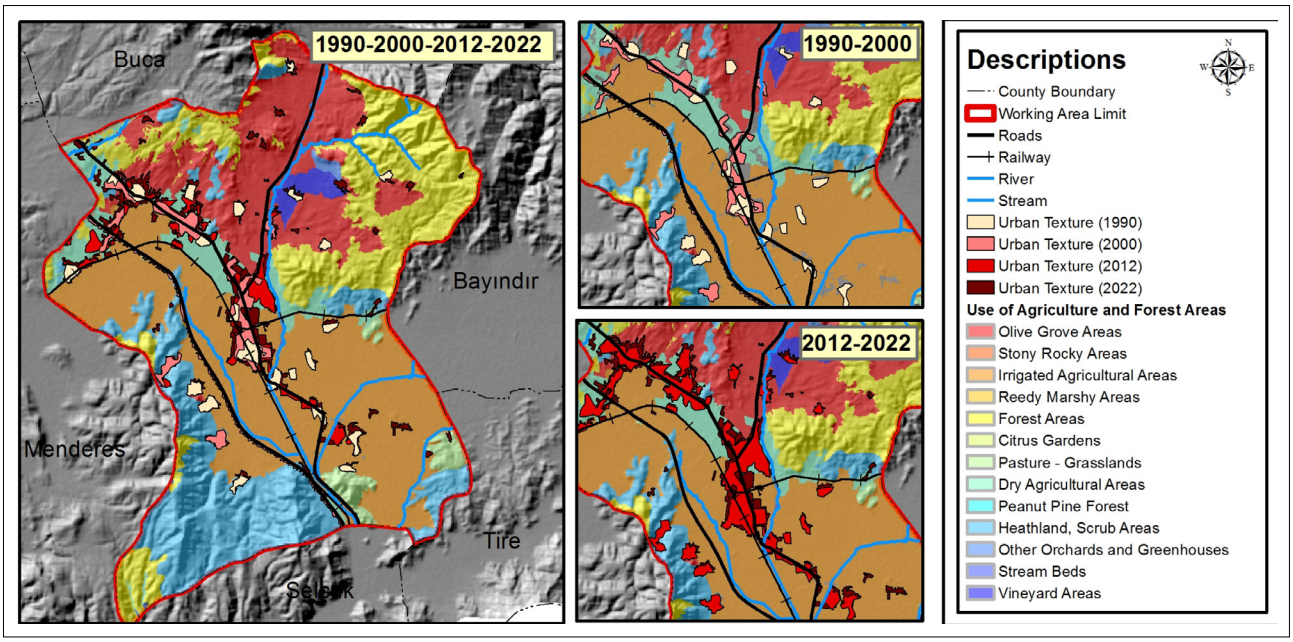

Figure 7. Development of urban settlement areas on agricultural and forest land in Torbalı district by year.

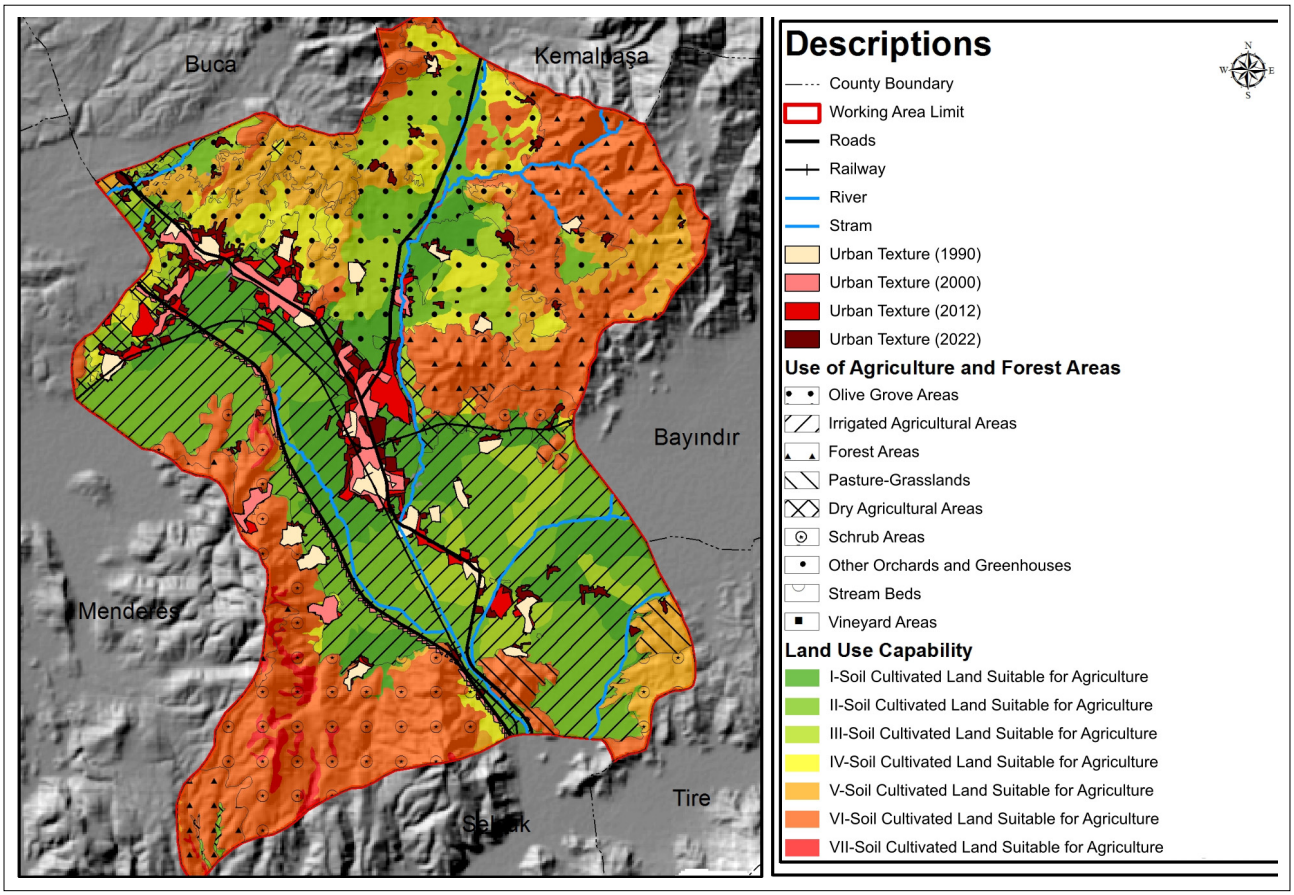

Figure 8. Synthesis map of Torbalı district.

Regional Master Plan, which was approved with the Ministry's approval No. 9948 of 23/06/2014, is analysed within the boundaries of the study area, it is seen that the areas suitable for settlement in the planning decisions made for Torbalı and its surroundings do not have a protective/preventive function for the integrity of agricultural areas. In other words, it can be

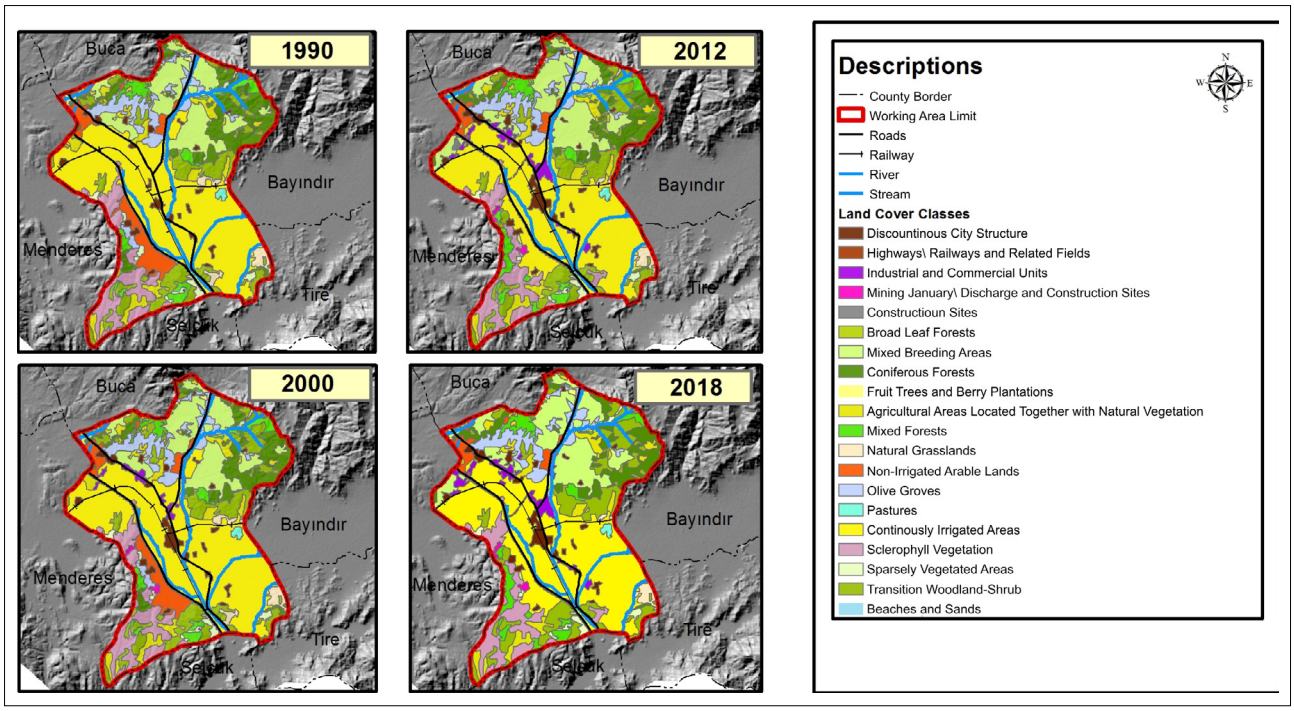

Figure 9. Land use/cover change in Torbalı district (1990, 2000, 2012 and 2018).

seen that the industrial areas, which have an important place in the development of the city, and the new settlement areas opened in this context have a disruptive effect on the integrity of the agricultural areas (Figure 10).

If one examines the master development plan of the Torbalı district centre on a scale of 1:5,000 from 1983, it seems that the planning decisions taken were mainly agricultural-oriented. While agricultural areas are located to the north of the settlement areas, industrial areas are located to the northeast. In addition to the existing settlement areas, new development areas are oriented east-west and north-south. When examining the master plan revision on a scale of 1:5,000, dated 13.03.2017, it can be seen that the planning decisions made are industry-oriented. It can be seen that the settlement areas have increased in size compared to 1983, and that the new development areas have been treated

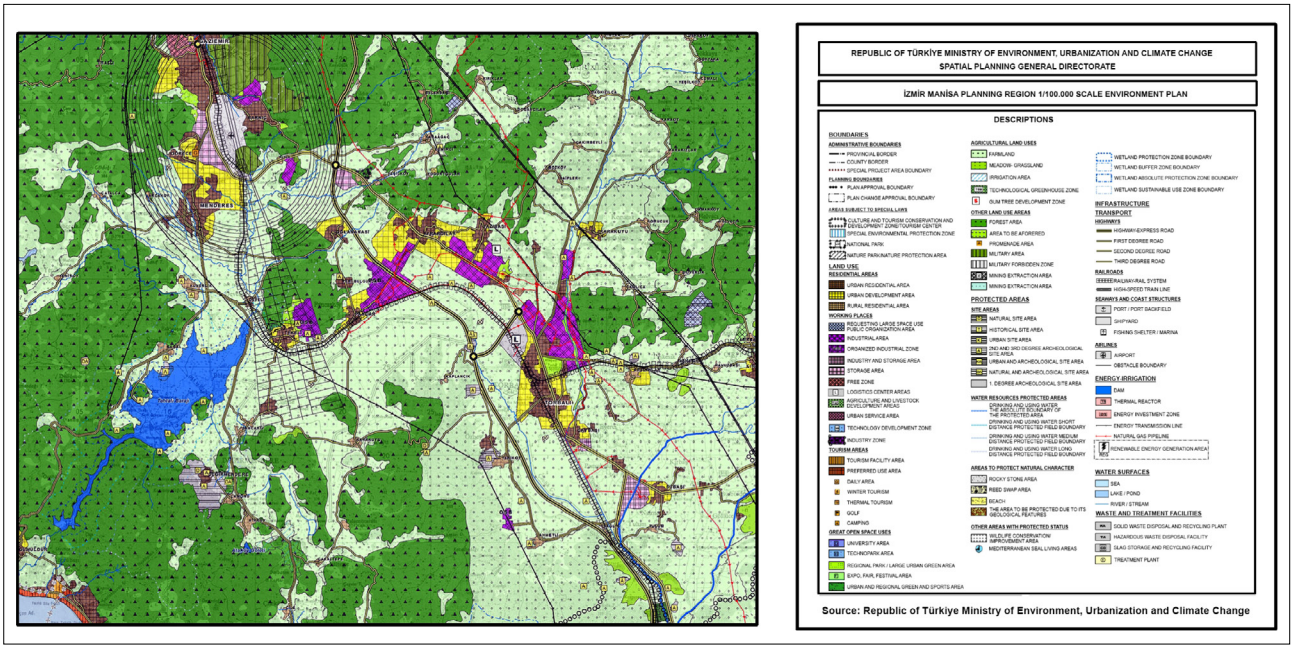

Figure 10. 1/100.000 Scale Regional Master Plan of Torbalı District.

in such a way that they surround the existing residential areas. In this process, it can be said that agricultural areas are being used as residential and industrial areas. The industrial areas, which tend to develop in a north-easterly direction, have increased compared to 1983 and have been integrated with the residential areas (Figure 11).

EVALUATION AND CONCLUSION

Since 1950, due to developments (opportunities brought by the industrial revolution), urban areas have shown a tendency to spread/agglomerate over rural areas. This situation has, over time, caused a serious process of change/transformation in agricultural areas and has reached a dimension that threatens the future of agricultural areas. This situation has been clearly demonstrated in many studies. In the above-mentioned studies, the transformation of agricultural areas was revealed using geographic information systems and remote sensing methods. In this study, in addition to identifying this change, the impact of plans drawn up at different scales on this process has been evaluated in terms of both time and space. In addition, other variables related to settlement (industrialisation, development of transport, etc.) were studied together with the planning process, taking into account the change in agricultural areas.

In this context, when the historical change of land use in Torbalı District is analysed within the framework of the study, it is found that in 2022, compared to 1990, artificial areas increased by 84.1%, agricultural areas decreased by 43.5%, forest areas decreased by 6.3%, and semi-natural areas increased by 49.3%. It is an undeniable fact that the increase in artificial areas is directly related to the increase in population. Developed industry and transport facilities are the main factors that are effective in the population increase of Torbalı district.

It has been observed that the existing urban fabric in Torbalı has developed on first and second class land, which is suitable for agriculture in terms of land use capacity. In addition, it has been observed that in the plans made specifically for Torbalı, decisions were made to support this situation, the settlement was planned on agricultural land, and no planning decisions were made to protect these areas.

The urban growth trend of Torbalı since 1990 has been on irrigated agricultural land in the centre and partly on dry agricultural land in the north and northwest. Therefore, it can be said that the urban developments from 1990 to 2022 will be mainly on irrigated agricultural areas.

In the land-use plans for the future, urban development is spreading in an uncontrolled and unplanned manner to meet the growing population and its needs. In this process, agricultural areas, which are of primary importance for human life, are neglected due to increasing needs, demands, economic interests, and concerns. As in the case of Torbalı, as a result of urbanisation and industrialisation, fertile agricultural land is being used for purposes other than those for which it was intended, and the relevant laws and regulations are providing a suitable environment for this to happen. For this reason, the protection of agricultural areas through planning decisions is a priority. In order to prevent the sprawling and rapid growth of residential areas of high agricultural quality, such as Torbalı, a planning and

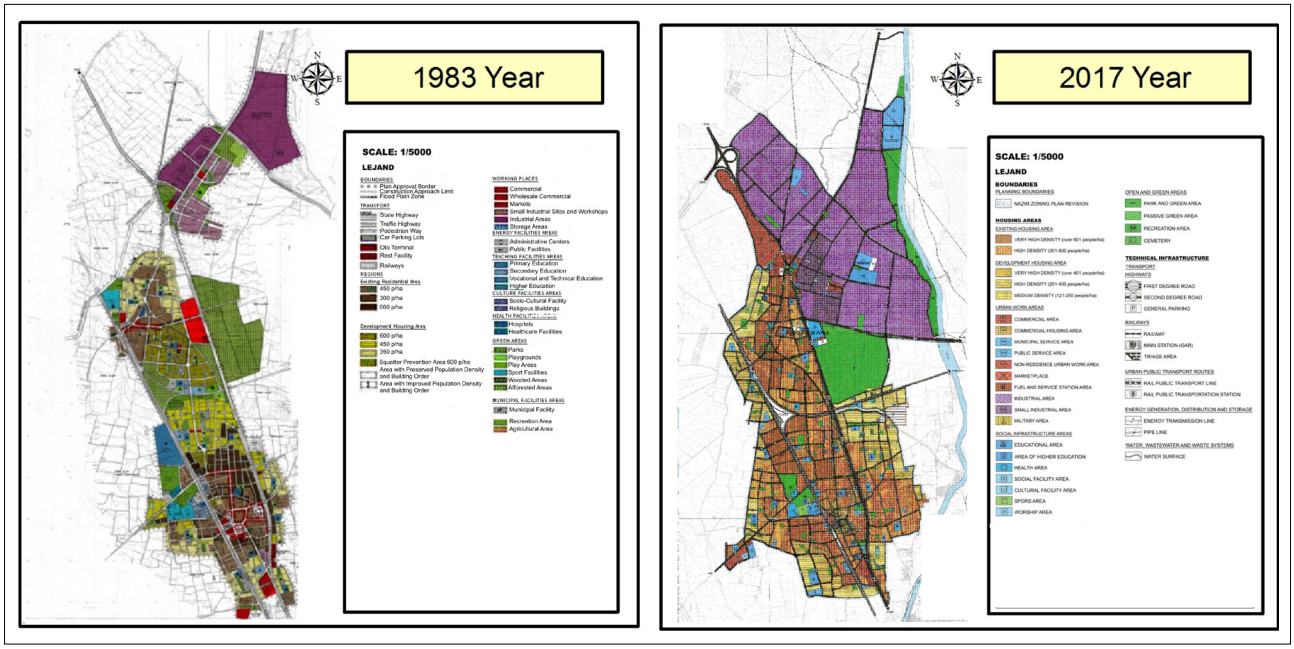

Figure 11. Torbalı District Centre Master Plan on A Scale of 1:5000 from 1983 and 13.03.2017.

zoning scheme should be proposed to ensure more compact development. In addition, in order to protect agricultural land and prevent it from being used for purposes other than those for which it was intended, construction decisions, especially in agricultural areas, should be avoided as much as possible, or the minimum construction conditions should be prepared in such a way as to prevent misuse (housing, etc.).

A study has simulated the urban growth of Izmir in 2050. According to the simulation results, the urban growth of Izmir is expected to reach 126,422 hectares in 2050. Another study for 2050 shows that the population of Izmir will reach 8.1 million in 2050, according to the population projection of the Izmir Water Master Plan for 2050. In this context, the agricultural area per capita is predicted to decrease to about 0.0268 ha in 2050 (Alğın, 2021).

As in many settlements, producers in Torbalı focus more on the economic aspect of farming than on the environmental and social aspects. Moreover, 50.82 percent of the producers do not plan to continue agricultural production in the future (Çukur & Işın, 2008). It is predicted that this situation will lead to a possible food crisis in the future. For this reason, it is necessary to take measures not only to protect agricultural land but also to protect the quality and ecological structure of the agricultural area. For this purpose, it is important to determine the building plans for the protection of the rural quality and the social structure of rural settlements where productive agricultural areas are located. Determining the incentives and legal restrictions to protect the quality of agricultural areas will also be effective in protecting the quality of the soil, the continuity of agricultural use of the area, the unique agricultural product pattern, and the socio-economic structure of the area.

Agricultural areas are of great importance for the continuity of vital activities and the national economy. For this reason, the development of settlements on agricultural land should be prevented within the framework of relevant laws and regulations. Decisions taken during the transition between plans should be monitored by the relevant institutions. Discouraging provisions should be introduced for those who pursue economic interests in the decisions taken. When the existing carrying capacity is exceeded, or in cases of necessity, the most appropriate site should be selected in the context of the analyses to be carried out for the region concerned, in such a way as not to disturb the integrity of the agricultural area, and the development layout should be rearranged in such a way as to protect the agricultural integrity.

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