

The Necessity of Urban Boundaries in Planning Legislation: A Case Study in Bilecik, Turkey

Mercan Efe Güney, Barış Parlatangiller, Melik Ayer

Abstract—In Turkey, while urban area boundaries are enlarged by making decisions on investment areas in cities, development plans are made according to government decisions, rather than scientific criteria. Even environment protection laws state that “if public interest is at stake”, areas under mandatory protection can be transformed into investment areas. This leads to destruction of valuable agricultural lands. Paper demonstrates loss of agricultural lands by superimposing plans, Suitability of the Lands for Agricultural Use and Google Earth Images in an exemplary settlement, and expresses that urban area boundaries should be included in legislation as an official boundary for all settlements.

Keywords—Agriculture, boundary, city planning, development plan, legislation.

I. INTRODUCTION

THE term boundary denotes an inseparable whole within physical planning in general and urban planning specifically. First, boundaries are determined in terms of area, and the work within the boundary is organized. Then, its functionality is discussed. In relation to this process, urban planning applications are determined by the economy, and they proliferate rapidly, degrading the ecological balance that is being permanently demolished to any random question that needs to be solved.

In the area of physical planning, decisiveness is lost during the process although the development of borders is often the starting point of thought and action. It is possible to identify the cause of this situation in the dependent relationship between each area and its economy. Since each stage of the physical planning process is institutionalized within a hierarchy, the transformation of natural areas into cultural areas is determined by the economy. It is inevitable that the speed and intensity of this process exceeds the thresholds of natural ecological balance. Thus, boundaries are indispensable for physical planning as a concept and foundation for action.

In determining urban boundaries in Turkey, there are three basic criteria related to establishing a province, county, and district in accordance with the Law for Provincial Administration no. 5442. They include requirements for geographical position, economic conditions, and public services. However, these criteria are not practically determined, and their means are not clearly delineated. In

addition to the uncertainty of how provincial boundaries are established, there is no legal basis for border formation [9]. Therefore, the city, which is the focal unit of provinces in Turkey, must aim to increase its building and population density continuously for a sense of development and civilization at the global scale. Areas in which housing, working, transportation, communication, and cultural activities are planned attract people by providing labour and modern living facilities, thus leading to a natural population increase. Furthermore, cities tend to continuously increase their building density, population density, and area because it is generally accepted that urban areas provide greater economic returns than the agricultural production upon which rural areas depend, which undermines the importance of food security. Consequently, it is a fact (factual reality) that urban space is an area open to continuous expansion.

Urban and suburban (county, borough, and village) regions are separated from one another by defined spatial differences or targeted spatial structures. The basis of different region definitions being dwelling units has been established by a settled lifestyle. Furthermore, the socio-economic characteristics of a community in harmony with its local natural conditions—and the related population and structural density—are the characteristics that determine this definition. In fictionalized or targeted cultural places, units are constructed and separated from established places with industrial production styles that are divided into sectors and specialized in narrow areas for potential development. Such fictionalized spatial organizations are necessarily followed by the appropriate administrative organizations. When the definitions of village, district, county, and urban settlements are similar in related literature (see [15], [18], [22], [23], [47]), the abovementioned difference is revealed in the details. For example, urban boundaries are the expression of the limits of fictional settlements within administrative borders and gradually expand on the basis of these borders. In other words, the more undefined an urban area boundary is, the more functional it becomes within the scope of the urban planning praxis. Consequently, there is no definitive awareness of boundaries or limitations within the current urban planning theory and praxis. Owing to this lack of awareness, urban planning has become dependent on the economy as an institution [10]. In order to change this, urban planning must first include an admissible ‘boundary awareness’ in relation to its own scientific knowledge and information.

Both in terms of economic and social returns and the developed–undeveloped land balance, which is a sine qua non of urban planning, there is an obligation to relate the issue of

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limitations from regional planning to the spread of urban areas within physical planning to then examine 'food security'. As the increase in urban populations depends on internal migration and the expansion of urban housing, new urban areas must necessarily be developed.

Countries around the world are working with comprehensive organizations to address food security [11]. Turkey must pay sufficient attention to agricultural production areas. The power of food independence and exporting goods is one of the most important factors affecting a country's development. As this power fades, dependency on foreign sources increases, and the country's economic power will weaken.

Currently, physical planning in practice requires institutional operability with a hierarchical structure. Institutions that require planning are units that are authorized within specific administrative boundaries. However, administrative boundaries that are built arbitrarily are also located within natural boundaries, but there has been a lack of focus on how natural boundaries that should not be changed are being superposed with cultural or economically determined boundaries. Changes in administrative boundaries that do not follow natural boundaries affect the authority and responsibilities of both provincial and local governments in terms of land use and planning. This is because—with all these developments—politics affects planning. This situation constitutes the beginning of the deterioration of natural and ecological balance in human settlements.

In 1965, which was one of the first years in Turkey in which population data were documented more attentively, 34% of Turkey's population lived in cities. By 2000, this increased to 65%. In 2013, the year after the Metropolitan Law was changed, the urban population of Turkey was 92%, and it reached 93% in 2017 [46]. In other words, a change in the administrative quality of a settlement catalyses population relocation. In Turkey, population relocation occurs when the population moves to a place in which new employment opportunities have been created. This new employment area was located in a natural area, thus supporting the trend of urban expansion without limitation. Tables I and II demonstrate this clearly. Since the criteria for determining a province or county do not depend on scientific data, determining these boundaries becomes a way for politicians to secure votes and accumulate power under the guise of realizing promises to their constituents.

As mentioned above, changes in administrative boundaries that do not consider natural boundaries affect the general population while changing the number and style of administrative organizations. The number of counties in Turkey, which was 285 in 1923, increased by 95% to 555 in 1963—when Turkey entered its planned period—and increased by 53% to 849 in 2000 and again by 9% between 2000 and 2018 to finally reach 922. Thus, from 1923 to 2018, the number of counties increased by 230%. Moreover, while Turkey had 55 provinces in 1923, this number increased by 47% by 1999 to 81. This increase in the total number of provinces and counties, and thus in local administrations, was

similarly seen in the number of municipalities. From 1985 to 2012, the number of provincial, county, and district municipalities increased by 71%, from 1712 to 2934. With the introduction of the Metropolitan Law in 2012, district municipalities with populations less than 2000 or within the borders of metropolitan municipalities were closed and incorporated into county municipalities. Turkey had no metropolitan municipalities until 1990 in which eight metropolitan municipalities were established; the number of metropolitan municipalities doubled by 2000 to 16. From 2012 until today, 37% of the total number of provinces (30 provinces) in the country is metropolitan municipalities [38].

The data demonstrate the increase in the number of areas to which urban services are rendered and the increase in the number of people relocating from rural to urban areas—and thus, the enlargement (or mandatory enlargement) of urban areas. Services in these areas are provided by municipalities whose boundaries are changeable. Similarly, in the theory and practice of urban planning, there is no concern for defining urban boundaries; the size of urban areas is determined by the boundaries of municipalities that can be changed based on the requirements of the day.

When the basic philosophy of planning is to protect ecological balance, the primary value is not the economy but rather the laws of nature, including the continuance of balance. If administrative boundaries are not determined based on permanent natural boundaries but by arbitrary factors within physical planning, problems will inevitably occur. City boundaries must be determined in Turkey, because as can be seen in studies related to the subject (see [19]-[21], [24]), agricultural and protected areas will be destroyed entirely. Urban policy should take precedence over urban growth [25]. Determining urban boundaries may be one of these policies.

City is settled in rural areas [4] and therefore in agricultural areas. So, alternative planning is necessary [5]. If planning decisions are made well, rural areas will improve [44]. This study problematized the fact that urban area boundaries have never been thoroughly examined and that there is no scientific, directive, or determinative information about these boundaries in Turkey thus far (within the scope of economic urban planning and urbanization). This study also clarified that urban boundaries must be included in Turkey's planning legislation, and the examination results suggest that this type of boundary may be used as official data for base maps in the planning of all settlement areas. The authors attempt to explain this requisite by revealing that urban area boundaries become uncontrollable or uninspectable with the changes in population, provinces, counties, and municipalities mentioned above. Moreover, this study provides evidence for the necessity of defining urban area boundaries by demonstrating that planning in Bilecik Province and its counties, which is one of the most important cities in Turkey, has led to an increase in its urban area beyond the approved plans despite current laws and legislations in addition to urban developments that are not included in approved plans. Furthermore, the effects of the planning processes specific to Bilecik Province show the effects of political power in the

transformation of natural areas into urban areas without scientific examination.

II. MATERIAL AND METHODS

Urban boundaries are expanding in Turkey. Cities are being

established in formerly natural areas through contemporary planning processes. By examining these changes in Bilecik Province, this study aims to elucidate the need to delineate limits to urban expansion in Turkey.



Fig. 1 Position of TR41 Nuts 2 Region in Turkey



Fig. 2 Location of Bilecik, its Counties, and Neighbouring Provinces

Bilecik is one of three provinces (the others being Bursa and Eskişehir) that are included in the TR41 NUTS 2 Region of Turkey. The province has eight counties (Central, Bozüyük, Gölpazarı, İnhisar, Osmaneli, Pazaryeri, Söğüt, and Yenipazar). Bilecik Province is the only province that has territories in four different geographical regions, located at the intersection of the Marmara, Black Sea, Central Anatolia, and Aegean Regions [1]. The Nuts 2 Region, which includes the

province, contains approximately 30% of Turkey's population of 82,003,882 people, and Bilecik contains approximately 10% of the region's population [47]. Bilecik neighbours Bursa and Eskişehir Provinces, which are both pioneers and leaders in the manufacturing, commerce, and tourism industries, are important metropolitan areas in Turkey. Bilecik is far behind in these industries by both regional and national standards [1]. Thus, it has focused on economic development in recent years.

There are two essential reasons why Bilecik Province was selected for this case study to reveal the necessity of establishing limits to urban areas. First, since the authors of this study helped prepare the Spatial Strategy Plan of Bilecik Province, the plans were easily accessible. Second, in Bilecik, it is possible to show the damage caused to agricultural lands by the use of planning to increase urban areas and therefore compete with the country's leading provinces.

In order to provide evidence that urbanization damages agricultural and forested lands, data from both artificial areas (urban structures; industrial, commercial, and transportation units; mine pits; disposal and construction sites; artificial, non-agricultural green areas) (see Table I) and forested and semi-natural areas (forests, natural meadows, moors, sclerophyllous plants, areas of change in vegetation, coasts, beaches, shoals, naked rocks and sparse vegetation, burnt areas, icecaps and permanent snows) (see Table II) from between 1990 and 2012 in the counties within Bilecik Province were taken from the Corine Project, which is the database of the Ministry of Agriculture and Forestry [6].

TABLE I
SIZE OF ARTIFICIAL AREAS PER YEAR IN EACH COUNTY OF BILECIK PROVINCE¹ [6]

Counties	Years			
	1990	2000	2006	2012
Central (Merkez)	1036.51	1331.5	1926.16	2180.88
Bozüyük	1168.43	1380.95	1855.62	2133.41
Gölpazarı	260.41	342.28	326.32	326.32
Osmaneli	324.54	324.54	257.95	257.95
Söğüt	696.35	728.91	2225.58	2262.44
Pazaryeri	157.79	157.79	232.48	257.65
İnhisar	228.55	284.75	297.9	309.19
Bilecik Province	3872.59	4550.74	7122.01	7727.85

In reviewing Table I, it can be seen that in all counties and the entire province, excluding Osmaneli, artificial areas increased continuously between 1990–2012, while reviewing Table II reveals that forested and semi-natural areas decreased 8% throughout the entire province during the same period.

TABLE II
SIZE OF FORESTS AND SEMI-NATURAL AREAS IN EACH COUNTY PER YEAR [6]

Counties	Years			
	1990	2000	2006	2012
Central (Merkez)	48,188.46	47,958.41	45,884.16	45,762.87
Bozüyük	59,616.98	59,555.65	57,342.98	57,296.05
Gölpazarı	41,628.3	41,546.42	37,289.91	37,289.91
Osmaneli	29,021.92	29,000.00	28,668.11	28,668.10
Söğüt	33,075.29	33,042.72	29,918.79	29,903.97
Pazaryeri	22,103.04	22,085.07	18,873.33	18,826.77
İnhisar	22,064.11	22,007.90	18,299.30	18,288.00
Yenipazar	12,767.55	12,767.55	11,721.28	11,721.28

While artificial areas increased, forested, semi-natural areas, and agricultural lands decreased. The total cultivated agricultural land in the entire province was 111,497 ha in

¹ Reference includes only the data from 1990 to 2012. Data on Yenipazar County could not be found.

1995, which decreased by 22.5% to 86,555 ha in 2012. Moreover, in the 22 years between 1995 and 2017, the total cultivated agricultural land decreased by 25.6% and fell to 82,970 ha in 2017 [47].² This decrease in agricultural lands is directly related to development plans. The larger scale plans for Bilecik were approved in 2008 with the 1:100,000 scale Development Plan [33], [34], the Bursa-Eskişehir-Bilecik Region Plan for 2010–2013, and the Bursa-Eskişehir-Bilecik Region Plan for 2014–2023 [2], [3], [35].³ In those plans, highway projects intended to strengthen the connection between Bilecik and two neighbouring metropolises (Bursa and Eskişehir) and the High-Speed Train (HST) project [7] intended to strengthen the connection between Bilecik and Ankara and İzmir—two other metropolitan areas in Turkey—were accepted [12]. Within this scope, the General Directorate of Highways began road construction work on the Bilecik–Bursa highway (D160), passing through Central County and connecting to Bursa and the Bursa–Eskişehir highway (D200), which is parallel with the highway (D650) in Bozüyük [13]. These highways pass through many different types of landscapes and ecosystems. HST stations have been constructed by the Directorate General of State Railways in Central and Bozüyük Counties. Stations and routes are located on first-class agricultural land in Central County, and on second-, third-, and sixth-class agricultural lands in Bozüyük County. The route of the line that passes through Osmaneli County is located on seventh- and eighth-class agricultural lands, not with the intention of taking care of the agricultural land but out of necessity for route continuity. Fig. 3 is a map depicting the route of these works.

The disclosure reports of large-scale plans present a vision and aim section that attempts to emphasise economics, ecology, and social structure. However, as clarified below, the natural environment (in this case, agriculture) has been ignored because the economy was prioritized as the plans started to become physical. In other words, the economic return of agriculture as a sector was ignored, and urban areas were expanded. In order to illuminate this situation, all the plans that could be reached in the eight counties of Bilecik were examined. In the first stage of this study, the approved development plans and the Total Land Size of Bilecik Province and The Suitability of the Lands for Agricultural Use – Earth Classes Map for 1999—made by the T.R Prime Ministry Directorate General of Rural Services Directorate of Surveying and Project Department [14]—were superimposed. Then, the agricultural lands on which those developments occurred were determined. In the second stage, Google Earth Images, development plans, and the Earth Classes Map [14] from 2011, which is the first year that data were available, to 2018 were superimposed and compared to determine whether

² Since the first data set is from 1995, there are no data for total processed agricultural land from 1990 that reflects the data parameters in Tables I and II. Data for 2018 are been announced yet.

³ There was also a Spatial Strategy Plan made for Bilecik Province for 2018. The authors of this study helped prepare that plan. The plan is the first spatial strategy plan prepared under the partnership of University and Government in Turkey, but it has not been implemented yet.

the districts developed in accordance with the plan and on which agricultural lands those artificial areas were formed (Figs. 4-10). At this stage, when the Earth Classes Map from 1999, the satellite imagery from 2011 to the present, and the development plans made after 2011 were superimposed, the number of ha of plan decisions made on agriculture-class land could be calculated clearly. However, since the development plans prepared before 2011 were drawn on maps prepared by the authors of this study with the help of satellite imagery from the period, they could not be fully matched or superimposed with the satellite images obtained after 2011, and the number of ha of plan decisions according to soil class could only be calculated approximately. First, this revealed the

soil classes of the areas in which the plan decisions were made, which in turn explained the reasons for the decrease in agricultural lands. Second, this comparison revealed which plan decisions were applied and which areas of urbanization did not comply with the plan decisions. Settlements are given proportionally regarding their size and schematic form with three categories which are named settlements in compliance with the plan, settlements outside the planning area boundary and settlements not in compliance with the plan inside the planning area boundary. All results indicate the necessity of limiting urban areas. The results obtained for each county are detailed below.

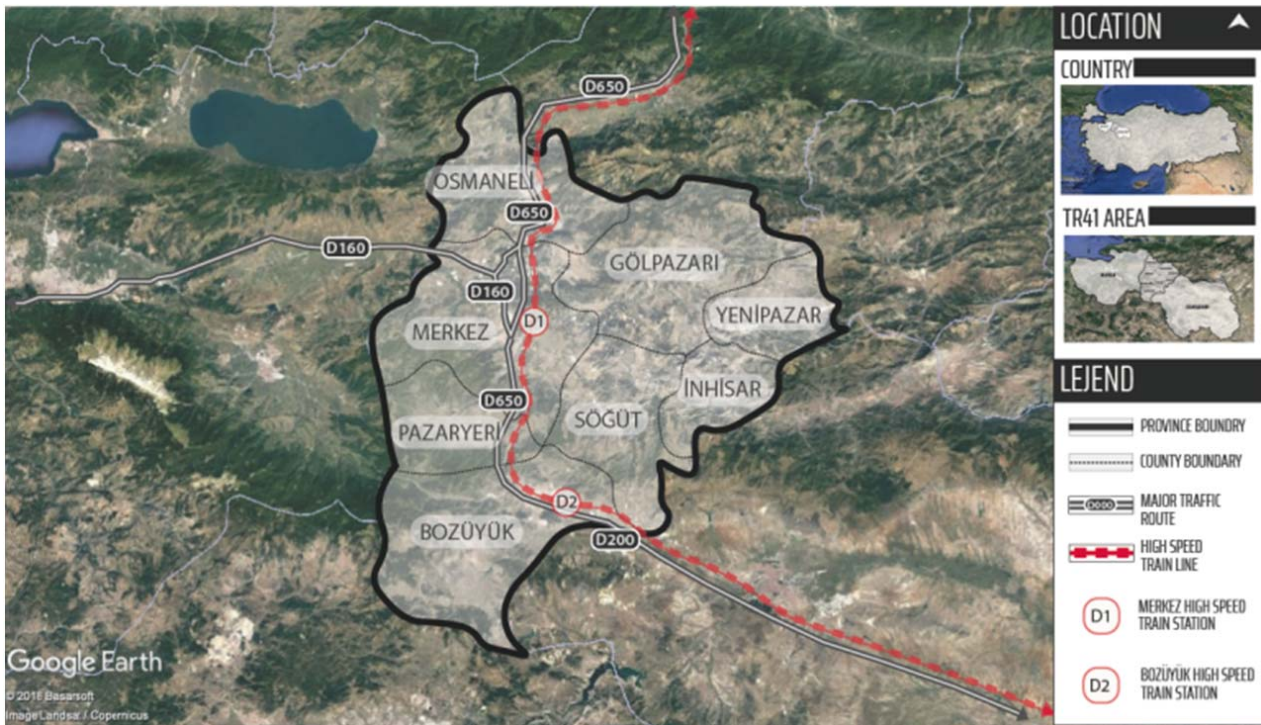


Fig. 3 Bilecik Province Upper-Scale Plans Transportation Decisions

III. RESULTS: RELATIONSHIP BETWEEN URBAN AREA CONSTRUCTION AND AGRICULTURAL LANDS: PLANS FOR THE COUNTIES WITHIN BILECIK PROVINCE

A. Bilecik Central County

In Central County, there are four development plans that were approved in 1956, 1972, 1990, and 1999. However, the plans and disclosure reports for 1956, 1972, and 1990 do not exist in the relevant municipality. Consequently, only the development plan for 1999 [28] could be evaluated.

1) Plan Decisions

The plan for Central County was made on first-, third-, fourth-, sixth-, and seventh-class agricultural lands. In the plan, 21,333 ha were added to the existing urban area of 1,793 ha, increasing Central County's urban area by 11 times to 23,126 ha.

The plan recommends preserving 1,186 ha of first-class agricultural land and 2,435 ha of third-class agricultural land as well as developing 5,262 ha of urban area on fourth-class agricultural land. The residual 12,450 ha were assigned to sixth- and seventh-class agricultural lands. Therefore, the decisions to use the first four classes of agricultural land in Central County accounts for approximately 42% of the total planning area with a size of 8,883 ha. However, the 'Regulation About Using Agricultural Lands for Purposes Other Than Agriculture' [27], which was published in the Official Gazette on 11 March 1989 and was valid when the plan was published, protected the first four classes of agricultural lands as 'the Land Suitable for Agriculture with Soil Cultivation' and decreed that these land classes could not be used for any purpose other than agriculture (Article 3). Despite this regulation, the city expanded onto agricultural

lands. The settlements and housing developments that comply with the plan, that are not within the planning area boundaries,

and that are within the planning boundary and do not comply with the plan are explained below (see Fig. 4).

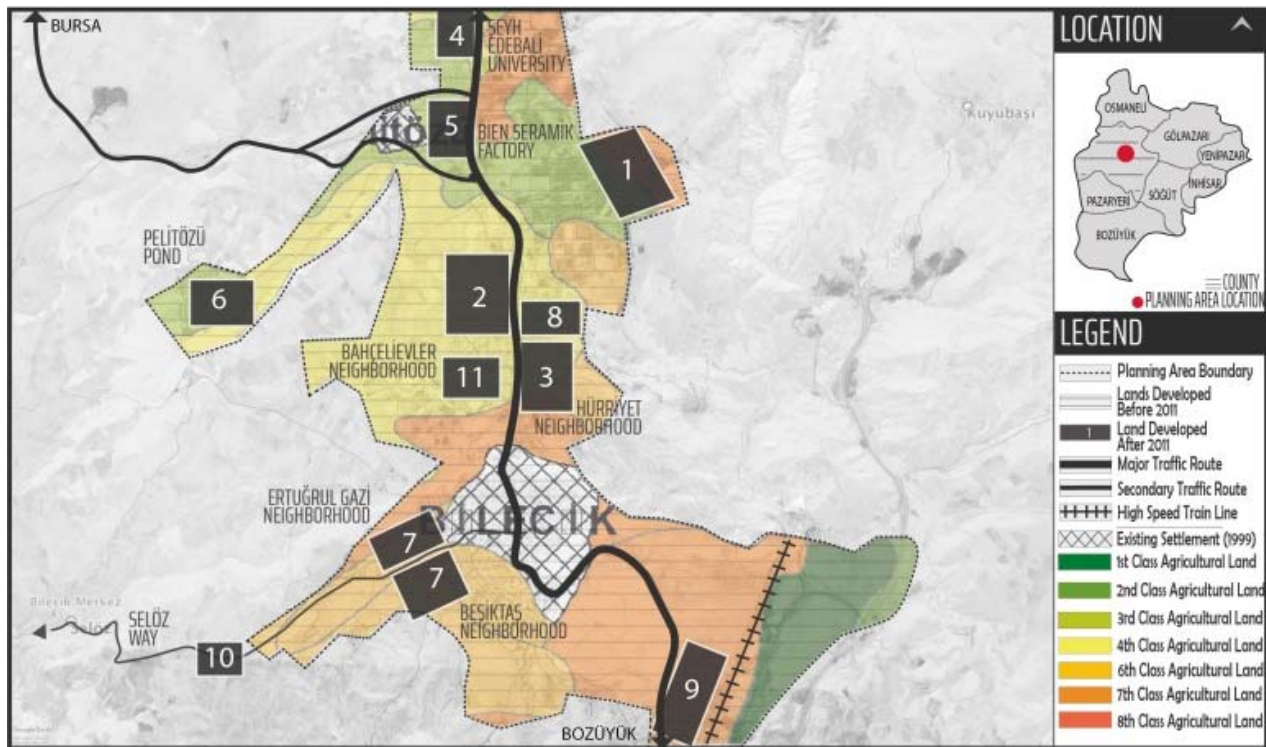


Fig. 4 Central County Satellite Pictures between 2011 and 2018 – Land Classes in 1999 – Mapping of Bilecik Additional and Revision Development Plan in 1999 [30]-[32]

a) Settlements in Compliance with the Plan

- (1) (2011–2016) Development in north-eastern part of the Bilecik first Organized Industrial Zone; approximately 58 ha on third-, sixth-, and seventh-class agricultural land.
- (2) (2011–2018) Residential development; approximately 87.8 ha on fourth-class agricultural land.
- (3) (2011–2013) Residential development; approximately 90 ha on fourth-, sixth-, and seventh-class agricultural land.
- (4) (2011–2013) Şeyh Edebalı University; 31.16 ha thus far (total area in the plan is 62.32 ha) on third-, fourth-, and seventh-class agricultural land.
- (5) (2011–2013) Development of the industrial area to the North and South; approximately 40 ha on third- and fourth-class agricultural land.
- (6) (2011–2013) Increase of water volume in Pelitözü Pond and strengthening transportation connections. Water volume data could not be obtained.
- (7) (2011–2013) Residential development; approximately 82 ha on sixth- and seventh-class agricultural land.
- (8) (2011) Development of the Small Industrial Zone; approximately 19 ha on fourth- and sixth-class agricultural land.
- (9) (2011) Residential development; approximately 75 ha on sixth-class agricultural land.

b) Settlements outside the Planning Area Boundary

- (10) (2011–2013) A housing development without a plan and planning permission; approximately 2 ha on sixth-class agricultural land.

c) Settlements not in Compliance with the Plan inside the Planning Area Boundary

- (11) (2011) Residential Area: The plan includes the construction of a 5-storey medium-density (121–250 person/ha) structure in the determined area of 2.5 ha. Based on this, the population forecast for this area would have been 121–250 people times 2.5 ha, or about 302 to 625 people/ha. However, as is common in Turkey, the plan was revised with a small ‘plan amendment’ (a type of revision) and turned into a planning decision for 13-storey (5 floors) and 16-storey (3 floors) structures by increasing the 5-storey construction decision. As a result of this transformation, while the current plans are being examined, a residential area has been constructed that contains 452 apartments in total with four apartments on each storey. When multiplying the three-person average household for Bilecik in 2018 [46] by total number of apartments (3 x 452), it can be determined that this development has a density of 1356 people/ha. While this density is much higher than that forecasted in the plan, it also does not include the social facilities (green area,

education areas, etc.) available per person that are predicted to be constructed in proportion to the population as stated in Article 11 of the Spatial Plans Construction Regulation, which is the basis for planning in Turkey, and Annex-2 Table.

B. Bozüyük County

The original implementation plan for Bozüyük county was developed in 1997, and three plans revising the 1997 plan were drafted in 2007; subsequently, a plan to revise the 2007 plan was proposed in 2012 [29]. Since the plans and plan reports for 1997 and 2007 could not be obtained, data on Bozüyük County were derived using the 2012 Additional and Revision Development Plan.

1) Plan Decision

The plan for Bozüyük was made using first-, second-, third-, sixth-, and seventh-class agricultural lands. Through this plan, 18,031 ha were added to the existing urban area of 3192 ha, increasing the urban area by 6 times to 21,223 ha.

The plan recommends preserving 1448 ha of first-class agricultural land and 6431 ha of second-class agricultural land, and developing 3640 ha of urban area on third-class agricultural land. The residual 6062 ha were developed on sixth- and seventh-class agricultural lands. Therefore, the first three classes of agricultural land in Bozüyük comprise

approximately 54% of the total planning area with a size of 11,519 ha. However, in the Soil Protection and Land Usage Law enacted on 15 December 2005 [26], which was in force when the plan was made, the first three classes of lands were deemed as unconditional agricultural land, and the protection of these lands was resolved (Article 13). Moreover, Articles 3, 9, 11, and 12 of the same law resolved the protection of land from all types of investment processes, preventing land loss and land degradation through the continuous protection of agricultural lands from urbanisation projects. There is even a report titled 'Agricultural Lands That are Usable and Shall Not be Opened to Settlement and Development and Conditions Determined by Provincial Directorate of Agriculture' that was submitted to urban planners through the Netcad portal, which is often used as an instructive and advising tool by urban planners in Turkey [44]. In accordance with this report, Sanctuary Preservation Areas are labelled as first-, second-, and third-class land groups and Prior Preservation Areas are labelled as fourth-, fifth-, and sixth-class land groups based on the definitions stated in the Land Capabilities Maps. In other words, urban planners that use the Netcad portal are frequently reminded of the Soil Protection and Land Usage Law and the land classes associated with it. Developments that are both in compliance and not in compliance with the planning area boundaries are presented below (see Fig. 5).

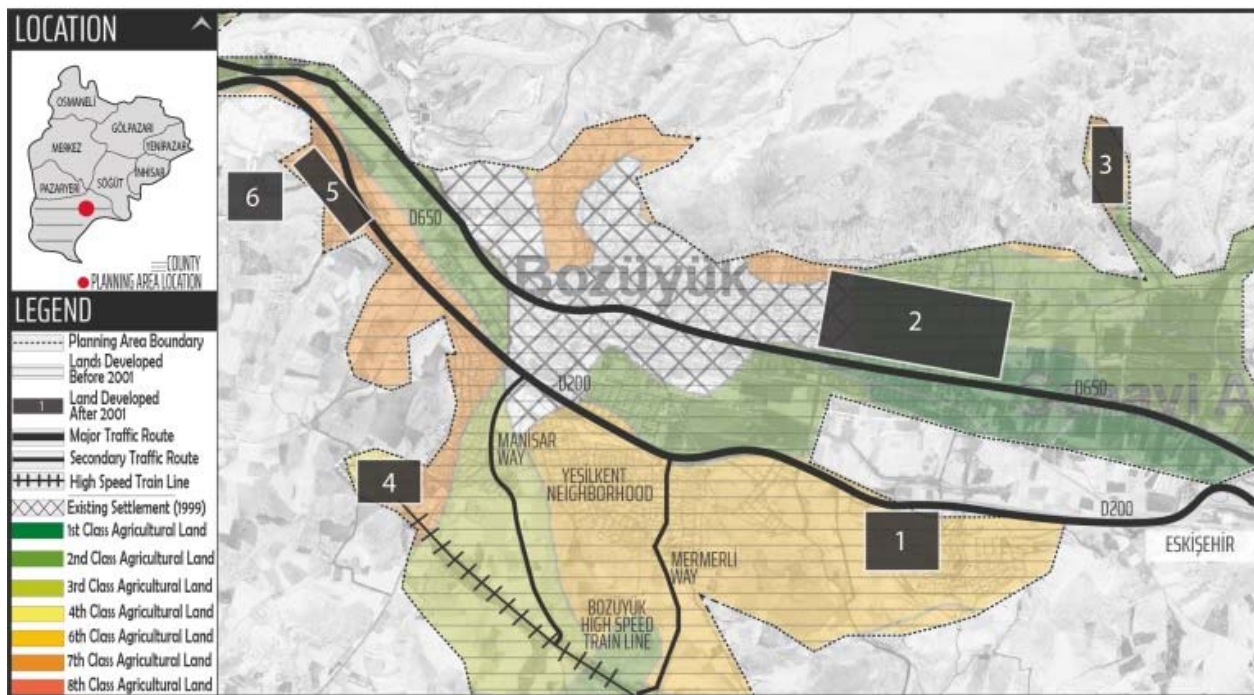


Fig. 5 Satellite Images between 2001 and 2018 in Bozüyük – Land Classes in 1999 – Mapping of Master Development Plan of Bozüyük in 2012 [30]-[32]

a) Settlements in Compliance with the Plan

- (1) (2001–2018) Residential development; approximately 28 ha on sixth-class agricultural land.
- (2) (2001–2018) Residential development; approximately 130 ha on second-class agricultural land.
- (3) (2001–2018) Industrial area; approximately 21 ha on second- and seventh-class agricultural lands.

- (4) (2010–2015) Residential development; approximately 24 ha on fourth- and seventh-class agricultural land built by the Housing Development Administration of Turkey (TOKİ).
- (5) (2011–2013) Usage of Commercial, Accommodation, Fuel Oil – LPG Station and Roadhouse Facilities of approximately 24 ha on seventh-class agricultural land.

b) Settlements Outside of the Planning Area Boundary

- (6) (2001) In this determined territory, in accordance with the Bozüyük Master Development Plan with a 1:5000 scale made in 2012, it is seen in the satellite images from 2018 that construction was started in the west of the area, which was designated for use by Commercial, Accommodation, Fuel Oil – LPG Station and Roadhouse Facilities. However, those areas currently consist of third-class agricultural lands, lands of other classes, and forested areas.

C. Gölpazarı County

Gölpazarı County's implementation plan, which was

approved in 1995, was revised in 2010 [36]. Studies of Gölpazarı were carried out using the Gölpazarı Additional and Revision Development Plan of 2010.

1) Plan Decision

The plan for Gölpazarı necessitated the use of first- and seventh-class agricultural lands. In the plan, 4284 ha were added to the existing urban area of 705 ha, increasing the urban area by 6 times to 4989 ha.

The plan for Gölpazarı recommends preserving 3010 ha of first-class agricultural land and developing 1274 ha of artificial area on seventh-class agricultural land. Therefore, the plan's use of first-class agricultural lands in Gölpazarı constitutes 60% of the planning area. In terms of Land Law no. 5403, which had been implemented prior to the creation of this plan, the recommendations and stipulations for Bozüyük County are also applied to Gölpazarı County. Developments that are both in compliance and not in compliance with the planning area boundaries are listed below (see Fig. 6).

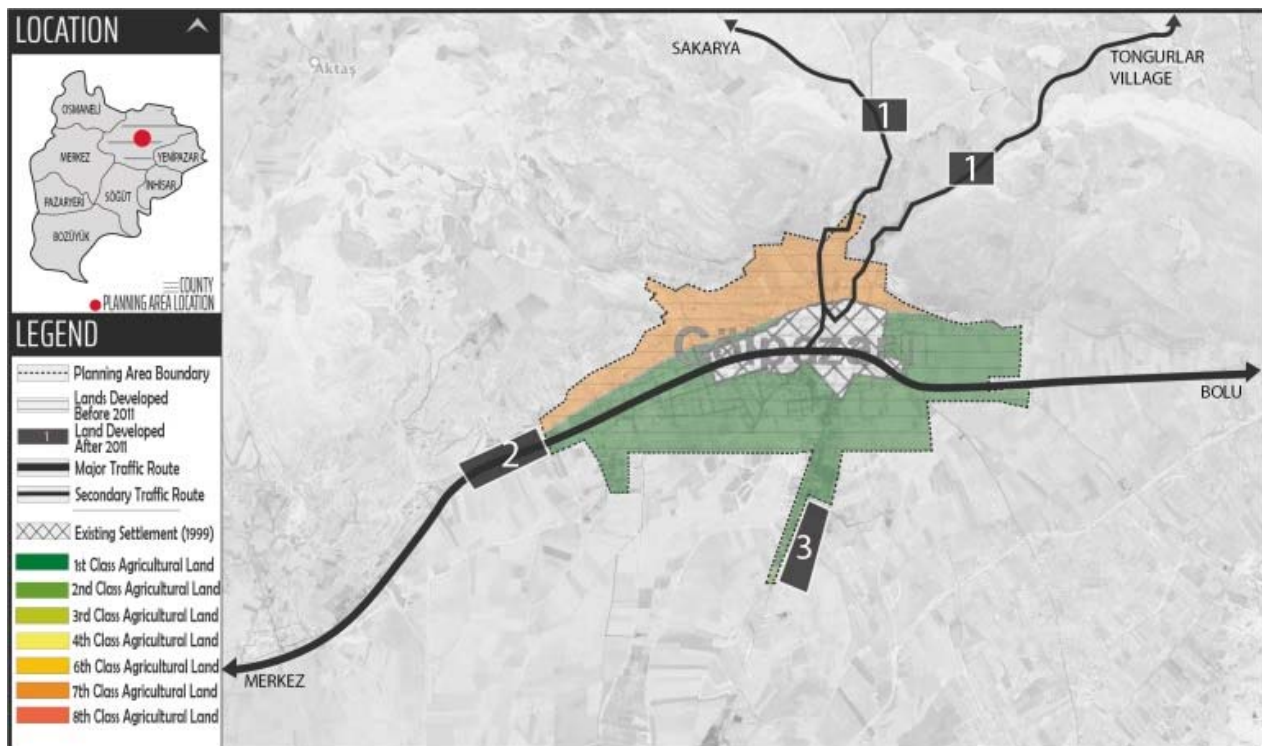


Fig. 6 Satellite Pictures between 2011 and 2018 in Gölpazarı – Land Classes in 1999 – Mapping of Gölpazarı Additional and Revision Development Plan in 2010 [30]-[32]

a) Settlements in Compliance with the Plan

- (1) (2011–2018) Reinforcement of village roads.

b) Settlements outside of the Planning Area Boundary

- (2) (2011–2018) Construction of the Penitentiary Institution of Gölpazarı; approximately 7 ha on seventh-class agricultural land.

- (3) (2011–2018) Establishment of small industrial units; approximately 6 ha on first-class agricultural land.

D. İnhisar County

There is no Master Development Plan with a 1:5000 scale made for the county. The only plan that is currently valid and enforced is the Implementation Development Plan from 1999 [37].

1) Plan Decision

The planning decisions were made using second-, third-, sixth-, and seventh-class agricultural lands. In the plan, 539 ha were added to the existing urban area of 157 ha, increasing the urban area by 4.5 times to 696 ha. This plan recommends preserving 23 ha of second-class agricultural land, 5 ha of third-class agricultural land, 423 ha of sixth-class agricultural land, and developing 243 ha of urban area on seventh-class

agricultural land. According to the 'Regulation About Using Agricultural Lands for Purposes Other Than Agriculture' from 1989 [27], which was also valid at the drafting of the plan, the recommendations and stipulations that are stated for Bilecik Central County are also valid for İnhisar county. Settlements that are both in compliance and not in compliance with the planning area boundaries are presented in Fig. 7.

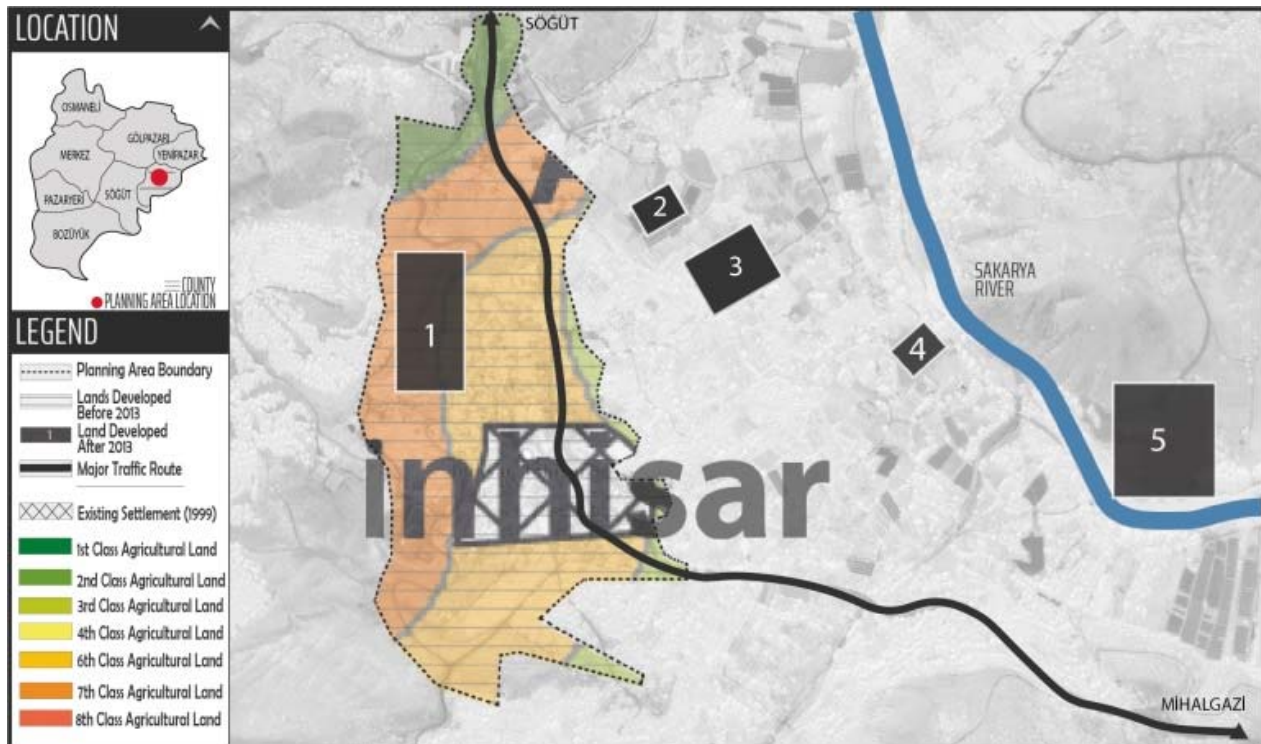


Fig. 7 Satellite Pictures between 2013 and 2018 in İnhisar – Land Classes in 1999 – Mapping of İnhisar Implementation Plan in 1999 [30]-[32]

a) Settlements in Compliance with the Plan

- (1) (2013–2018) Residential development in the northwest area of İnhisar; approximately 0.3 ha on seventh-class agricultural land.

b) Settlements outside of the Planning Area Boundary

- (2) (2013–2018) Construction of a solar energy power plant to the west of the Sakarya River; approximately 0.2 ha on third-class agricultural land.
- (3) (2013–2018) Construction of Greenhouse Facility in west of Sakarya River: approximately 1 ha in third-class agricultural land.
- (4) (2015–2018) Construction of an industrial facility to the west of the Sakarya River; approximately 0.3 ha on third-class agricultural land.
- (5) Construction works began in the northeast of the Sakarya River; approximately 2.7 ha on third- and eighth-class agricultural land.

E. Osmanieli County

The authors used the Implementation Plan in Osmanieli

County for 2004 [39] to evaluate this county.

1) Plan Decision

The planning decisions for this county were made using first-, second-, seventh-, and eighth-class agricultural lands. In the plan, 8079 ha were added to the existing urban area of 1967 ha, increasing the urban area by 8 times to 10,046 ha. This plan recommends preserving 373 ha of first-class agricultural land and developing 3779 ha of urban area on second-class agricultural land. The residual 3927 ha were assigned to seventh- and eighth-class agricultural lands. Therefore, the use of the first two agricultural land classes in Osmanieli County constitutes approximately 41% of the total planning area at 4152 ha. According to the 'Regulation About Using Agricultural Lands for Purposes Other Than Agriculture' from 1989 [27], which was valid when this plan was drafted; the recommendations and stipulations for Bilecik Central County and İnhisar County are also applied to Osmanieli County. Settlements that are both in compliance and not in compliance with the planning area boundaries are listed in Fig. 8.

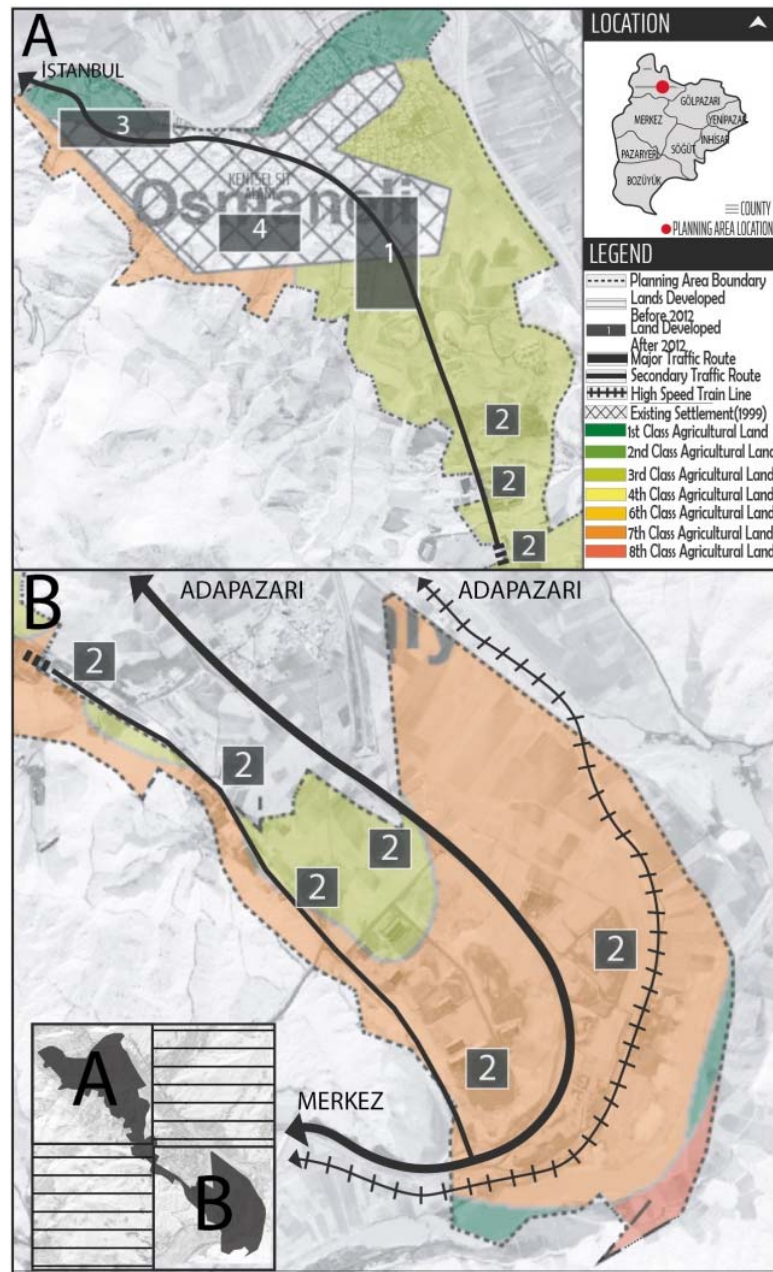


Fig. 8 Satellite Pictures between 2012 and 2018 in Osmaneli – Land Classes in 1999 – Mapping of Osmaneli Implementation Development Plan in 2004 [30]-[32]

a) Settlements in Compliance with the Plan

- (1) (2015–2018) Residential development; approximately 36 ha on third-class agricultural land.

b) Settlements outside of the Planning Area Boundary

- (2) (2012) Construction of industrial areas; approximately 10 ha on second-class agricultural land and approximately 26 ha on seventh-class agricultural land.

c) Settlements not in Compliance with the Plan inside the Planning Area Boundary

- (3) (2012–2018) Areas designated as green spaces and health facilities were constructed and structured as residential, educational, and commercial areas; approximately 30 ha on first-class agricultural land.
- (4) (2015) The protected urban area in this region—the size of which was announced to be minimized in 2004—was expanded in 2006 with a statement protecting this area's boundary.

F. Pazaryeri County

Plans that were enacted in Pazaryeri County include the Master Development Plan with a 1:5000 scale from 2016 [41] and the Implementation Plan with a 1:1000 scale. The reports for these plans could not be accessed through a related municipality.

1) Plan Decision

The planning decisions for this county used second- and third-class agricultural lands. In the plan, 919 ha were added to the existing urban area of 1876 ha, thus increasing the urban area by 2 times to 2795 ha.

The Master Development Plan recommends preserving 636 ha of first-class agricultural land and developing urban areas on 283 ha of third-class agricultural land. Therefore, the use of the first three classes of agricultural land in Pazaryeri County constitutes approximately 33% of the total planning area at 919 ha. In terms of Land Law no. 5403 [26], which was valid and in force at the creation of this plan, the recommendations and stipulations for Bozüyük and Gölpazarı counties are also valid for Pazaryeri County. Settlements that are both in compliance and not in compliance with the planning area boundaries are presented in Fig. 9.



Fig. 9 Satellite Images between 2010 and 2018 in Pazaryeri – Land Classes in 1999 – Mapping of Master Development Plan with a 1:5000 Scale of Pazaryeri in 2016 [30]-[32]

a) Settlements in Compliance with the Plan

(1) (2010–2018) Continuing construction of residential areas; approximately 68 ha on first-class agricultural land.

b) Developments outside of the Planning Area Boundary

(2) (2010–2018) Construction of industrial areas; approximately 42 ha on second-class agricultural land.

(3) (2010–2018) Continuing construction of residential areas; approximately 18 ha on first- and third-class agricultural land.

G. Söğüt County

Plans enacted in this county include the Master Development Plan with a 1:5000 scale dated to 2015 and the Implementation Plan with a 1:1000 scale [40].

1) Plan Decision

The plan suggests development on first-, second-, third-, sixth-, and seventh-class agricultural lands. In the plan, 6852 ha of land were added to the existing urban area of 1656 ha, increasing the urban area by four times to 8508 ha.

The Master Development Plan recommends preserving 1356 ha of first-class agricultural land and 1128 ha of second-class agricultural land, and developing 2783 ha of urban area on third-class agricultural land. The residual 1585 ha of land was assigned to sixth- and seventh-class agricultural lands. Therefore, the decision to use the first three classes of agricultural land in Söğüt County constitutes approximately 62% of the total planning area at 5267 ha. In terms of Land Law no. 5403, which was valid and in force at the creation of this plan, the recommendations and stipulations for Bozüyük, Gölpazarı, and Pazaryeri counties are also valid for Söğüt

County. Since the plan was approved more recently—in 2015—the settlements that do or do not comply with the plan within the planning area boundary could not be determined.

Developments that are not within the planning area boundaries are presented in Fig. 10).

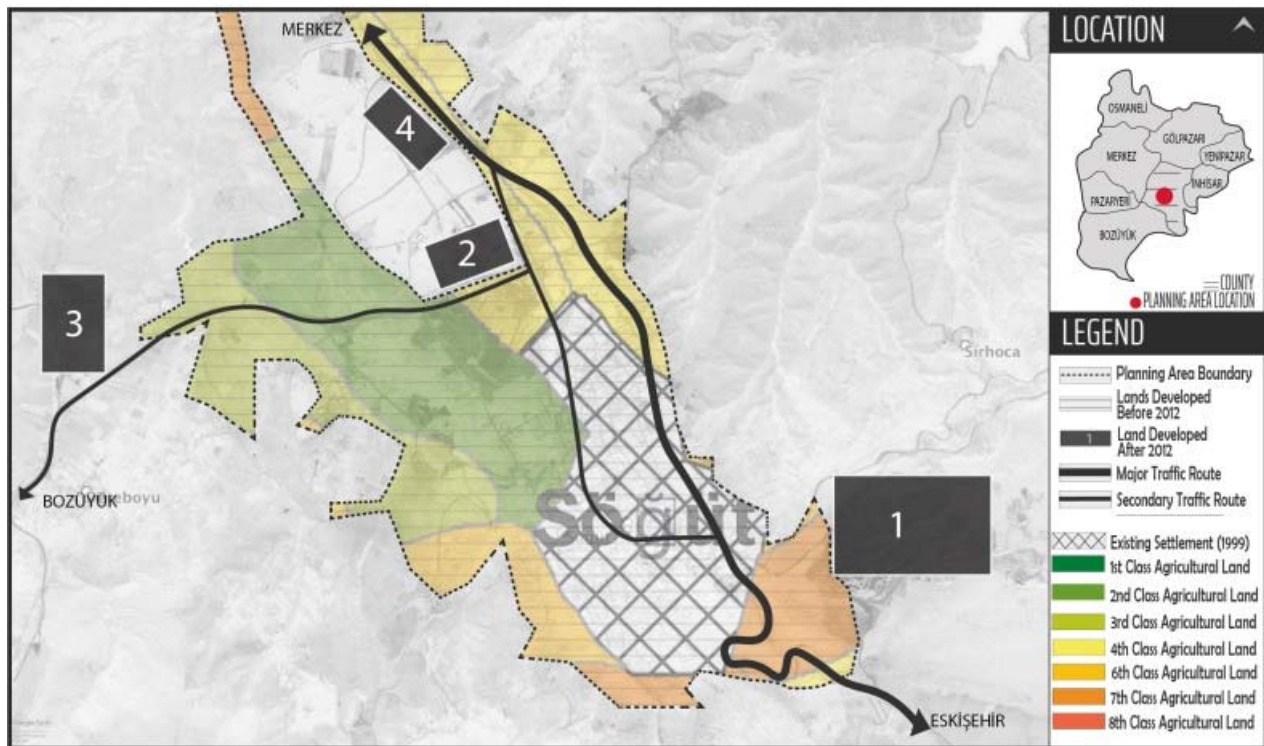


Fig. 10 Satellite Images between 2012 and 2018 in Söğüt – Land Classes in 1999 – Mapping of the Master Development Plan for Söğüt in 2015 [30]-[32]

a) Settlements Outside of the Planning Area Boundary

- (1) (2012–2018) Continuing construction works; approximately 47 ha on sixth- and seventh-class agricultural land.
- (2) (2012–2018) Continuing construction works; approximately 18 ha on first- and fourth-class agricultural land.
- (3) (2012–2018) Continuing industrial construction works; approximately 13 ha on first-class agricultural land.
- (4) (2012–2018) Continuing construction works; approximately 7 ha on fourth-class agricultural land.

H. Yenipazar County

Yenipazar County has only one Implementation Plan with a 1:1000 scale. In accordance with the planning hierarchy, there is no Master Development Plan with a scale of 1:5000, which must have been completed before the plan with a 1:1000 scale [42].

1) Plan Decision

Since there is no Master Development Plan with a 1:5000 scale in this county, planning decisions made for the city and which land classes were used could not be examined in detail. Furthermore, since there is no spatial change determined for 2018 and before in Google Earth satellite images of the

county, no evaluations could be made about whether any structuring does not follow the planning area boundaries. However, in the Implementation Plan, it can be seen that the county has been expanding northward and southward, and these expansions spread onto first-class agricultural lands.

IV. CONCLUSIONS

A boundary is defined as a limit—both the minimum and maximum extent to which something could quantitatively increase or decrease [45]. When this definition is adapted to urban areas, a maximum limit determines the physical and social boundaries of urban areas. In this context, the boundary can be qualified as a measurement of physical space [17]. Boundaries can also be natural or artificial. While natural boundaries are defined by geographical features, artificial boundaries generally depend on political decision-making [43]. Today, cities are considered to be areas that are waiting to be expanded at any moment, and their boundaries are determined without restraint [16]. Particularly in Turkey, as mentioned above, administrative boundaries are always changing as the number of provinces, counties, and municipalities continue to increase. All plans at any scale are made in accordance with these administrative boundaries. Therefore, plans use administrative boundaries rather than

natural boundaries as their reference data. Both the centralized administration and local governments change the areas under their power into investment areas in order to accrue votes. In other words, as the administrative boundaries in Turkey change, targeted dynamics in the city are effective. Thus, administrative boundaries and boundary changes are considered to be opportunities for legislating spatial changes rather than forming urban developments [8]. However, boundaries can be related to many different disciplines, such as boundaries for natural areas, international and national boundaries that are established politically, abstract boundaries that are established socially, and architectural boundaries, among others [48]. As the term boundary directly affects all types of information production levels in the science of physical planning, the boundaries for urban areas must be determined for each city by considering data and assessments of all scientific areas, and urban development at the expense of natural areas must be prevented. Otherwise, as seen in Bilecik Province and its counties, natural areas with special ecological and economical value will be lost, current plans will be changed, and the practice of changing planning decisions and settling outside of planned area boundaries will continue to be allowed.

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