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The Land Use Changes in the Çukurova University Campus

Çukurova Üniversitesi Yerleşkesinde Alan Kullanım Değişiminin Belirlenmesi

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ABSTRACT:
This study aimed to determine the land-use changes in the Cukurova University campus, providing ecosystem services to the city of Adana with its natural areas. Land uses of the study area were determined via GIS techniques. The Image results were verified by doing field studies. Also, the "Cukurova University Balcali Campus Construction Plan Amendment, 2017 with 1/1000 scale" was assessed to foresee the land-use changes in the future. The most critical land-use changes in the campus were on the campus central area and transportation network pressure increasing, especially after 2000. This change in land uses mainly caused the decrease in biological diversity and the distortion of the balance among other land uses such as forestation, agriculture, and meadow. Suggestions related to the campus central area and transportation network that would not harm or minimize the campus's natural ecosystems and biological diversity were made and mapped.

KEYWORDS: *Artificial surfaces, Campus, Cukurova University, Land use change, Urbanization.*

ÖZ:

Bu çalışmada doğal alanlarıyla, Adana kentine ekosistem hizmetleri sağlayan Çukurova Üniversitesi yerleşkesindeki alan kullanım değişimlerinin belirlenmesi amaçlanmıştır. Yerleşkedeki alan kullanım değişimleri uzaktan algılama tekniği ile belirlenmiştir. Elde edilen görüntüler, saha çalışmaları ile doğrulanmıştır. Ayrıca gelecekteki alan kullanım değişimlerinin öngörülebilmesi için 2017 yılı 1/1000 ölçekli Çukurova üniversitesi Balcalı Kampüsü İmar Planı Değişikliği de değerlendirilmiştir. En önemli alan kullanım değişiminin özellikle 2000 yılından sonra artan yapılaşma ve ulaşım ağı baskısı olduğu belirlenmiştir. Alan kullanımlarındaki bu değişimin, başta biyolojik çeşitliliğin azalması olmak üzere; ağaçlandırma, tarım ve mera gibi diğer alan kullanımları arasındaki dengenin de bozulmasına neden olduğu saptanmıştır. Yerleşkedeki doğal ekosistemler ve biyolojik çeşitliliğe zarar vermeyecek ve/veya en aza indirgeyecek optimal (en uygun) yerleşke merkez alanı ve ulaşım ağı güzergahı ile ilgili öneriler haritalanmıştır.

Anahtar Kelimeler: *Yapay yüzeyler, Yerleşke, Çukurova Üniversitesi, Alan kullanım değişimi, Kentleşme.*

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INTRODUCTION:

Urbanization (Glaeser, 1998), defined as the human movement from rural to urban areas, is one of the most critical 20th and 21st centuries issues. Cities become attractive to people due to the reasons such as the market fertility, employment, education, and health opportunities (Christopher, 2008). Therefore, there is a constant human movement from rural to urban areas. According to a report by United Nations (2018), the world's urban population ratio increased from 13% in 1900 to 30% in 1950, and it exceeded 55% in 2018. In 2030, the urban population will reach 60% and 68% in 2050. Due to the increasing population, natural ecosystems have become urban areas quickly, leading to urbanization (Attwell, 2000; Lo & Quattrochi, 2003; Wu et al., 2011; Zhang & Wang, 2018).

Land-use changes in the natural ecosystem losses cause too many negative impacts (McKinney, 2002; Grimm et al., 2008; Li et al., 2009; Yiğitcanlar, 2009; Lhotte et al., 2014). These negative impacts could be listed as the decrease in or extinction of biological diversity due to the deformation, fragmentation, and loss of habitats (Miller, 2005; Fuller et al., 2007; Zhang & Jim, 2014), the loss of ecosystem services, air pollution and negative impacts on the urban thermal environment (Huang et al., 2005; Barbera et al., 2010; Fang et al., 2015; Wang et al., 2020), water pollution (Bao & Fang, 2007, Xian et al., 2007; Ren et al., 2014) and soil pollution (Chen, 2007; Peng et al., 2013).

Cities becoming artificial surfaces are a clear example of the impact of human activities on natural resources. Since the world population continues to rise with urbanization, it is obligatory to take precautions to efficiently use natural resources in all aspects of human activities (Yiğitcanlar, 2009). Within this scope, the protection of natural and semi-natural areas in cities has gained much importance. Parks, city forests, gardens of public areas, and university campuses known as natural and semi-natural areas also gain importance. Recently, there have been many studies conducted on the issue of the provision and protection of environmental sustainability, especially on university campuses (e.g., Ertan & Perksoy, 2000; Venetoulis, 2001; Barnes & Jerman, 2002; Balsas, 2003; Bernheim, 2003; Alshuwaikhat & Abubakar, 2008; Samanta et al., 2011; Abbas & Arigbede, 2012; Sultana, 2013; Mosaind, 2014; Popoola et al., 2016; Choi et al., 2017; Colding & Barthel, 2017; Liu et al., 2017; Yücel et al., 2018; Shuqin et al., 2019; Yücel et al., 2019).

Today's campuses have become as complex as urban areas. Many campuses are planned as small cities due to their impacts on one another and their natural characteristics (Coulson et al., 2011). Similarly, as can be observed worldwide, natural and semi-natural ecosystems have been destructed due to rapid urbanization in Turkey. The areas with natural ecosystems, such as university campuses, are also important for Turkey. One of the mentioned areas is the Cukurova University campus in Adana.

Cukurova University, established with two faculties in 1973, sustains its educational, research, and scientific activities in 19 Faculties, 4 Colleges, 12 Vocational Schools, 1 State Conservatory, 4 institutes, and 38 Research and Application Centers. The campus population and artificial area ratio still rise with the establishment of new faculties. However, the campus contains forested areas, agricultural land, meadow, and natural and semi-natural ecosystems. Thus, it has a very rich biological diversity. 32.3% of the natural taxa in Adana, containing 10.7% of the plants in Turkey, are on the campus (Critical Ecosystem, 2017). A study by Yücel et al. (2019) specified that 21 out of 454 taxa detected within the campus borders are endemic. The campus is rich in flora and fauna (Yücel et al., 2018).

One of the main factors in protecting the natural and semi-natural ecosystems on the Cukurova University campus is the public administration area, which keeps the campus out of urbanization. Although the campus has been protected against urbanization pressure due to external factors, the artificial surfaces have increased with the newly opened faculties, leading to significant changes in land use.

This study aimed to determine the land-use changes in the Cukurova University campus, providing ecosystem services to the city of Adana with its natural and semi-natural areas. Within the scope of the study, the land-use changes on the Cukurova University campus were periodically determined, related plans were assessed, and the planned amendments were examined.

MATERIAL AND METHOD:

The study area was the Cukurova University Campus, located in the north of Adana city, in Saricam district borders and surrounded by the Seyhan Dam Lake in the east. It covers an area of 1 977, 26 hectares between 37°00'34" – 37°05'00" northern latitudes and 35°20'15"-35°23'30" eastern longitudes (Figure 1).

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Figure 1. Location of the research area.

Çukurova University was founded in 1973. The Faculty of Agriculture founded as a part of Ankara University in 1969, and the Cukurova Faculty of Medicine, founded as a part of Erzurum Atatürk University in 1972, were major educational institutions that were united under Cukurova University. The university initially had only two faculties. Today, it has 19 faculties, 4 academy colleges, 11 vocational schools, 1state conservatory, four institutes, and 38 research and application centers. There are a total of 54 737 registered students, 2 297 academic staff, 12 560 associate students, 33 633 undergraduate students, and 8 544 graduate students (Cukurova University, 2021).

Despite its intense use, the campus is a vibrant area with its fertile agricultural soils and morphology (Figure 2). Although all soil fertility classes are sectional and available on campus, especially classes I, II, and III are suitable for agricultural use in most of the area (Şenol et al., 1996). Mainly agriculture faculty students apply agricultural practices on those fertile lands located in the southern and south-eastern parts of the campus. These areas are significant for agriculture, and livestock farming practices provide essential habitats for many bird and plant species (Yücel et al., 2018).

The campus also has a very high morphological and biological diversity thanks to altitude variety, climate conditions, closeness to Seyhan Dam Lake, and protection against urbanization.

The campus is very important with its rich flora and fauna. Despite its rich natural resources, the increasing number of undergraduate students leads to the building of artificial surfaces on the campus, which has changed the land uses. Lambin (1997) specified that land-use change analyses are essential tools to assess the ecosystem changes and their environmental impacts on various periodical and spatial scales. Therefore, in this study, the artificial surfaces on the campus were examined to determine the land-use changes between the years 1985-1990-2000-2010 and 2019. The vector-based classification method, traditional image interpretation, and classification methods were used in the study. The classification was achieved by grouping the artificial surfaces, agricultural areas, forestation areas, meadows, and water surfaces as the main classes and separating each main class into sub-units. Google-earth images (1985-1990-2000-2010 and 2019) were the primary data mapped with ArcGIS 10.7 software. Image interpretation results from multispectral and field verification were compared to introduce the polygon layer attribute table, which yielded land-use changes in the area.

The approved plans related to the campus were examined to foresee the land-use changes in the future on the Cukurova University Campus. Especially the "Cukurova University Balcali Campus Construction Amendment" (approved by Adana Metropolitan Municipality Council; Date: 12.10.2017 and No:395) with a 1/1000 scale in which the new construction and transportation routes were planned was assessed. Considering the study results, the suggestions, including mapping the campus central area and transportation routes, were made for the Cukurova University campus.

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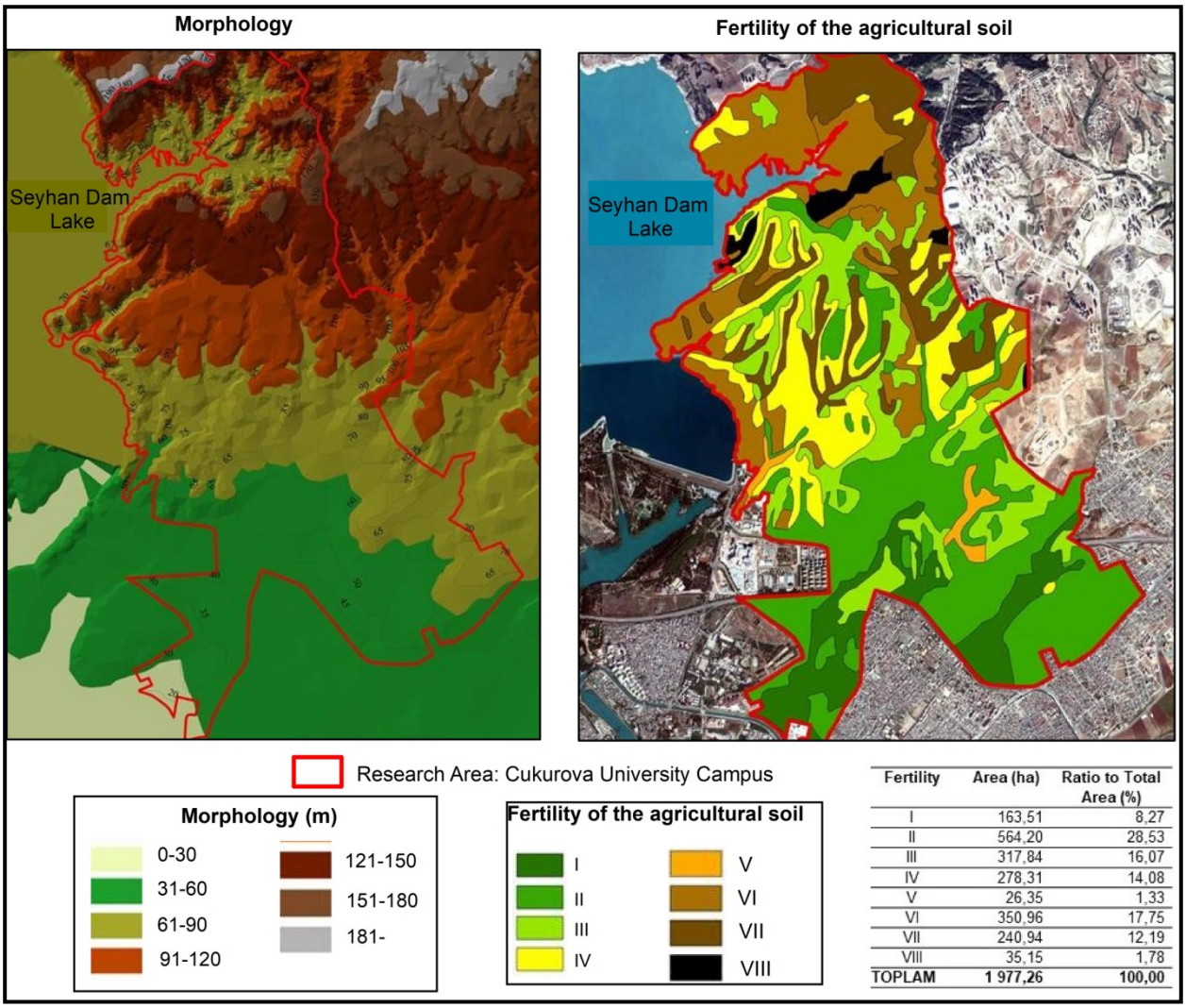

Fertility	Area (ha)	Ratio to Total Area (%)
I	163,51	8,27
II	564,20	28,53
III	317,84	16,07
IV	278,31	14,08
V	26,35	1,33
VI	350,96	17,75
VII	240,94	12,19
VIII	35,15	1,78
TOPLAM	1 977,26	100,00

Figure 2. Morphology and fertility of the agricultural soils and of the Cukurova University Campus (Developed from Şenol et al., 1996).

RESULTS AND DISCUSSION:

The study results showed that the most apparent changes occurred in the artificial surfaces on the campus center, in the transportation system, agricultural forestation, and meadow areas, respectively (Table 1 and Figure 3).

Table 1. Land use ratio of Cukurova University

Land Use	1985		1990		2000		2010		2019	
	(ha)	%	(ha)	%	(ha)	%	(ha)	%	(ha)	%
Out-of-property areas	0.00	0.00	0.00	0.00	0.00	0.00	16.43	0.77	168.98	7.87
Artificial surfaces										
Campus central area	75.07	3.50	80.83	3.77	92,81	4,32	128,65	5,99	148,74	6,90
Kindergarten	0.00	0,00	0.00	0.00	0.00	0,00	0.00	0,00	1.70	0.08

Techno city	0.00	0.00	0.00	0.00	0.00	0.00	9.37	0.44	11.16	0.52
Boat house	0.00	0.00	0.00	0.00	0	0.00	1.97	0.09	1.97	0.09
ASKI	0.00	0.00	0.00	0.00	0.73	0.03	0.73	0.03	0.73	0.03
Gas station	0.00	0.00	0.70	0.03	0.70	0.03	0.70	0.03	0.70	0.03
Personal Property	0.24	0.01	0.24	0.01	0.24	0.01	0.24	0.01	0.24	0.01
Guesthouse of Research Assistants	1.51	0.07	1.51	0.07	1.51	0.07	1.51	0.07	1.51	0.07
Camlitepe Public Houses	4.25	0.20	4.25	0.20	4.25	0.20	4.25	0.20	4.25	0.20
Sub-Tropic Fruits Res. and App. Center	18.49	0.86	18.49	0.86	18.49	0.86	18.49	0.86	18.49	0.86
Public Facilities and Public Houses	5.60	0.26	5.60	0.26	5.60	0.26	5.60	0.26	5.60	0.26
Production Area of Ornamental Plants	5.90	0.27	5.90	0.27	5.90	0.27	5.90	0.27	5.90	0.27
Fishing Facilities	5.16	0.24	5.16	0.24	5.16	0.24	5.16	0.24	5.16	0.24
Road	25.77	1.20	44.26	2.06	50.14	2.34	56.46	2.63	61.71	2.88
Refuge	0.92	0.04	0.92	0.04	8.77	0.41	12.27	0.57	12.27	0.57
Agriculture and Meadow Areas										
Field Agriculture	901.30	41.99	891.77	41.55	864.38	40.27	643.33	29.97	600.84	27.99
Horticulture	211.53	9.86	200.35	9.33	200.35	9.33	333.76	15.55	235.07	10.95
Graveyard	2.89	0.13	2.89	0.13	2.89	0.13	2.89	0.13	2.89	0.13
Botanic Garden	25.56	1.19	25.56	1.19	25.56	1.19	25.56	1.19	25.56	1.19
Agricultural Faculty Research and Application Farm	63.92	2.98	63.92	2.98	63.92	2.98	63.92	2.98	63.92	2.98
Meadow Areas	163.45	7.62	163.45	7.62	92.19	4.30	123.99	5.78	56.24	2.62
Open and Green Areas										
Forestation Area	496.95	23.16	494.95	23.08	573.10	26.72	579.03	27.01	568.52	26.31
Valley	35.60	1.66	35.60	1.66	35.60	1.66	26.61	1.24	7.86	0.37
Sport Area	8.01	0.37	8.01	0.37	9.41	0.44	15.21	0.71	15.21	0.71
Pond	0.00	0.00	0.00	0.00	2.02	0.09	2.02	0.09	2.02	0.09
Open Areas	80.01	3.73	77.77	3.62	68.41	3.19	42.60	1.98	97.16	4.76
Dormitories	14.11	0.66	14.11	0.66	14.11	0.66	19.59	0.91	21.84	1.02
TOTAL	**2146.24**	**100**	**2146.24**	**100**	**2146.24**	**100**	**2146.24**	**100**	**2146.24**	**100**

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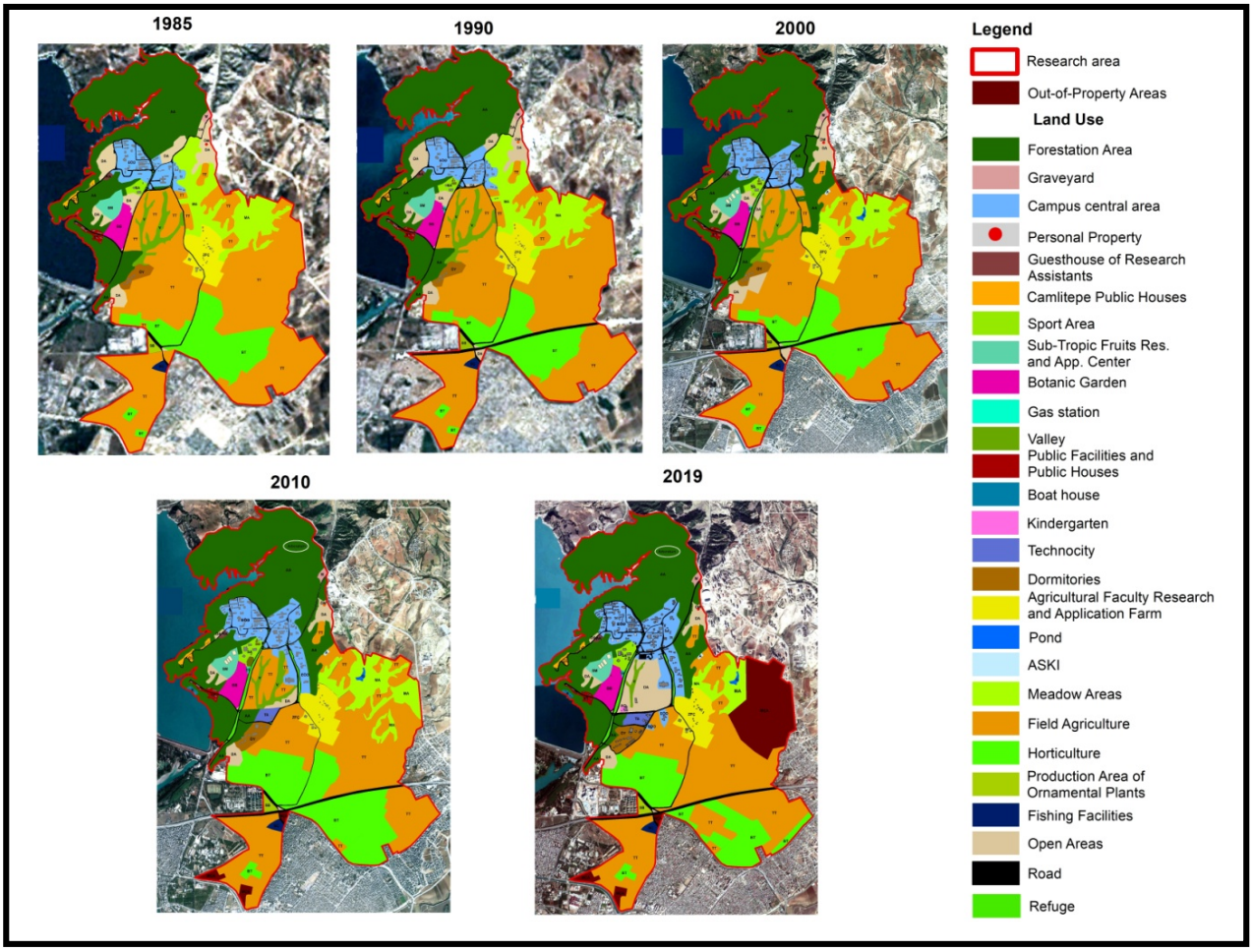

Figure 3. Land use of Cukurova University Campus by years.

The north-eastern side of the campus (Areas 2 and 3 in Figure 4) was accepted as the central campus before the 2000s. Since the number of faculties opened until the 2000s was low, the central campus area in the northeast grew slowly. However, the spatial growth in the campus center increased due to the newly opened faculties after the 2000s. Then, to not damage the forested areas in the north, the southern part of the campus was determined to be the central campus. As it was called "New Campus in the “Construction Amendment.” Such a change also led to a substantial loss of agricultural areas in the south (Area 4 in Figure 4).

Area 5 in Figure 4 remained under the pressure of the techno city, and area 6 was under the pressure of both the techno city and the intense artificial surfaces such as dormitories. Area 5 had been used for agriculture except for the valley before constructing the techno city in the field. Valleys had hosted an intense diversity of plant and animal species before they were filled with artificial surfaces such as techno cities, kindergartens, convention centers, and newly opened faculties, whose impacts have been evident, especially after 2010. Therefore, the plant species in the valleys have become extinct, and fauna species have disappeared (Yücel et al., 2018).

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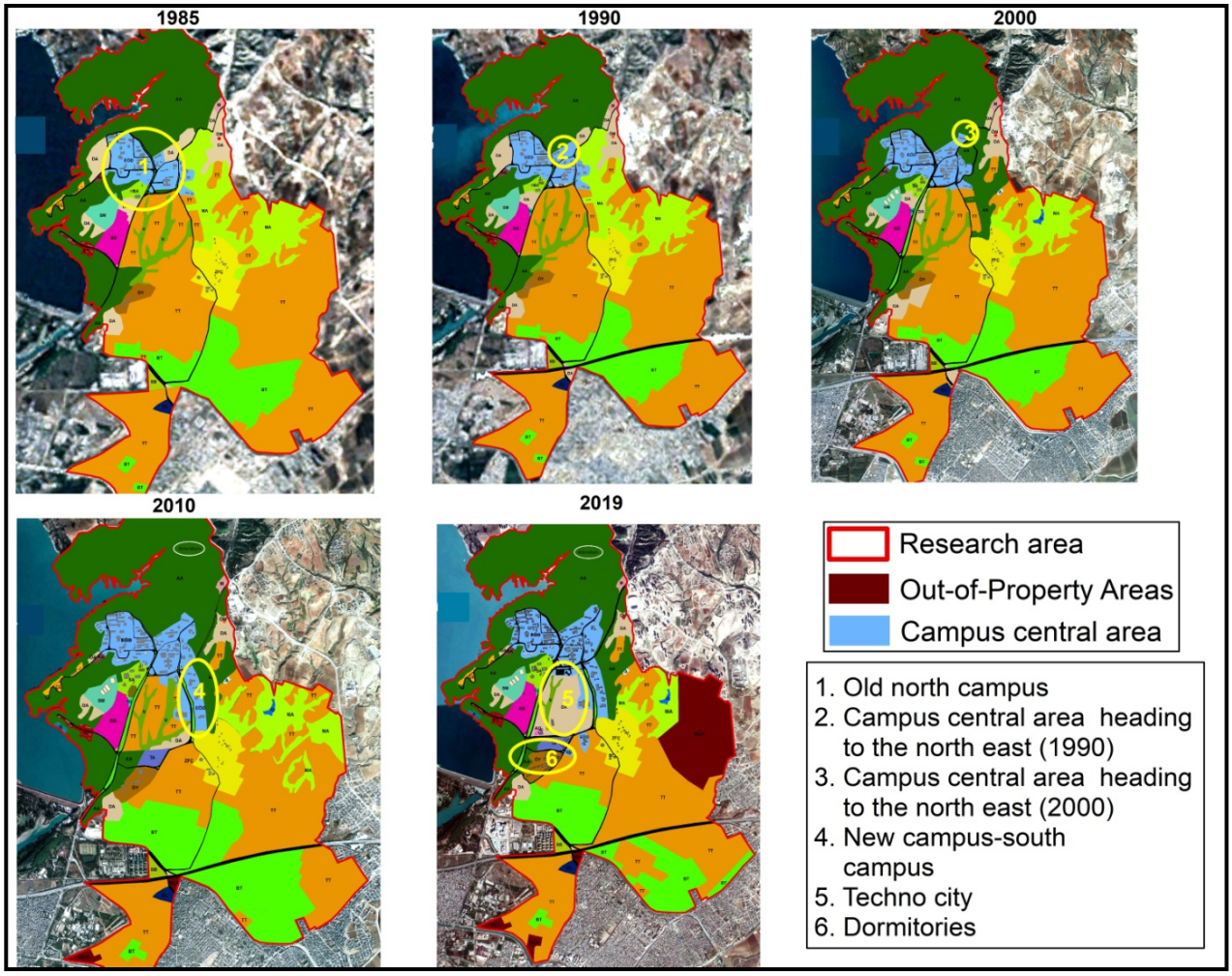

Figure 4. Change in academic land use by years.

The most notable change in the land use on the campus was the transportation system. As specified in Figure 5, TAG (Tarsus-Adana-Gaziantep) Highway was added to the campus land use in 1990. TAG Highway passes across the agricultural lands of the Agricultural Faculty Research and Application Farm in the southern part of the campus, which led to an 18.49 ha loss of the agricultural lands on the campus (Area 1 in Figure 5). Another change in the transportation system happened in 2000; a single-lane road was turned into a double-lane highway (Area 2 in Figure 5).

After the 2000s, the central campus area has expanded towards the south-eastern side, which resulted in more highway transportation requirements. Therefore, the central road was expanded from a single-lane to a double-lane for transportation to new faculties opened after 2000 (Area 3 in Figure 5). Also, new transportation networks were established for the new dormitories, which seemed necessary due to the increasing student population (Area 4 in Figure 5).

Another issue that should be addressed within the scope of the transportation network was the "İlim Way" project. The İlim Way passes across the border of the campus, and it gets connected to Catalan Way by passing as a transit line with a length of 4 kilometers and a width of 35 meters from the Agricultural Faculty Research and Application Farm areas, agricultural lands, and meadows (Area 5 in Figure 5). Approximately 2 km of the Ilim Way passes across the agricultural areas, 550 m across meadows, and 520 m across the Agricultural Faculty Research and Application Farm. Thus, approximately 73 500 m2 of agricultural areas, 19 250 m2 of meadows, and 18 200 m2 of agricultural soils get lost to the current route of the İlim Way.

In addition to the campus center and transportation network on the campus, a remarkable change was also observed in the agricultural areas. The new artificial surfaces, especially in the campus center and transportation system, were built on mainly Red Brown Mediterranean Soils and I., II. and III. soil fertility regions (Figure 2). Therefore, an apparent decrease in the agriculture areas

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has been observed recently. The agriculture areas, which were 901.3 ha in 1985, decreased to 643.33 ha in 2010, especially with the increasing facilities and highway transportation network after 2000, and it is approximately 600 ha today. "İlim Way," still under construction, is not even included in this analysis.

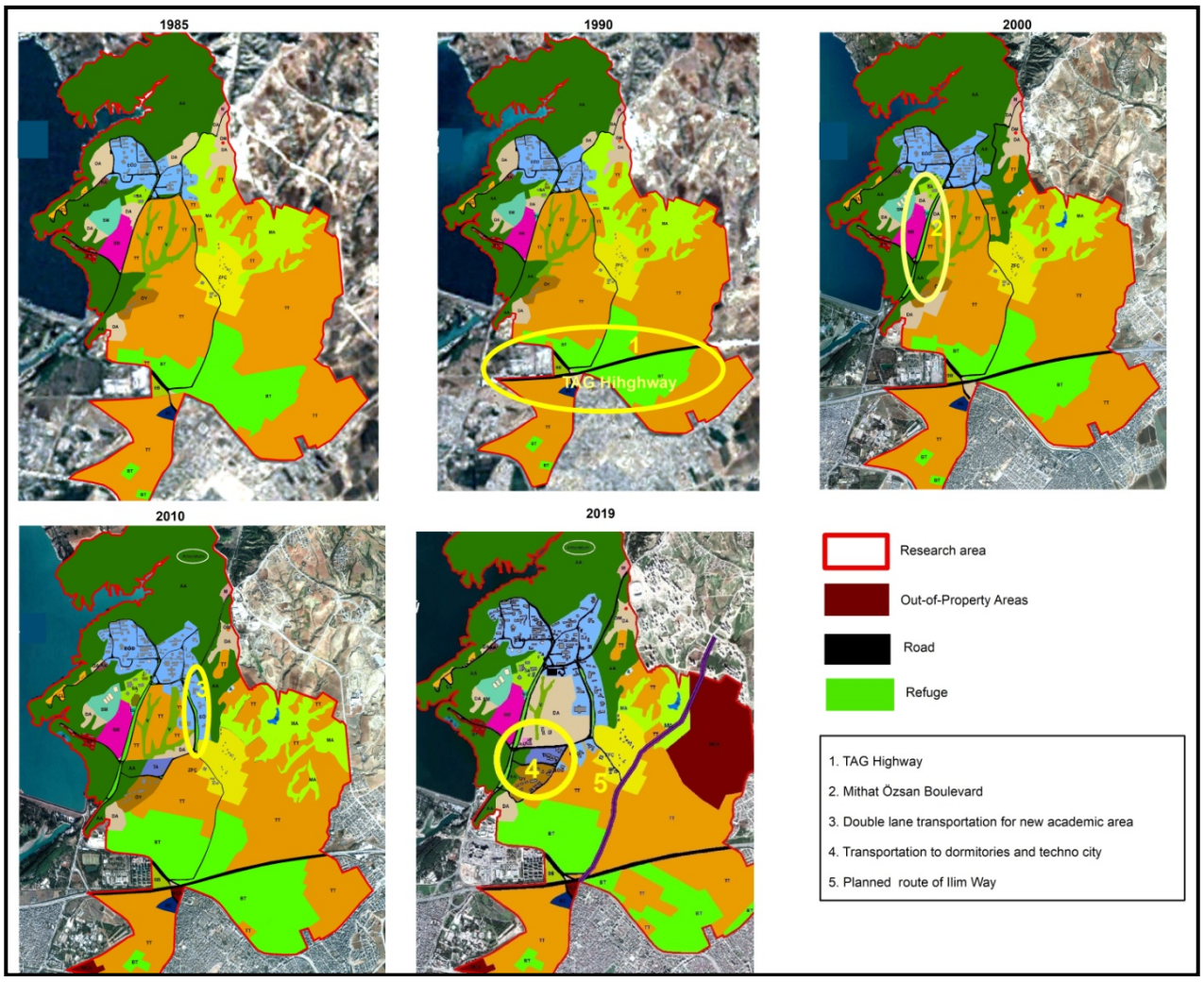

Figure 5. Change in campus road transport network by years.

As stated in the Construction Amendment, artificial surfaces such as the campus center and techno city were built in the southern part of the campus, which has ensured the protection of the forested areas in the north of the campus. The forests in the north, especially after the 1990s, have grown towards the southeast but partially occupied the meadows. Both the Southern Campus and the new forested areas have caused a decrease in the meadow areas. Such a change on the Cukurova University campus has brought about many environmental problems. Popoola et al. (2016) similarly stated that such changes harm the nature of the campus.

The degree of the anthropogenic factors, magnitude, and age of the campus also affect the plant species diversity and the sustainability of the natural ecosystems on campuses (Pautasso & Parmentier, 2007; Ferenc et al., 2014). Yücel et al. (2019) and Liu et al. (2017) have shown much evidence for the extent of the harm. The ancient and great campuses, such as the Cukurova University campus, have more habitats and diversity of species compared to the newly opened and small campuses. However, as specified by Aronson et al. (2014), this richness may disappear over time due to the reasons such as land-use change and socio-economic factors.

The most evident negative impact of the land-use change was observed in the losses of the arable lands on the campus. Especially the nature of valleys, as vital habitats for flora and fauna, have unfortunately been destroyed irrevocably and replaced with artificial surfaces. Moreover, open areas on the Cukurova University campus were also converted into artificial surfaces. The study findings

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showed that the most damaging land-use changes involved artificial surfaces and the transportation network on the campus (Table 2).

Table 2. Land-use changes of the Cukurova University Campus

Land use	1985		2019		Land use change	
	(ha)	%	(ha)	%	(ha)	%
Artificial surfaces	89.18	4.16	183.44	8.52	+94.26	+105.70
Transportation	26.69	1.24	73.98	3.45	+47.29	+177.18
Agriculture	1112.83	51.85	835.91	38.94	-276.92	-24.88
Meadow	163.45	7.62	56.24	2.62	-107.21	-65.59
Forestation	496.95	23.16	568.52	26.31	+71.57	14.40
Valley	35.60	1.66	7.86	0.37	-27.74	-77.92

Abbas & Arigbede (2012) specify that ecological factors should be considered and opening them to construction should be prevented. According to the study results, the most suitable area for new facilities on the Çukurova University campus were areas 1 and 2 in Figure 6 because those areas have lost their natural characteristics with the current changes and are among the built areas.

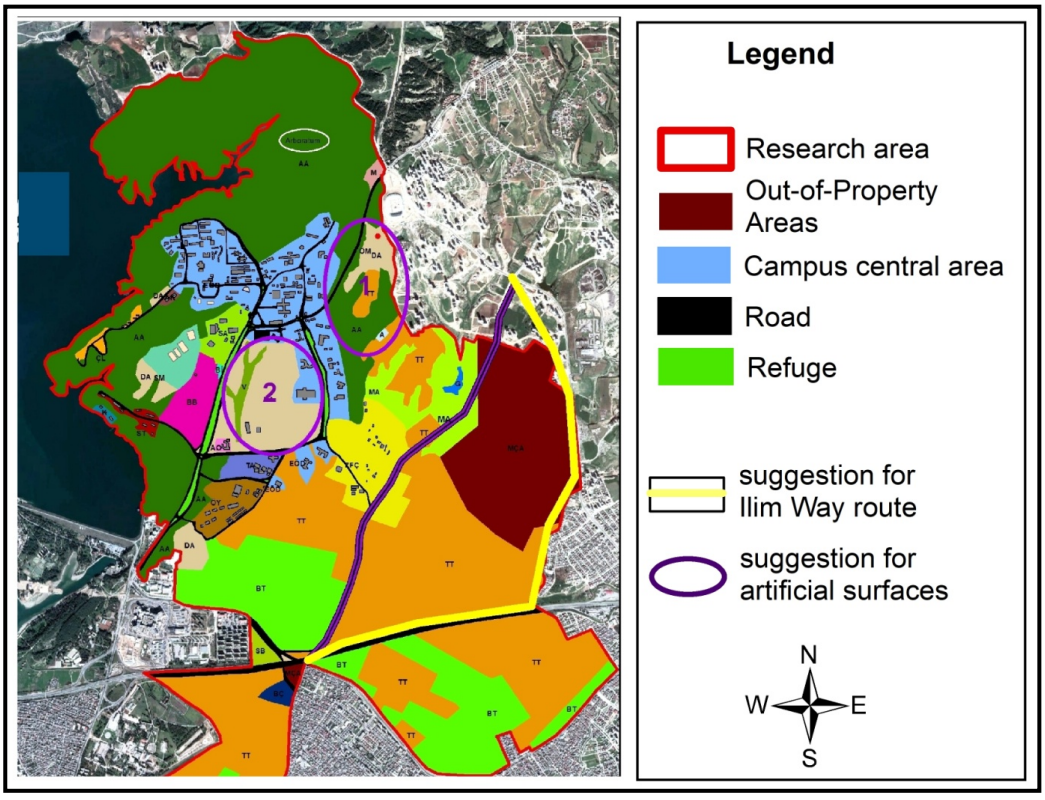

Figure 6. An alternative for the artificial surfaces on the campus and the route of Ilim Way.

Another critical point was the transportation network, particularly the "İlim Way," which was planned to cross the campus's agricultural lands and natural and semi-natural areas. In order to prevent habitat fragmentation, it is recommended that the İlim

Way be located in the area parallel to the TAG Highway and pass through the eastern boundary of the area (Figure 6). Thus, transportation can be directed to the newly opened Adana Koza Stadium and Alparslan Türkeş Science and Technology University, and thus the destruction in natural and semi-natural areas can be reduced.

CONCLUSION:

Cukurova University is one of the leading universities in Turkey. The number of students has gradually increased, and the Cukurova University campus has expanded spatially. This study showed that this spatial growth resulted in transforming natural and semi-natural areas into artificial surfaces on campus.

This study determined that the most critical change on the campus was the increasing pressure on the central area and transportation network. Agricultural lands were the most disadvantaged areas, followed by the other natural and semi-natural areas.

The increase in the construction and transportation network on the campus was undoubtedly necessary due to the development and growth of the university's capacity. However, the critical issue here was the planning of the construction process so that it would not harm the natural and semi-natural areas on the campus.

As in the world, campuses, parks, gardens, protected areas, and even graveyards play significant roles in decreasing the negative impacts of the intense constructing pressure stemming from the urbanization policies in Turkey. Since many campuses are located in natural and semi-natural lands outside of urban, as being public areas, they have been protected against urban construction pressure. However, they face internal construction pressure due to the growth and development policies like the Cukurova University campus. Therefore, the findings and recommendations of this study may contribute to the planning process of other similar campus areas in Turkey.

In conclusion, universities should have a holistic view of environmental issues and their roles and responsibilities. They should make decisions considering the current conditions and long-term impacts.

Compliance with Ethical Standard

Conflict of Interests: The author declare that for this article they have no actual, potential or perceived conflict of interests.

Ethics Committee Approval: Ethics committee approval is not required for this study.

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Extended Abstract

Cities becoming artificial surfaces are a clear example of the impact of human activities on natural resources. Since the world population continues to rise with urbanization, it is obligatory to take precautions to efficiently use natural resources in all aspects of human activities (Yiğitcanlar, 2009). Today's campuses have become as complex as urban areas. Many campuses are planned as small cities due to their impacts on one another and their natural characteristics (Coulson et al., 2011). Similarly, as can be observed worldwide, natural and semi-natural ecosystems have been destructed due to rapid urbanization in Turkey. The areas with natural ecosystems, such as university campuses, are also important for Turkey. One of the mentioned areas is the Cukurova University campus in Adana. Cukurova University, established with two faculties in 1973, sustains its educational, research, and scientific activities. However, the campus contains forested areas, agricultural land, meadow, and natural and semi-natural ecosystems. Thus, it has a very rich biological diversity. This study aimed to determine the land-use changes in the Cukurova University campus, providing ecosystem services to the city of Adana with its natural and semi-natural areas. Within the scope of the study, the land-use changes on the Cukurova University campus were periodically determined, related plans were assessed, and the planned amendments were examined.

in this study, the artificial surfaces on the campus were examined to determine the land-use changes between the years 1985-1990-2000-2010 and 2019. The vector-based classification method, traditional image interpretation, and classification methods were used in the study. The classification was achieved by grouping the artificial surfaces, agricultural areas, forestation areas, meadows, and water surfaces as the main classes and separating each main class into sub-units. Google-earth images (1985-1990-2000-2010 and 2019) were the primary data mapped with ArcGIS 10.7 software. Image interpretation results from multispectral and field verification were compared to introduce the polygon layer attribute table, which yielded land-use changes in the area.The approved plans related to the campus were examined to foresee the land-use changes in the future on the Cukurova University Campus. Especially the "Cukurova University Balcali Campus Construction Amendment" (approved by Adana Metropolitan Municipality Council; Date: 12.10.2017 and No:395) with a 1/1000 scale in which the new construction and transportation routes were planned was assessed.

This study determined that the most critical change on the campus was the increasing pressure on the central area and transportation network. Agricultural lands were the most disadvantaged areas, followed by the other natural and semi-natural areas. The new artificial surfaces, especially in the campus center and transportation system, were built on mainly Red Brown

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Mediterranean Soils and I., II. and III. soil fertility regions. Therefore, an apparent decrease in the agriculture areas has been observed recently. The agriculture areas, which were 901.3 ha in 1985, decreased to 643.33 ha in 2010, especially with the increasing facilities and highway transportation network after 2000, and it is approximately 600 ha today.

The most evident negative impact of the land-use change was observed in the losses of the arable lands on the campus. Especially the nature of valleys, as vital habitats for flora and fauna, have unfortunately been destroyed irrevocably and replaced with artificial surfaces. Moreover, open areas on the Cukurova University campus were also converted into artificial surfaces. The study findings showed that the most damaging land-use changes involved artificial surfaces and the transportation network on the campus.

According to the study results, the most suitable areas for new facilities on the Çukurova University campus were determined and mapped. Those areas have lost their natural characteristics with the current changes and are among the built areas. Another critical point was the transportation network, particularly the "İlim Way," which was planned to cross the campus's agricultural lands and natural and semi-natural areas. In order to prevent habitat fragmentation, it is recommended that the İlim Way be located in the area parallel to the TAG Highway and pass through the eastern boundary of the area. Thus, transportation can be directed to the newly opened Adana Koza Stadium and Alparslan Türkeş Science and Technology University, and thus the destruction in natural and semi-natural areas can be reduced.

As in the world, campuses, parks, gardens, protected areas, and even graveyards play significant roles in decreasing the negative impacts of the intense constructing pressure stemming from the urbanization policies in Turkey. Since many campuses are located in natural and semi-natural lands outside of urban, as being public areas, they have been protected against urban construction pressure. However, they face internal construction pressure due to the growth and development policies like the Cukurova University campus. Therefore, the findings and recommendations of this study may contribute to the planning process of other similar campus areas in Turkey.