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Green Design in Urban Squares: Ecological Urban Consciousness in Landscape Architecture Education

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Abstract
Due to increase in population density in cities, unplanned urbanization, where built areas proliferate and concrete and impermeable surfaces are predominant, have started to capture cities. While this causes the natural environments and green areas in cities to decrease day by day, it also directly affects the formation of heat islands in the cities, air pollution and the decrease in the quality of life of people. Since landscape architecture is a discipline that deals with the planning, development, protection and design of rural and urban open spaces that can make the future better, teaching students the importance of the ecological city and the criteria of designs for this should be the primary goal in universities. The area, which was determined as an Urban Transformation area by Trabzon Municipality and planned to be designed as Karagöz Square, was studied within the scope of Karadeniz Technical University Landscape Architecture Environmental Design Project 4 in the fall semester of 2019-2020. The lecturer of the course aimed to teach the students the awareness of green design-oriented city square solution in line with ecological city criteria. Within the scope of this study, course data were examined with ecological city criteria.
Keywords: Ecological City; Green Design; Green Roofs; Urban Square.

Kent Meydanlarında Yeşil Tasarım: Peyzaj Mimarlığı Eğitiminde Ekolojik Kent Bilinci

Özet:
Kentlerdeki nüfus yoğunluğunun artması ile yapısal alanların çoğaldığı, beton ve geçirimsiz yüzeylerin ağırlıklı olduğu plansız kentleşmeler, şehirleri esir almaya başlamıştır. Bu, kentlerdeki doğal ortamların ve yeşil alanların her geçen gün giderek azalmasına neden olurken, ekolojik dengenin bozulmasına, kentlerde ısı adaları oluşmasına, hava kirliliğine ve insanların yaşam kalitesinin azalmasına da doğrudan etki etmektedir. Peyzaj mimarlığı geleceğin daha iyi olmasını sağlayabilecek kırsal ve kentsel açık mekanların planlanması, geliştirilmesi, korunması ve tasarlanması ile ilgilenen bir disiplin olduğu için, peyzaj mimarlarının yetiştirildiği üniversitelerde öğrencilere ekolojik kentin önemi ve buna yönelik tasarımların öğretilmesi öncelikli hedef olmalıdır. 2019-2020 güz yarıyılında, Karadeniz Teknik Üniversitesi Peyzaj Mimarlığı Çevre Tasarım Proje 4 Kapsamında, Trabzon Belediyesi tarafından Kentsel Dönüşüm alanı olarak belirlenen ve Karagöz Meydanı olarak tasarlanması planlanan alan, çalışılmıştır. Dersin yürütücüsü ders kapsamında, ekolojik kent kriterleri doğrultusunda yeşil tasarım odaklı kent meydan çözüm bilincini öğrencilere öğretmeyi hedeflemiştir. Bu çalışma kapsamında ders çıktıkları ekolojik kent kapsamında irdelenmiştir.
Anahtar Kelimeler: Ekolojik Kent; Yeşil Tasarım; Yeşil Çatı; Kent Meydanları.

1. Introduction

Cities began to enter a rapid urbanization process, especially with the industrial revolution in the 18th and 19th centuries. The foundations of environmental problems in today's world began to be laid at that time Increasing population density in urban areas all over the world and their needs have led to the emergence of urban sprawl and irregularly growing cities (Kaya & Susan, 2020). These cities started to harm the natural environment and faced with the depletion of natural resources. Increasing carbon footprint due to the increasing greenhouse gases in the atmosphere, the expanding settlement surface and the widespread use of automobiles causes the extinction of living species in the world, the reduction of forest areas, water pollution-scarcity, increase in the amount of toxic substances, desertification, growing problem such as climate change and a threats on a global scale (Yang ve diğerleri, 2016). As a result of these problems, the world society, confronted with the fact that the natural environment and resources are limited, has begun to bring new urban planning approaches to the agenda.

The pioneer of these approaches is "Sustainable Development" (Brundtland Report, 1987; Barlett, 2012). This report, also known as "Our Common Future", has revealed not only the environmental but also the social and economic dimensions of sustainability. As a result, the main objectives of sustainable development are the protection of natural resources, meeting the needs of today and their capacity to meet the needs of future generations without risking them, and leaving livable environments for future generations.

With the sustainable development approach, different approaches have emerged according to the urbanization style and planning approach of a city. These are various approaches such as 'smart growth', 'new urbanism' and 'green building movement' (Farr, 2008), 'compact city', 'ecological cities', 'green cities' and 'livable cities' (Van Kamp et al., 2003). All of these approaches basically aim to control the growth and development of cities and to produce urban environments that are healthier, more compatible with nature and high quality of life. Since ensuring global sustainability necessitates the ecological, social, cultural and economic sustainability of cities, it is expected that the practices implemented at the local scale will be effective on a global scale (Aklanoğlu, 2009; Kaya & Susan, 2020).

Landscape architects can also support sustainable environments by relieving problems such as air pollution, hydrological degradation, heat island effects and global warming with the green-focused environments they design. For this reason, it has been the primary goal of the researchers to guide landscape architect students to adopt the importance of green-oriented, ecological cities and to reflect them on their environmental designs.

1.1. Ecological Cities - Urban Squares - Landscape Architecture

The ecological city phenomenon is an urban design and implementation approach in which the city and the environment are handled in relation and interaction with each other (Tosun, 2017). Ecology is reflected in the space integrated with technology and reveals an alternative city vision in harmony with nature, economically competent and socially compatible (Kaya & Susan, 2020). Ecological city implementation includes the development of new cities and the strengthening of existing ones; It is formed in a wide range from holistic approaches covering the whole of the city to regional and local implementation.

The reason for the emergence of ecological urban attempts is climate change. It focuses on carbon footprint and low-carbon development and the combined use of technologies by ensuring smart and efficient use of resources. It proposes the use of different modes of transport with medium-high densities and strong connections in the design of urban areas. For example, promoting the use of bicycles or public transportation by minimizing the use of private vehicles, can be listed as the primary goals of sustainable transportation. In addition, it includes universal technologies such as smart grid, water treatment systems, solid waste management systems, solar technology, renewable energy, education (information and awareness) activities on ecological and environmental protection, the use of environmentally friendly and compatible materials, real-time transportation information. (Gül & Polat, 2002; Sharifi, 2016).

In the effort to become an ecological city, especially, impermeable surfaces covered with concrete and asphalt should be reduced, the amount of green areas should be increased, a balanced distribution should be ensured between buildings, roads and green areas, green roof systems should be increased, thus reducing the heat island effect. in settlements, giving importance to street life characteristics such as being in touch with nature, livable, safe and comfortable walking paths, open areas, parks, shops and cafes and characteristics supporting social life and should be taken into account (TBB, 2017). Thus, the city must be both a center of attraction and a part of the global and regional economy (Graedel, 1999).

As a result, the ecological city is a very comprehensive city model that cannot be handled alone, based on many criteria, and can be reached by governments and experts by acting together. Therefore, for the realization of the eco-city, citizens and the administration must unite and strive around the needs of the eco-city. We can list these requirements as follows; (Akçakaya, 2019; Łobejko, 2015)

1. **Ecological Safety:** Clean air and reliable water sources, healthy housing and workplaces, healthy food, municipal services and protection against disasters**.**
2. **Ecological Sanitation:** An efficient, cost-effective eco-engineering for the treatment and recycling of sewage waste, polluted water and other waste**.**
3. **Ecological Industrial Metabolism:** Conservation of resources and the environment industrially (through reuse of materials, life cycle production, renewable energy, efficient transport and meeting human needs).
4. **4.Eco-landscape:** To maximize biodiversity and to maximize the city's accessibility for all citizens while conserving energy and resources, areas such as parks and plazas, building connectors and waterways such as streets and bridges so that automobile accidents, air pollution, relieve problems such as hydrological deterioration, hot island effects and global warming.
5. **Ecological Awareness:** Helping people understand their place in nature, cultural identity, environmental responsibility and change their consumption behavior**.**

However, the features that can transform a settlement into an ecological city are listed as follows (Akçakaya, 2019; Roseland, 1997; Urban Ecology, 1996; Kaya & Susan, 2020; Tosun, 2017; Çetinkaya 2013)

- Establishing transport priorities that support pedestrian and bicycle transport and public transport and focus on proximity to transport; rehabilitating damaged urban and natural environments, especially in bays, coastal areas and wetlands,
- Close to transportation centers; to review land use priorities to create green, safe and peaceful places,
- Ensuring that the whole city is like a forest with very intense planting and green corridors,
- Repairing damaged areas in streams, coastlines and wetlands,
- To build affordable, safe, affordable and affordable housing,
- Strengthening social justice, creating opportunities for women, the disabled and minorities,
- Designing the street layout and buildings in a way that does not interrupt the air flow
- Supporting local agriculture and urban greening projects,
- To encourage recycling, innovative technologies, the use of renewable energy sources and the protection of resources while reducing pollution and hazardous wastes,
- Working with businesses to support environmental and ecological activities while preventing pollution, waste and the use and production of hazardous substances,
- To deter excessive consumption, to encourage consuming as much as necessary,
- To increase the awareness of the local environment and biological region with activism and education projects that increase the awareness of the public on ecological sustainability issues.

Among all these criteria of being an ecological city, the most important criterion that a landscape architect should consider in order to contribute to creating an ecological city should be to include green-oriented designs that minimize impermeable surfaces into the lives of users. In addition to this, the foresight of constructing the structures within the designs as green roofs. They should also have the awareness of adapting the activity organization that can support social life to the open spaces they will design. Green areas are important as they contribute to the city in terms of aesthetics and serve as living spaces for many living creatures. Natural and green areas in big cities are almost nonexistent. Despite the limited living space dimensions, roof gardens increase the amount of green space per person in the city, while also helping to protect the habitat and biological diversity within the city (Barış et al., 2012). Thus, urban green spaces are among the important design concepts of sustainable urban form. Designers are looking for the way of integrating nature into the lives of urban users with the diversity of open landscapes (Jabareen, 2006). Urban open spaces and natural corridors integrated with the green belt supported by walking tracks have an important effect in increasing accessibility.

In this direction, within the scope of Karadeniz Technical University Landscape Architecture 5th semester "City Square" Environmental Design Project 4 course, the instructor of the course was directed to the students to adopt the green-oriented design criterion, which is the necessity of the ecological city, and produce design solutions for this. The outcomes of the course are examined in line with the green design criteria for creating an ecological city.

Since the primary goal of the course is to design a city square, the general structure and characteristics of the City Squares are shared with the students both through research and information transfer method. City squares are intense activity centers surrounded by high density buildings and streets. Because it is a clearly demarcated place, it is easiest to envision, think, and represents a goal for action. (Erdönmez and Çelik, 2016). Town squares are the most effectively used element of urban open spaces. The city square is an important public space used by the citizens on special occasions for social, cultural, political and commercial purposes, in short, where urban life takes place (Özer & Ayten, 2005). Squares should have features that will attract people by influencing them, enable them to spend time, and facilitate meetings and interactions (Marcus and Francis 1998). Thus, in addition to being areas that allow the realization of urban life, they enable mutual relations and communication, one of the basic human needs, and can also be used as social spaces that allow interaction. The social processes created by these interactions are determinant in the formation of social unions from the past to the present (Erdönmez & Haznedar, 2012). Thus, it can be said that squares have a positive effect on the sense of community and a sense of belonging. However, squares can be defined as pedestrian-oriented, public spaces (Önder & Aklanoğlu, 2002). The most important feature that affects usage levels is the variety of activities that allow passive and active activities such as wandering, sitting, eating and drinking, watching, watching, chatting, which arise from the need for socialization. The squares that can be used for this purpose are used more frequently and for a long time by the users, increasing the opportunities for people to meet and communicate with each other.

2. Material and Methods

In this study, plan (soft-hard floor map) of KTU Landscape Architecture Department 5th semester “City Square” student projects (ÇTP 4), three-dimensional expressions were used. In the fall semester of 2019-2020, the area designated as an Urban Transformation area by Trabzon Municipality and planned to be designed as Karagöz Square

was selected as the study area within the scope of Karadeniz Technical University Landscape Architecture Environmental Design Project 4. The city squares made by the students were examined with the following criteria in line with the green design criteria for creating an ecological city.

1. Green area - impermeable surfaces ratio (heat island effect and air pollution reduction level in the city)
2. The green roof setup and the level of cutting the air flow of the buildings used (kiosk-cafe, etc.)
3. Level of using smart technology in Irrigation and Lighting methods
4. Natural plant species usage level
5. Contribution to social life (variety of activities, socialization, etc.).

3. Results

wo student studies selected in the findings section were examined.

Table 1: Damlanur Kocaman Karagöz Square Design Project with the Concept of " Genius Loci "

Green area - impermeable surfaces	**3D Representations**
Due to the dense housing in the city center of Trabzon, the low rate of green areas and the open areas squeezed between the buildings and to achieve the goal of ecological city, the rate of green areas was used at a high level by keeping the impermeable surfaces rate at a minimum. In addition, an aerated lagoon is also used in the study area and an alternative natural landscape element to the impermeable surface has been added to the design. **Plan**  **Natural Plant Species**: Laurus nobilis, Cercis siliquastrum, Pyracantha coccinea, Crataegus monogyna, Laurocerasus officinalis, Jasminum fruticans, Pinus pinea, Betula pendula, Cedrus libani, Platanus orientalis, **Exotic Species:** Ginkgo biloba, Thuja occidentalis 'Aurea', Lagerstroemia indica, Malus floribundo, Morus alba 'Pendula', Magnolia grandiflora	 Kiosks for eating and drinking activities have been designed in the area. In order to minimize the impermeable surfaces in the buildings used and to reduce the heat island effect in the city, the green roof system was used in these buildings.  Aerated lagoon has been used as a natural alternative to impermeable surface, to add value to open spaces in terms of aesthetics, to provides the opportunity to play with water and cooling in the summer months It is planned to build a cafe in the area for people to interact and socialize. The blind area with 3 meters of wall was designed as a cafe and as a green terrace and used as a sitting, resting, viewing terrace and active green area.

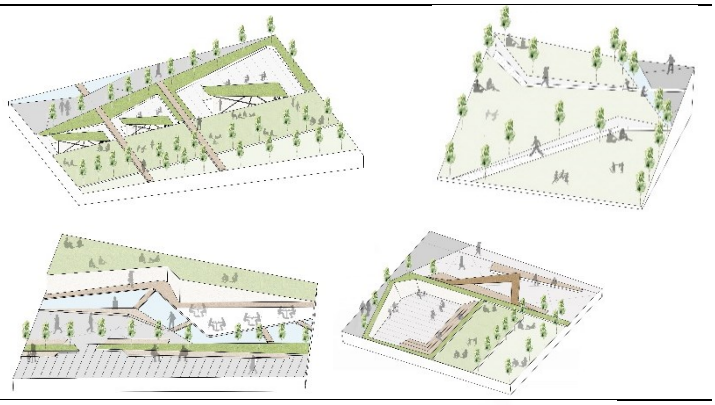
Lighting and irrigation systems: Intelligent technology systems have been proposed to minimize energy and water consumption and to use them correctly. It has been proposed to make irrigation systems that work according to the needs by determining the water need, humidity and weather conditions of the soil and plants.

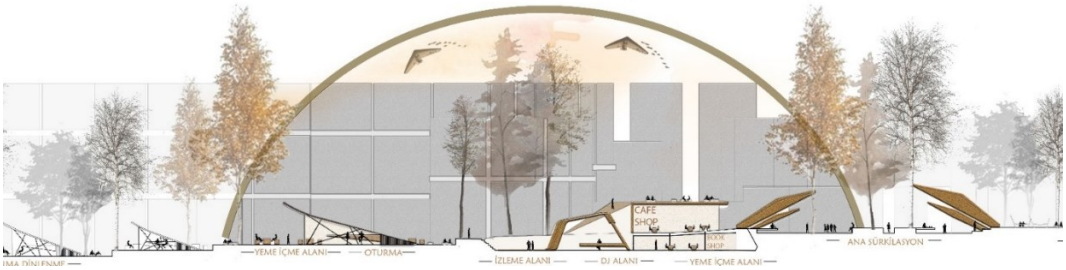
Thus, it was planned to prevent water waste by preventing automatic irrigation without needing it. A lighting system has been thought of, with the help of sensors that detect daylight and detect the presence of users in the area, suggesting that the lighting enters the camel after dark and depending on whether there is a user in the area. Thus, it is thought to save energy not according to the hour, but according to the dark-light conditions or the presence or absence of the user**.**

Contribution to social life: Gathering, festival, celebration, entertainment area, open-air cinema, watching, listening, listening and resting sections are designed by organizing together. However, in the absence of these events, the places where there are elevation differences are designed as books and cafes. In addition, active green areas are designed for users to do various activities (playing games, picnic patch, sitting, chatting, meeting, singing, pet walking cv.). Instead of using fixed seating, the use of pouffes and movable chairs, which can be moved according to the user's preference, has been brought to the fore.

Concept: Genius Loci

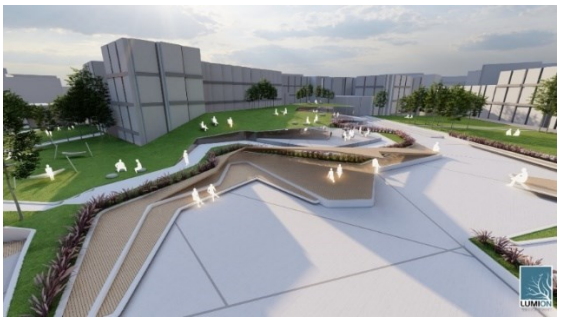
The design process was developed with the idea that it is necessary to create much more than space in order to gain the old spirit of Karagöz Square, which has a historical past. In order for the space to have a place spirit, both physical comfort, the presence of commercial and public seating, the quality of third places, green areas, the presence of water element-shelter, the presence of social features such as user and activity diversity, and semantic, that is, the past event. Features such as the continuity of patterns, memories and activities are reflected in the design.





Section

Table 2: Hilal Köprücü Karagöz Square Design Project with the Concept of " Green Connection "

Green area - impermeable surfaces	**3D Representations**
Due to the dense housing in the city center of Trabzon, the low rate of green areas and the open areas squeezed between the buildings and to achieve the goal of ecological city, the rate of green areas was used at a high level by keeping the impermeable surfaces rate at a minimum. In addition, an aerated lagoon is also used in the study area and an alternative natural landscape element to the impermeable surface has been added to the design. **Plan**  **Natural Plant Species**: Fagus orientalis, Laurus nobilis, Rosmarinus officinalis, Cerotonia siliqua, Crataegus monogyna, Fraxinus excelsior, Philadelphus coranarius, Tilia platyphyllos, Cedrus libani, Platanus orientalis, Laurocerasus officinalis, Jasminum fruticans, Cercis siliquastrum **Exotic Species:** Ginkgo biloba, Sequoiadendron giganteum, Picea sitchensis, Malus floribundo, Morus alba 'Pendula', Magnolia grandiflora, Pittosporum tobira 'Variegatum', Cotaneaster microphyllus, It is planned to build a cafe in the area for people to interact and socialize. The blind area with 3 meters of wall was designed as a cafe and as a green terrace and used as a sitting, resting, viewing terrace and active green area	 Kiosks for eating and drinking activities have been designed in the area. In order to minimize the impermeable surfaces in the buildings used and to reduce the heat island effect in the city, the green roof system was used in these buildings. Aerated lagoon has been used as a natural alternative to impermeable surface, to add value to open spaces in terms of aesthetics, to provides the opportunity to play with water and cooling in the summer months   

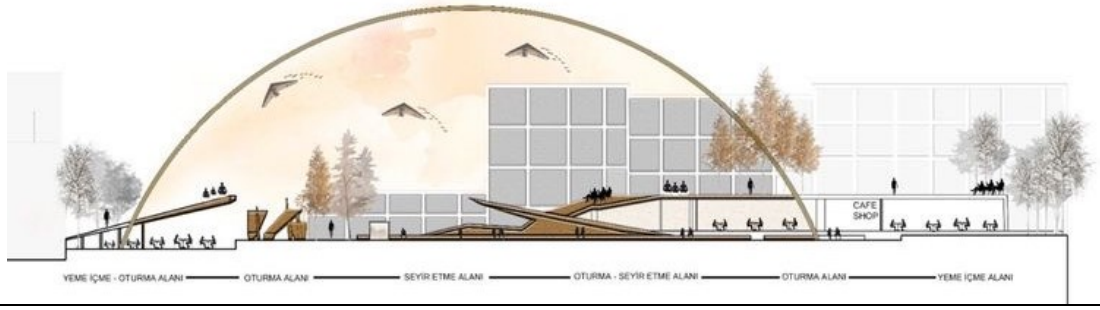
Lighting and irrigation systems: Intelligent technology systems have been proposed to minimize energy and water consumption and to use them correctly. It has been proposed to make irrigation systems that work according to the needs by determining the water need, humidity and weather conditions of the soil and plants.

Thus, it was planned to prevent water waste by preventing automatic irrigation without needing it. A lighting system has been thought of, with the help of sensors that detect daylight and detect the presence of users in the area, suggesting that the lighting enters the camel after dark and depending on whether there is a user in the area. Thus, it is thought to save energy not according to the hour, but according to the dark-light conditions or the presence or absence of the user**.**

Contribution to social life: Gathering, festival, celebration, entertainment area, open-air cinema, watching, listening, listening and resting sections are designed by organizing together. However, in the absence of these events, the places where there are elevation differences are designed as books and cafes. In addition, active green areas are designed for users to do various activities (playing games, picnic patch, sitting, chatting, meeting, singing, pet walking cv.). Instead of using fixed seating, the use of pouffes and movable chairs, which can be moved according to the user's preference, has been brought to the fore.

Concept: Green Connetcion

The main goal of the design process is to integrate quality of life, socialization and unity with green spaces. While doing these, it is thought to enliven the area, increase the usage preference, and present them with the organization of the event, which appeals to users of all ages. While doing these, green design has been our main focus. While making the area the most attractive and attractive city center of the city, impermeable surfaces have been minimized and a green connection has been established between the spaces.



4. Conclusions

Within the scope of Karadeniz Technical University Environmental Design Project 4, a city square design has been processed with a green-oriented design process depending on the ecological city criteria. Within the scope of this study, the students were primarily asked to determine what features a city square should have and what the expectations of users from a city square are. For this, they conducted a comprehensive literature review and field study, interviewed the users of the city and collected the necessary data. Thus, instead of starting a design with only their own analysis and survey research, it was adopted to determine the design goals in line with the expectations of the real users of the ratio. Students, who were candidates to become landscape architects in the future, thus had the opportunity to experience the user-designer relationship for the first time. The results showed that Trabzon city users longed for green spaces in the city center where they could breathe. First of all, users need a city square where green and nature are at the forefront. Their next need is to find the opportunity to reach multiple activities at the same time, such as sitting, eating, having fun, reading, playing, lying, open-air cinema, kermes and rest, where they can interact with people. Another design approach requested from the students was to make green-oriented designs with the awareness of being an ecological city. At this point, the expectations of the users and the purpose of the course were similar. In the theoretical part of the course, the criteria for being an ecological city and green design were determined as a result of both the students' own researches and the guidance and information exchange of the course director. When the design process started, it was determined that 6 students, who were under the responsibility of the director, made designs with this awareness. It has been observed that impermeable surfaces are used at minimum level, green roof systems are recommended in buildings, importance is given to using natural plant species, systems that can minimize energy and water consumption are researched and recommended. However, it has been determined that spatial organizations that allow various activities to be held in order to enliven the social life have been designed.

As a result, it can be predicted that students who adopt design with ecological city connoisseur will continue their habit of designing with this awareness when they step into their professional life in the future. These small practices, which started locally, are expected to have significant environmental impacts on a global scale. Thus, an education approach that can contribute to the biggest problem of today, such as climate change, air pollution, and the heat island effect, has been tried to be presented with this awareness of design. The results of this study can be beneficial both for educators who want to embody the ecological city awareness to students and for designers who want to create green-oriented ecological city spaces.

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Conflict of Interests

The Authors declare no conflict of interest.

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