THEORY AND RESEARCH IN ARCHITECTURE, PLANNING AND DESIGN II

EDITOR: DOÇ. DR. SİBEL DEMİRARSLAN

gece kitaplığı

İmtiyaz Sahibi / Publisher • Yaşar Hız

Genel Yayın Yönetmeni / Editor in Chief • Eda Altunel

Kapak & İç Tasarım / Cover & Interior Design • Gece Kitaplığı

Editörler / Edıtors • Doç. Dr. Sibel Demirarslan

Birinci Basım / First Edition • © Aralık 2020

ISBN • 978-625-7319-03-4

Gece Kitaplığı / Gece Publishing
Türkiye Adres / Turkey Address: Kızılay Mah. Fevzi Çakmak 1. Sokak
Ümit Apt. No: 22/A Çankaya / Ankara / TR
Telefon / Phone: +90 312 384 80 40
web: www.gecekitapligi.com
e-mail: gecekitapligi@gmail.com

__Baskı & Cilt / Printing & Volume__
Sertifika / Certificate No: 47083

Theory and Research in Architecture, Planning and Design II

EDITOR

Doç. Dr. Sibel Demirarslan

gece kitaplığı

İÇİNDEKİLER

Chapter 1

LANDSCAPE PLANTS THAT CAN BE USED IN THE DESIGN OF CHILDREN'S PLAYGROUNDS

Nilüfer SEYİDOĞLU AKDENİZ[1]

Ş. Doğanay YENER[2]

Murat ZENCİRKIRAN[3]

1 Doç. Dr. Nilüfer SEYİDOĞLU AKDENİZ, Bursa Uludag University, Faculty of Agriculture, Department of Landscape Architecture, Bursa- Turkey.

2 Dr. Öğr. Üyesi Ş. Doğanay YENER Istanbul University - Cerrahpasa, Faculty of Forestry, Department of Landscape Architecture, Bahcekoy-Istanbul, Turkey.

3 Prof. Dr. Murat ZENCİRKIRAN, Bursa Uludag University, Faculty of Agriculture, Department of Landscape Architecture, Bursa- Turkey

INTRODUCTION

GAME AND CHILDREN

The game can be defined as an activity that encompasses mental and physical activities that enable people to have fun (Erdem, 2001; Loder, 2008). The importance of the game is an undeniable fact, especially for children. The child has the opportunity to try out different social roles with the game, to express their feelings, as well as to associate objects with each other or to examine human relations. Children gain the ability to express themselves verbally with the game that provides the opportunity to research the environment and solve problems. The game supports and strengthens the child's muscle development (Özer et al, 2006; Yılmaz and Bulut, 2003).

The game is classified in different ways according to Piaget (1962), Parten (1932), Smilansky (1990), and Moore (1986) (Özgür 2000; Acar, 2003; Bal, 2005; Aksoy, 2011; Erten, 2019).

Classification of the game according to Piaget:

- **Games of exercise:** Includes games played between the ages of 0-2. In this period, which is the sensorimotor development period of children, babies can classify the color and sound of the toys.

- **Symbolic games:** Includes games played between the ages of 2-8. It is the period when children play alone. They are games played as if they are real.

- **Games with rules:** These are games played after the age of 7-8. During this period, children imitate the games of those older than them. These are the games that allow the child to socialize.

Classification of the game according to Parten:

- **Solitary games:** The child plays with material alone, he/she is independent and not in groups.

- **Watching another game:** children play the game independently, but the materials they use are not similar. Children are not influenced by each other during the game.

- **Games played together:** Children play together and games are played in the form of groups. Children who are in mutual communication may want to support, change, or prevent their friends' play.

- **Cooperative games:** These are games in which children play together cooperatively and socially interact to achieve the aim of the game together. Children play the game to achieve a goal.

Classification of the game according to Smilansky:

- **Functional games:** These are games consisting of simple muscle movements and imitating the movements of others.
- **Constructive games:** These are the games in which the child plays with material for a long time. The child can reveal a structure with materials.
- **Symbolic games:** These are the games that children produce imaginatively according to their needs and interests.

Classification of the game according to Moore:

- **Active game types:** These are high-energy games that promote physical health by coordinating the body and brain. Games such as swinging, climbing, jumping, and balance games are included in this group.
- **Social game types:** These are activities where body energy is combined, such as sitting, speaking, and reading and that allows children to get to know each other.
- **Cognitive game types:** These are environment-based, problem-solving games that teach information with the use of items. Games such as the use of seesaw, etc. are included in this group.
- **Imaginary game types:** These are the games in which children realize the mental transformation of the objects they see in their environment. Games such as using a stone or leaf instead of money, etc. are included in this group.
- **Creative game types:** It is a type of game that includes all the activities that children add creativity depending on their body usage patterns. These are games such as water play, sand play, castle construction, hole digging, and painting.

Regardless of the variety and types of play, play is important because it affects the child's physical development, psycho-motor and language development, and social, emotional, and mental development. Also, education is closely related to the game, and children learn the knowledge, skills, and behaviors necessary for their lives by themselves during the games (Esen, 2008; Erten, 2019). Many social behaviors such as sharing, engaging with the environment, taking responsibility, respect, and following the rules are also learned by way of games (Dinç, 1993).

Children's games vary depending on the previous generation or cultures and the types of games of children are observed to differ according to the seasonal changes. In other words, while games that require less energy are preferred in summer, children prefer games that require more power and energy in autumn and winter. The change in the types of games of children also varies depending on whether they are boys or girls, and while there is no difference in terms of gender in the early stages of development, in the other stages, boys prefer more active games compared to girls and also play materials change (Yörükoğlu, 2002; Erten, 2019).

In recent years, advancing technology and mass media are also included in the games. Children spend a long time and shape their game preferences with mass media such as television and tablet (Yörükoğlu, 2002).

CLASSIFICATION AND DESIGN OF CHILDREN'S PLAYGROUNDS

Children's playgrounds can be defined as open spaces, the environment of which is separated by certain limits, providing the integration of children with nature, having different play elements, and serving the entire residential area, neighborhood or district (Tekkaya, 2001; Gül and Zorlu, 2002; Çetin, 2003).

The game, which exists at all ages, changes shape with age, guides them to outdoor games after the age of three or four, and children prefer open spaces where they have the opportunity to play together, such as gardens, streets and children's playgrounds (Dinç, 1993). Besides making children understand nature, communicate with the environment, and gain basic experiences, playing games helps the child's healthy development and reveals his/her creativity (Bektaş, 2003; Erten, 2019).

Children's playgrounds are classified in different ways by different researchers according to their size (Özgür, 2000), age groups (Acar, 2003) and building purposes (Yılmaz and Bulut, 2002).

Classification of playgrounds according to their size;

- **Children's playgrounds:** These are the areas that contain the game elements for the active play of 0-6-year-olds.

- **Neighborhood playgrounds:** These are areas with certain facilities for the play of the children between the ages of 6-14.

- **Large playgrounds:** They are playgrounds that meet the recreational needs of young people and adults while meeting children's play needs.

Classification of playgrounds according to age groups;

- **Playgrounds for children from 0 to 3 years old:** These are small areas. An area of 7-10 m² is sufficient for each child. These playgrounds should contain sections that can make children feel different emotions. All of the botanical or structural materials to be used must be suitable for the child scale.

- **Playgrounds for children from 4 to 7 years old:** These areas are mixed with the 0-3 age group, but are playgrounds that are at least 300-400 m^2 and are set up in green areas in the neighborhood.

- **Playgrounds for children from 8 to 15 years old:** These playgrounds, also known as "the playground", are areas associated with settlements and primary schools, but they also contain playgrounds for children and areas for sports activities.

Classification According to Building Purposes;

- **Traditional children's playgrounds:** It is the most common children's playground consisting of standard materials. It is created by selecting game elements from different catalogs by different institutions and individuals and it is the most common playgrounds in residential areas.

- **Contemporary children's playgrounds:** These are playgrounds designed from different forms and shapes and have an aesthetically beautiful appearance. Generally, they are static playgrounds that combine all parts of a building form.

- **Adventure children's playgrounds:** Unlike contemporary playgrounds, they are areas with non-static elements. It is important to have a staff member who can supervise and guide children in these playgrounds.

- **Children's playgrounds for private playing and learning:** They are playgrounds designed for children with disabilities so that they can use the playground easily. These playgrounds help children with disabilities physically and socially adapt and interact with other people.

- **Environmental areas:** These areas are the areas where the games are shaped by using rural elements while providing the opportunity to introduce to children and make them discover elements such as bush, flower, tree, and soil.

Children's playgrounds should be designed in line with landscape planning and design principles such as location selection, floor coverings, planting, taking into account the tendencies and expectations of children (Samur and Kızıltepe, 2018).

Children's playgrounds should be at a suitable distance from residential areas, at a suitable size, and should be open to multifaceted development. Varying according to age groups in the playgrounds, there should be designs that can expand the imagination of children, such as sand fields, play walls, playhouses, as well as the equipment with high motion density, such as swings and slides, and these items should be located away from other elements. Also, there should be areas where older children can conduct athletic activities such as football and basketball (Yılmaz and Bulut 2002).

A well-designed playground should be appropriate in terms of security, function, comfort, material, and social communication (Korkmaz, 2016). Security is an element that should be considered firstly in the design of playgrounds. Security game equipment is related to the layout of the ground and the playing field, and it can cause various accidents due to many reasons such as the deterioration of the playground surface, design errors, and lack of maintenance of the game elements. While creating safer children's playgrounds, it is also important to carry out maintenance regularly in the areas created (Yılmaz and Bulut 2002; Hendricks, 2011; Duman ve Koçak, 2013; Samur and Kızıltepe, 2018).

Materials such as organic sand, organic gravel, and rubber should be preferred for the flooring of children's playgrounds. The material used should be soft enough as well as firm and tough enough for wheelchairs, baby-walkers, etc. While synthetic materials such as soil, sand, and rubber are used as impact-reducing materials, wood, fiber, and plastic-based materials will be more suitable for children with physical disabilities. Also, in the material selection of play equipment, the use of plastic, polyethylene, wood, rubber, galvanized steel, and metal materials is preferred (Samur and Kızıltepe, 2018).

On the other hand, considering child psychology in the design of playgrounds, it is necessary to choose living and inanimate materials that can break the sharp lines and monotony in the environment and it is important to have sufficient and comfortable seating areas, structure sensitive to environmental conditions (slope, topography, vegetation, etc.), and comfort elements such as garbage cans and water. It is important to keep the boxes in the items that will provide comfort such as water (Yücel, 2005; Uluğ and Altan 2008).

THE LANDSCAPE PLANTS THAT CAN BE USED IN CHILDREN'S PLAYGROUNDS

The use of landscape plants, one of the indispensable elements of landscape design, in children's playgrounds has special importance. Children use many organs of plants such as leaves, fruits, seeds, and flowers and plants allow children to learn about the life cycle in nature by making them wonder about nature. The children with plants around will learn nature through experience by activating many sensory organs such as smelling, touching, and hearing. Besides, by observing the changes such as leaf shedding, leaves changing color, and blooming, children can recognize the seasons and they can improve their motor skills with activities such as climbing and picking and storing leaves and flowers (Turgut and Yılmaz, 2010).

Landscape plants to be used in the design of children's playgrounds should be selected from plants suitable for child scale (Uluğ and Altan 2008). Plants used in appropriate sizes and densities have many functions such as controlling noise, absorbing harmful gases, absorbing dust and dirt particles, and providing safety by creating a barrier (Sorkun, 1996).

In regions with high traffic, it is necessary to use hedge plants to ensure that different areas of activity in children's playgrounds are separated from each other. Also, the creation of small flower beds in playgrounds will excite children. Cut and rare flowering species should not be used in these areas (Sorkun, 1996; Uluğ and Altan 2008; Güngör and Oğuzhanoğlu, 2019).

It is important to create a buffered green space between playgrounds and settlements. In that case, the green area to be created provides screening and hiding functions (Sorkun, 1996). Children love running in the bushes and small flowers. In addition to the use of bushes along the pathways in the design, the presence of flower parterres in the playground will give children a great sense of pleasure. Designs by using plants used for creating small hills within playgrounds also enable children to play games such as jumping and hiding (Acar, 2003).

However, it is important to use large trees in areas where mostly silent games are being played and trees and bushes should not create a hindrance in games. For example, when the leaves of a tree planted on the edge of a sand pool are shed, it will cause the sand pool to become dirty and some plants will also multiply (Sorkun, 1996).

Landscape plants to be used in the design should not have allergenic effects, poisonous leaves, flowers, or fruits and should not be thorny. Plants with large fruit such as *Aesculus* sp. should not be used together with trees that drop branches such as *Tilia* sp. (Özgüç, 1998; Yılmaz and Bulut, 2002).

Also, grass plants with allergen pollen such as *Agrostis stolonifera*, *Dactylis glomerata*, and *Lolium perenne* should not be used in the grass areas to be formed, instead, species such as *Poa* sp. and *Festuca ovina*, which have less allergen pollen, can be preferred (Acar, 2003).

Examples of some landscape plants that can be used in children's playgrounds are given in Table 1, types of poisonous plants are given in Table 2, and examples of allergenic plants are given in Table 3.

Table 1. *Some landscape plants that can be used ın chıldren's playgrounds (Erdem, 2003; Acar, 2003; Bulut and Kılıçaslan 2009, Herrington et.al., 2010; Başay, 2017; Yeşil and Beyli 2018; Çelik 2020)*

Trees and Shrubs	
Acer campestre	*Salix babylonica*
Acer platanoides	*Salix alba*
Acer pseudoplatanus	*Sophora japonica*
Acer rubrım	*Abelia grandiflora*
Cercis siliquastrum	*Chaenomeles speciosa*
Eleagnus angustifolia	*Chaenomeles japonica*
Eleagnus comunata	*Cornus alba sibirica*
Fraxinus exselsior	*Cornus mass*
Fraxinus ornus	*Cornus alba 'Sibirica'*
Ginkgo biloba	*Corylus avellana*
Liriodendron tulipifera	*Deutzia gracilis*
Liduidambar styraciflua	*Deutzia arenata*
Lagerstroemeria indica	*Euonymus japonica*
Magnolia grandiflora	*Forsithya x intermedia*
Picea orientalis	*Hibiscus syriacus*
Pinus strobus	*Ribes spp.*
Purunus serrulata	*Spiraea vanhouttei*
Purunus cerasifera	*Spiraea bumalda*

Wrapping-Climber and Flowers	
Jasminum sp.	*Calendula sp*
Geranium sp.	*Matricaria sp.*
Cosmos sp.	*Ageratun sp*
Myosotis sp.	*Lavandula sp.*

Table 2. *Some poisonous landscape plants (seeds, fruit or leaves) (Erdem, 2003; Acar, 2003; Çelik 2020)*

Trees and Shrubs	
Cedrus atkantica	*Euonymus europaeus*
Creteagus sp.	*Hydrangea sp.*
Cycas sp.	Lantana camara
Cydonia oblonga	*Laurocerasus officinalis*
Laburnum anagroides	*Ligustrum vulgare*
Laburnum alpinum	*Malus floribunda*
Melia azedarach	Nerium oleander
Phoenix sp.	*Rhododendron ponticum*
Robinia pseudoacacia	*Rhododendron luteum*
Taxus baccata	*Symphoricarpus sp.*
Cotoneaster sp.	*Viburnum lantana*
Daphne sp.	*Ilex aquifolium*
Eriobotrya japonica	
Wrapping-Climber and Flowers	
Achillea millefolium	*Delphinium sp.*
Anemone sp.	*Irıs germanica*
Aquilegia sp.	*Senecio cineraria*
Arum maculatum	*Clematis sp.*
Calla palustris	*Hedera helix*
Colchium autumnale	*Lonicera xylosteum*
Convalaria majalis	*Wisteria sinensis*

Table 3. *Some landscape plants with allergic pollen (Özgür, 2000; Acar, 2003).*

Trees and Shrubs	
Acer negundo	*Platanus orientalis*
Alnus glutinosa	*Robinia pseudoacacia*
Carpinus betulus	*Tilia argentea*
Castanea sativa	*Ulmus campestris*
Cedrus libani	*Calluna vulgaris*
Juniperus sp.	*Erica arborea*
Morus sp.	*Erica verticillata*
Populus sp.	*Corylus avellana*
Platanus occidentalis	
Wrapping-Climber and Flowers	
Lonicera sp.	*Plantago lanceolata*
Bellis perennis	*Rumex acetocella*

CONCLUSION

It is important to create children's playgrounds, which have an important role in children's development, in line with the planning and design criteria. It is necessary to ensure safety, comfort, and continuity while designing playgrounds for children of all ages. Especially with landscape plants that instill a love for nature, children can be enabled to play in a beautiful perspective.

The ultimate aim should be to create a suitable place for children with the plants to be used in the design. Effective and functional designs can be created with many landscaping plants, such as large grass areas, flowers, and plants reminiscent of the seasonal transition. It is important not to include plant species that have negative features such as having large fruits, thorns, poison, and allergen pollen.

REFERENCES

Acar, H. (2003). *Çocuk Oyun Alanlarında Kullanıcıların Bitki Tercihlerinin Belirlenmesi Üzerine Bir Araştırma: Trabzon Kenti Örneği*, Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi Fen Bilimleri Enstitüsü, Trabzon, Türkiye.

Aksoy, Y. (2011). Çocuk oyun alanları üzerine bir araştırma İstanbul, Isparta, Eskişehir, Erzurum, Kayseri, Ankara, Zonguldak ve Trabzon illeri örneği. İstanbul Aydın Üniversitesi. http://acikerisim.aydin.edu.tr/bitstream/11547/629/1/yildiz_aksoy1.pdf

Bal, A. (2005). *Zonguldak Kenti Yeşil Alan Sistemindeki Çocuk Oyun Alanlarının Durumunun Peyzaj Mimarlığı İlkeleri Açısından İrdelenmesi*, Yüksek Lisans Tezi, Zonguldak Karaelmas Üniversitesi Fen Bilimleri Enstitüsü, Zonguldak, Türkiye.

Başay, S. (2017). *Edible Landscape*. Recent Researches in Science and Landscape Management. Chapter 10. Edited by Recep Efe, Murat Zencirkiran and İsa Curebal. Cambridge Scholars Publishing. ISBN (10): 1-5275-1087-5. ISBN (13): 978-1-5275-1087-6. P: 152-167.

Bektaş, Y. (2003). *İlköğretim Çağı Çocuklar ve Çocuk Oyun Alanları*, Yüksek Lisans Tezi, Ankara Üniversitesi Fen Bilimleri Enstitüsü, Ankara, Türkiye

Bulut, Z., Kılıçarslan,Ç. (2009). An Important Principle to Encourage Self-Reliance to Child: Playground Safety. *Artvin Çoruh University Faculty of Forestry Journal*, 10 (1):78-85.

Çelik, B.H. (2020). Bursa Kent Parkları Tasarım Bitkilerinin Toksikolojik Özellikleri Üzerine Bir Araştırma. B.U.Ü. Fen Bilimleri Enstitüsü Yüksek Lisans Tezi. Bursa.

Çetin, G. (2003). Üsküdar İlçesi'ndeki Çocuk Oyun Alanlarında Yeterlilik ve Kalite Açısından incelenmesi, Yüksek Lisans Tezi, İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü, İstanbul.

Dinç, H. (1993). Çocuk Oyun İşlevi ve Öğeleri, Yüksek Lisans Tezi, Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü, İstanbul, Türkiye.

Duman, G. Koçak, N. 2013. Çocuk Oyun Alanlarının Biçimsel Özellikleri Açısından Değerlendirilmesi (Konya İli Örneği). *Türk Eğitim Bilimleri Dergisi*. Kış, 11(1), 64-81.

Erdem, N. (2001). Çocuk Oyun Alanlarında Kullanılan Oyun Elemanları Üzerine Bir Araştırma, *I. Uluslar Arası Kent Mobilyaları Sempozyumu,* İstanbul. Büyük Şehir Belediyesi, İstanbul, 9-11 Mayıs 2001, s: 291-300.

Erten, M. (2019). Düzce'deki Çocuk Oyun Alanlarının İlköğretim Çağındaki Kullanıcılarca Değerlendirilmesi Ve Tasarım İlkelerinin Belirlenmesi. Düzce üniversitesi Fen Bilimleri Enstitüsü Yüksek Lisans Tezi. 195 s.

Esen, M.A. (2008). Geleneksel Çocuk Oyunlarının Eğitimsel Değeri Ve Unutulmaya Yüz Tutmuş Ahıska Oyunları. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi,* 21(2), 357-367.

Güngör, S. and Oğuzhanoğlu, Z. (2019). Evaluation of Children Playgrounds in Konya-Kulu District in Terms of Landscape Architecture. *Turkish Journal of Agriculture – Food Science and Technology.* 7 (sp3): 83-88.

Gür, R, G. Ö., Zorlu, T. (2002**).** *Çocuk Mekânları*. Yem Yayınları, İstanbul.

Hendricks, B.E. (2011). *Designing for play*. Second Edition. Farhnam . Ashgate Publishing Limited.

Herrington, S., Lesmeister, C., nicholls, J., Sefiuk, K. (2010). *An Informational Guide to young Children's Outdoor Play Spaces*, Consortium for Health, Intervention, Learning and Development (CHILD). 52 p. Accessed date 02 July 2020. https://sala.ubc.ca/sites/sala.ubc.ca/files/ documents/7Cs.pdf.

Loder. T. (2008). The Demographics Of Playground Equipment İnjuries İn Children. *Journal of Pediatric Surgery,* 43 (4), 691-699.

Moore, C., R., (1986). *Childhood's domain: Play and place in child development*. Biddles Ltd. p. 206. Australia

Özer, A., Gürkan, A.C., Ramazanoğlu, M.O. (2006). Oyunun Çocuk Gelişimi Üzerine Etkileri. *Fırat Üniversitesi Doğu Anadolu Bölgesi Araştırmaları Dergisi*. 4 (3): 54-57.

Özgüç, İ. M. (1998). Oyun Bahçelerinde Tasarım İlkeleri. *Peyzaj Mimarlığı Dergisi*. T.M.M.O.B. Peyzaj Mimarları Odası İstanbul Şubesi, Temmuz-Ağustos , 5(15 -16), İstanbul.

Özgür, H. (2000). İlkokul Dönemindeki Çocukların Oyun Araçlarına Olan İlgileri, Yüksek Lisans Tezi, Ege Üniversitesi Fen Bilimleri Enstitüsü, İzmir, Türkiye.

Parten, M. (1932). Social Play Among Preschooler Children. *Journal of Abnormal and Social Psychology*, 27(3), 243-269.

Piaget, J. (1962). *Play, Dreams and Imitation in Childhood*. New York: Norton Company.

Samur, A.Ö., Kızıltepe G.İ. (2018). Aydın İlindeki Çocuk Oyun Alanlarının İncelenmesi. *Social Sciences Research Journal*. 7 (1): 31-46.

Smilansky, S. (1990). *Sociodramatic Play: İts Relevance to Behavior and Achievement in School.* Children's Play and Learning: Perspectives and Policy İmplication ss. 18-42. New York: Teachers College Press.

Tekkaya, E. (2001). Tasarlanmış Çocuk Hakları: Ankara Çocuk Oyun Alanları. *Milli Eğitim Dergisi, 151*(1), 25-37.

Turgut, H. and Yılmaz, S. (2010). Ekolojik Temelli Çocuk Oyun Alanlarının Oluşturulması. III. Ulusal Karadeniz Ormancılık Kongresi. Cilt: IV Sayfa: 1618-1630.

Uluğ, H. (2007). Kuzey Adana' daki Çocuk Oyun Alanlarının Bitki Seçimi Yönünden İrdelenmesi. Ç.Ü Fen Bilimleri Enstitüsü Peyzaj Mimarlığı Ana Bilim Dalı Yüksek Lisans Tezi, s:184.

Yeşil, P., Beyli K.N. (2018). Çocuk Oyun Alanlarında Detaylı Mekan Analizi: Akyazı Mahallesi (Ordu) Örneği. *Türk Tarım - Gıda Bilim ve Teknoloji Dergisi*. 6(6): 652-662.

Yılmaz, S., and Bulut, Z. (2003). Kentsel Mekanlarda Çocuk Oyun Alanlarının Yeri ve Önemi. *Milli Eğitim Dergisi*. Sayı, 158.

Yörükoğlu, A. (2002). *Çocuk Ruh Sağlığı,* Çocuğun Kişilik Gelişimi, Eğitimi ve Ruhsal Sorunları. İstanbul: Özgür Yayınları

Yücel, G.F. (2005) Çocuk oyun alanları tasarımı. *İstanbul Üniversitesi Orman Fakültesi Dergisi* 55(2):99-110

Chapter 2

URBANIZATION AND COVID-19 RELATIONSHIP IN TURKEY

***Gamze SEÇKİN GÜNDOĞAN*[1]**

Seçil Gül MEYDAN YILDIZ

1 Academic Gamze SEÇKİN GÜNDOĞAN, Çankırı Karatekin University, Çerkeş Vocational School of Higher Education, Department of Architecture and Urban Planning, Academic, Çankırı/TÜRKİYE
ORCID: https://orcid.org/0000-0001-7674-8670

Assoc. Dr. Seçil Gül MEYDAN YILDIZ, Yozgat Bozok University, Faculty of Engineering and Architecture, Department of Urban and Regional Planning, Yozgat/TÜRKİYE
ORCID: https://orcid.org/0000-0001-9869-4159

1.Introduction

COVID-19 appeared in Wuhan city, Hubei Province of China towards the end of December 2019 (Şahin, 2020). Unlike the previous known corona viruses, it was initially named SARS-CoV-2, then this virus was named 2019 Novel Coronavirus, and now Covid 19 (Budak and Korkmaz, 2020). Later, people traveling from one city to another have caused the spread of the infection. Although the Chinese government quarantined the city of Wuhan on January 23, 2020; many people traveling to other countries in the last 20-25 days has increased the spread rate of COVID-19.

China, Italy, Iran, South Korea, India, Switzerland, Taiwan, USA, Sweden, Singapore, Sri Lanka, France, Australia, Malaysia, Spain, the United Arab More than 200 countries including, World Health Organization (WHO) case was reported COVID-19 (Chakraborty and Maity, 2020). While the first 2019 COVID-19 case in the USA was detected in Washington State on January 20, 2020, the first case in Europe was reported in Spain, Italy and France on January 24, 2020. While the number of cases has increased in India and Bangladesh on the Asian continent, cases have also started to increase in South American countries such as Brazil (Şirin and Özkan, 2020). On March 11, 2020, who declared COVID-19 an epidemic due to 118,319 unconfirmed cases per day, including 492 deaths (Ghosh vd, 2020). On April 20, 2020, WHO reported 157,847 confirmed deaths and 2.314,621 unconfirmed cases (Magazzino vd, 2020). Each country has started to take measures to limit the spread of COVID-19. However, in the 3-month period (January-April), the virus spread globally. All over the world, new terms such as “social distance”, “self-isolation”, “14-day quarantine”, “hand disinfection” have emerged Ghosh, Mundy, Ghosh and Mallick, 2020).

Upon the developments in the world, Turkey cancelled the flights from Wuhan city on January 22, 2020 and then all flights from China on February 5, 2020 (T.C. Ministry of Transport and Infrastructure, 2020). Thus, the emergence of the first case in Turkey has been delayed for a while, and the first case was detected on March 10, 2020 (T.C Ministry of Health, 2020). After the first case was detected, Turkey has started to take measures within the scope of COVID-19. Some of those cover many activities such as; suspending elementary schools, secondary schools, high schools and universities, stopping sports, competitions, banning entry and exit abroad, closing shopping and worship areas malls that cause crowded areas, and stopping artistic activities (Demir, Günaydın and, Şen Demir, 2020). However, despite these measures, on 03 April 2020, the total number of cases approached 20 thousand and the total number of deaths increased to 425 people (T.C. Ministry of Health, 2020).

As of the date of April 3, 2020, all 81 cities in Turkey has infected with the virüs (T.C. Ministry of Health, 2020). The rapid spread of the COVID-19 epidemic shows that public health is not given enough attention in the urban planning, design and management process (Öztaş Karlı, Çelikyay, 2020). Also in the first half of the year it has been observed that the spreading rate of the COVID-19 pandemic is higher in the cities that are defined as metropolis and have an important role in the industrialization process.

By May, it was observed that there was a decrease in the number of cases of Covid-19. However, the decreasing number of cases starts to increase again with the removal of restrictions. With this increase, it was observed that the cases spread throughout the country.

When the pandemic period is considered, it has emerged with the re-increase of the number of cases that problems are experienced in all cities and solutions for these problems are insufficient. When the "Pandemic Influenza National Preparation Plan" prepared by the Ministry of Health is examined, it is understood that there are no decisions regarding the city in the decisions made for the epidemic and this plan is not integrated with the "Disaster and Emergency Management Plan".

In this study, the relationship between the urbanization process and the demographic structure in Turkey is examined within the context of epidemic diseases as a type of disaster by using literature review method. In line with the assumption that "Balanced and planned urbanization is achieved with demographic balance. This structure reduces the risk of and / or facilitates the control of epidemic diseases", the impacts of 2019 nCoV pandemic process on the urbanization policies and the urban planning approaches in Turkey shall be discussed. Eventually, the main purpose of this study is to explain that a balanced population distribution process can be achieved through urbanization policies and urban planning, and that the nature-oriented urbanization process should be adopted by stating that the metropolitan model increases the vulnerability to disasters.

2. Method And Procedure

In Turkey, which is a developing country, the relationship between urbanization, development and demographic structure is progressing irregularly (Meydan Yıldız, 2018a). The basic principle in the planning system is to provide the opportunity to live in a healthy and balanced environment and to protect and design the environment right of individuals in line with the principle of public interest (Keleş, 2014; Meydan Yıldız, 2018b). The development plans created in this process should ensure that the cities are prepared by taking into consideration the potential disaster risks, as well (Şengün and Meydan Yıldız, 2017). However, the problems faced in the design and implementation process of development plans in Turkey are also increasing the vulnerabilities in regard to disasters. In the most general sense, the concept of the city is described as: "The settlement unit where continuous social development take place and the needs of the society such as settlement, shelter, commute, work, rest, and entertainment are met, few people are engaged in agricultural activities, which are dense in terms of population compared to villages and composed of small neighborhood units" (Keleş, 1998). Cities are home to most of the world's population and are also central to economic growth, development and innovation (Sharifi and Khavarian-Garmsir, 2020). The city is composed of human communities that are densely settled on a large, heterogeneous and limited land area (Lee, 1955).

With the emergence of the urban phenomenon, many new concepts such as urbanization have emerged (Güven, 2016). Urbanization is defined as "the increase of the number of cities and the number of people living in the city" and explained as a population accumulation process (Keleş 2004). Urbanization does not have a beginning to be determined by a clear and concrete date (Eş and Ateş, 2004). On the other hand, it is not a proper approach to define urbanization as a population movement, only. We need to explain urbanization as a concept that develops in parallel with industrialization. Industrialization and urbanization have gained great momentum and this momentum has caused the population to increase in cities (Yıldırım, 2004). This situation represents a process that covers all economic, social, political and behavioral changes, as well (Keleş 2014). Besides, the concept of urbanization refers to engaging in economic urban activities and having urban values and culture. Therefore, urbanization has gained momentum with the industrialization process, causing changes and transformations in all economic, environmental, political and vital structures. This change and transformation process has created an increasing number of organizations, division of labor and specialization in the social structure due to industrialization and economic development, leading to city-specific changes in human behavior and relationships (Keleş 2004). In the process of urban spatial change and transformation, land use decisions of urban structures are established via urban planning. It is necessary to be prepared and cautious against all kinds of disasters in the land use decisions.

High density in cities makes people vulnerable to natural and man-made disasters (Sharifi and Khavarian-Garmsir, 2020). Disaster is the name given to all natural or man-made events that cause economic, social, physical, natural and environmental losses for people, stop or interrupt our daily life and activities, make local resources and resources unusable, require crisis management (Kadıoğlu, 2011). Disasters are classified in their own right. One of them is biological disasters. Outbreaks of biological disasters are caused by accidental or deliberate release of a lethal microorganism and infestation of insects (Tezcan, 2020). Disasters are much more experienced due to global warming in recent years, climate change, poor use of natural resources, migrations, terrorist movements, wars, and so on From antiquit to the present day, there have been many natural disasters. Epidemics have caused deaths between regional or continents from biological in these natural disasters. Plague, smallpox, anthrax, ebola, Spanish flu, and finally the COVID-19 epidemic that affected the whole world in 2020 caused the death of many people (Tezcan, 2020).

The issue of disaster should be examined in detail in the National Development Plans in order to deal with all the negative consequences of disasters in advance and to create a disaster resilient society that can cope with the disasters and that is resistant to the disasters. National Development Plans, which set forth a holistic country vision, form the backbone of all plans. The issues dealt in the Development Plans are transferred to the city plans and implemented.

11th Development Plan, covering the period 2019-2023, is the first development plan of the Presidential Government System (Öner, 2020). The aim of the plan can be summarized as to increase the efficiency and production in every field, and to reach the internationally competitive power in science and technology. 11th Development Plan envisages planning livable cities for the welfare of the public. Moreover, it aims to create a sustainable environment and to become a democratic state where the rule of law is maintained. However, there is not any decision or action plan proposal directly for epidemic diseases. In our country, responsibilities for disasters are legally assigned to the Ministry of Interior, Disaster and Emergency Management Authority. Responsibilities for epidemic diseases are given to the Ministry of Health (Kadıoğlu, 2008).

3. Findings

The first of the main pillars of urban planning is the Urban Development Law No. 3194 and its related regulations. In addition to this, all legal and administrative regulations on human, environment and society affect urban science directly and indirectly. Besides, in the Environmental Law No. 2872, regarding the urban planning process, there are various prevention and protection principles against environmental problems. However, there is not any article directly for epidemic diseases.

In the Urban Development Law No. 3194 and its regulations, first of all, the urbanization principles and rules are defined. These principles focus on public benefit, public health and safety. The law is made in order to ensure the organization of the settlements and the housing in these areas are in compliance with the plans, science health and environmental conditions.

The Environmental Law No. 2872 does not contain any articles explicit on epidemic diseases. However, it includes the sustainable development strategies based on the balance between environmental, economic and social goals which ensure that present and future generations live in a healthy environment. Thus it is emphasized that everyone has the right to live in a healthy and balanced environment.

There is doesn't item for planning related to epidemic diseases in natural disasters. The most obvious studies on epidemic diseases emerged with COVID-19. In just 4 months, many countries have been restrictions on entry and exit to cities. As travels between countries come to a halt, the face of cities has been begun to change (Acuto, 2020). Cities also have a large share in the spread of epidemic diseases. High-rise and dense buildings are the main feature of cities around the World. This means more people gather in less space. More people mean more infections. This shows that the risk of epidemics is higher in cities with high density. In addition, the risk of infection increases in areas where low-income groups live and lack design, service and legal status. Because in these regions, the priorities of the people are changing. Table 1 compares the effects of sensitivity and insensitivity to epidemic faults in location selection decisions.

Table 1. *Comparison Of Susceptibility To Epidemic İllness And Effects Of İnsensitivity İn Location Selection Decisions (Kadıoğlu, 2008).*

Effects Of Location Selection Decisions that made Susceptible To Outbreak Illness	**Effects Of Location Selection Decisions that made Unsusceptible To outbreak Illness**
Reduces Risk	Increases risk
Prevents increased losses of life and property	Leads to increased losses of life and property
Epidemic alleviates disease consequences	Aggravates epidemic disease outcomes
Provides an effective intervention	Creates a problem of transportation and coordinationy
After the disaster prevents new risks from forming, treatment areas, epidemic hospitals and relief areas are predetermined and logistics services fast.	Creates uncertainty
Accelerates quarantine of positive results and restricts contact. Provides acceleration of healthcare delivery. It provides quick access to the person/persons with positive results with smart urban communication methods equipped with Geographical Information System and Urban Information System.	Confusion prevails

It limits the effects of the outbreak and offers a planned intervention. Speeds up the healing or normalization phase	Harms increases with wrong interventions. It causes the negative socio-psychological effects of the epidemic to lengthen and spread. It leads to prolonged normalization time and domestic violence, depression, etc. reveals new problems.
Facilitates emergency relief organization. It obliges ongoing training in the public to be conscious, discreet and calm.	It leads to the disruption of the social and economic order and new costs.

Outbreaks have always been on our agenda since ancient times. Epidemics have an effect that can radically change the order of society. During the Industrial Period in the 18th century, new planning studies emerged outside the city due to residences close to factories due to busy working hours, air pollution, environmental pollution and related diseases. The main reason for the start of this planning work is that people want to escape diseases. In the development of agricultural societies, people have harmed the natural environment Chemicals used in plants and feeding animals have caused people to get sick and have a hard time finding clean water. In this case, the emergence of epidemic patients has made it inevitable. (Özden, 2014). The epidemic or pandemic declared as a result of epidemic diseases has seriously affected the development of cities and each epidemic has caused great transformations in cities. (Öztaş Karlı and Çelikyay, 2020). The COVID-19 virus, which emerged due to the eating habits of people in Wuhan, China towards the end of December 2019, quickly spread all over the world. Thereupon, the effects of the virus, which was declared a pandemic by WHO, still continue. This epidemic has also negatively affected the cities. It has been observed that the spreading rate is higher, especially in cities with high-rise buildings. With the emergence of COVID-19 in our country, people have been stuck in high-rise houses due to reasons such as the implementation of curfews and not leaving the house unless necessary. In Table 2, the numbers of 2019 nCoV cases according to provinces are given. As Table 2 is examined, it is determined that in the distribution of the number of cases detected in Turkey on April 03, 2020 according to provinces, the highest value is in the provinces with metropolitan status. In addition to this, particulary, the province of Zonguldak, where the industrial institutions and organizations, that are the main factors of the urbanization process, are located, is also among the metropolitan cities with high number of cases.

Table 2. *Number Of Covid 19 Cases By Provinces (Ministry Of Health, 2020)*

Location	Approved Cases	Location	Approved Cases	Location	Approved Cases
İstanbul	12231	Yalova	64	Aydın	20
İzmir	1105	Mardin	51	Karabük	20
Ankara	860	Gaziantep	49	Bolu	19
Konya	601	Kırklareli	49	Afyonkarahisar	18
Kocaeli	500	Osmaniye	47	Kars	18
Sakarya	337	Diyarbakır	46	Şanlıurfa	18
Isparta	289	Muğla	46	Kilis	17
Bursa	259	Siirt	44	Mersin	17
Adana	241	Uşak	40	Bilecik	16
Zonguldak	197	Amasya	38	Erzincan	15
Samsun	167	Sinop	35	Yozgat	15
Kayseri	130	Çorum	35	Karaman	14
Tekirdağ	121	Adıyaman	32	Muş	14
Eskişehir	118	Düzce	32	Elazığ	12
Balıkesir	106	Hatay	32	Gümüşhane	12
Antalya	102	Ağrı	31	Niğde	12
Rize	101	Çanakkale	30	Bingöl	10
Manisa	100	Kahramanmaraş	28	Bartın	9
Edirne	91	Nevşehir	27	Batman	9
Tokat	90	Iğdır	26	Sivas	9
Ordu	88	Kastamonu	26	Kırşehir	7
Trabzon	87	Çankırı	25	Tunceli	6
Denizli	86	Van	24	Aksaray	5
Şırnak	80	Bayburt	23	Ardahan	5
Erzurum	78	Kırıkkale	23	Kütahya	5
Giresun	73	Bitlis	22	Burdur	3
Malatya	66	Artvin	20	Hakkâri	2

According to 2019 TUİK (Turkish Statistical Institute) data, the total population of Turkey is 83.154.997 persons. 63.040.596 of this population lives in the provinces with metropolitan status (Figure-1).

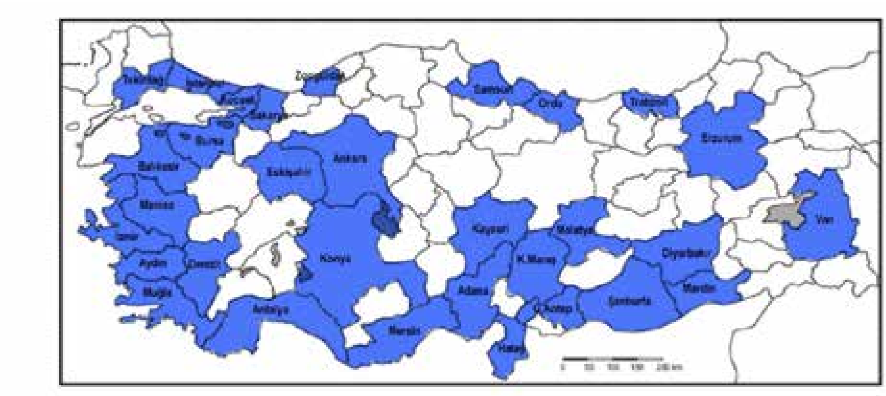


Figure 1. *Border of Cities with the Status of 30 Metropolitan Municipalities and the Province of Zonguldak*

As the number of 2019 nCoV cases is analyzed, it is determined that the majority of these cases are in the cities defined as metropolitan and whose population is above 750000. In Table 3, the populations and the number of cases in 30 metropolitan municipalities of Turkey are given. Accordingly, as of April 03, 2020, the highest number of are found to be in the Metropolitan Municipalities.

Table 3. *Number Of Cases İn Metropolitan Provinces And Zonguldak Province İn Turkey*

Location	Population (2019)	Number of cases (3 April)
Adana	2.237.940	241
Ankara	5.639.076	1105
Antalya	2.511.700	102
Aydın	1.110.972	20
Balıkesir	1.228.620	106
Bursa	3.056.120	259
Denizli	1.037.208	86
Diyarbakır	1.756.353	46
Erzurum	762.062	78
Eskişehir	887.475	118
Gaziantep	2.069.364	49
İstanbul	15.519.267	12231
İzmir	4.367.251	1105
Kahramanmaraş	1.154.102	28
Kayseri	1.407.409	130

Kocaeli	1.953.035	500
Konya	2.232.374	601
Malatya	800.165	66
Manisa	1.440.611	100
Mardin	838.778	51
Mersin	1.840.425	17
Muğla	983.142	46
Ordu	754.198	88
Sakarya	1.029.650	337
Samsun	1.348.542	167
Şanlıurfa	2.073.614	18
Tekirdağ	1.055.412	121
Trabzon	808.974	87
Van	1.136.757	24
Zonguldak	596.053	197
Total	**63.636.649**	**17.927**

As shown in Table 3, the Metropolitan Municipalities constitute 75% of Turkey's total population and more than 90% of the number of cases announced on April 3, 2020. When the reports published by the Ministry of Health between June 2020 and September 2020 were examined, it was observed that there were changes in the distribution of the number of cases. Table 4 shows the number of cases in June by region.

Table-4. *Number Of Cases Compared To June (Ministry Of Health, 2020).*

Region	June Number of Cases	June Total Number of Cases
İstanbul	11.914	108.749
Western Marmara	408	2.834
Eastern Marmara	3.892	21.626
Aegean	2.093	12.926
Mediterranean	1.355	5.184
Western Blacksea	918	4.746
Eastern Blacksea	234	1.946
Western Anatolia	4.619	15.181

Central Anatolia	615	3.010
Northeastern Anatolia	469	2.176
Southeastern Anatolia	6.923	16.813
Mideastern Anatolia	947	3.090
Total	34.387	198.284

As seen in Table 4, the city with the highest number of cases in June is 34.7% Istanbul and 20.1% Southeastern Anatolia Region. The regions with the least number of cases in June are 0.6% East Black Sea and 1% West Marmara. Table-5 contains the number of cases for the month of July.

Table-5. *Number Of Cases Compared To July (Ministry Of Health, 2020).*

Region	**July Number of Cases**	**July Total Number of Cases**
İstanbul	1.789	113.521
Western Marmara	52	2.964
Eastern Marmara	624	23.308
Aegean	489	13.951
Mediterranean	409	6.293
Western Blacksea	191	5.229
Eastern Blacksea	102	2.178
Western Anatolia	1.072	18.016
Central Anatolia	229	3.537
Northeastern Anatolia	178	2.574
Southeastern Anatolia	1.791	21.624
Mideastern Anatolia	275	3.809
Total	7.201	217.004

As seen in Table 5, the region with the highest number of cases in July is Southeastern Anatolia Region with 24.85%. Thus, it got ahead of

Istanbul, which ranked 1st in June. Second, the region with the highest number of cases is Istanbul with 24.84%. The regions with the lowest number of cases in July are the West Marmara with 0.7% and the Eastern Black Sea Region with 1.4%. Table 6 contains the number of cases for the month of August.

Table-6. *Number Of Cases Compared To August (Ministry Of Health, 2020).*

Region	August Number of Cases	August Total Number of Cases
İstanbul	1.054	119.087
Western Marmara	67	3.245
Eastern Marmara	533	25.648
Aegean	494	16.305
Mediterranean	568	8.650
Western Blacksea	420	6.605
Eastern Blacksea	257	3.069
Western Anatolia	1.603	23.775
Central Anatolia	805	5.878
Northeastern Anatolia	417	4.20
Southeastern Anatolia	1.670	29.022
Mideastern Anatolia	560	5.621
Total	8.544	250.945

As seen in Table 6, the region with the highest number of cases in August is Southeastern Anatolia Region with 18.54%. Thus, it has been observed that the increase in the number of cases continues. Second, the region with the highest number of cases is Western Anatolia with 18.76%. Thus, it was observed that the number of cases in Istanbul decreased August. The regions with the least number of cases in August are West Marmara with 0.78% and Eastern Black Sea Region with 3%. Table 7 contains the number of cases for September.

Table-7. *Number Of Cases Compared To September (Ministry Of Health, 2020).*

Region	August Number of Cases	August Total Number of Cases
İstanbul	1.434	124.590
Western Marmara	86	3.592
Eastern Marmara	661	2.345
Aegean	721	19.106
Mediterranean	955	13.919
Western Blacksea	674	9.320
Eastern Blacksea	280	4.335
Western Anatolia	2.582	34.019
Central Anatolia	1.468	11.786
Northeastern Anatolia	458	6.165
Southeastern Anatolia	1.073	34.654
Mideastern Anatolia	1.075	9.659
Total	11.467	273.490

As seen in Table 7, the city with the highest number of cases in September was West Anatolia with 22.2%, and it was observed that the this region have experienced the highest increase compared to August. Central Anatolia is in the second place with 12.8%.The regions with the lowest number of cases in September are the West Marmara region with 0.74% and the Eastern Black Sea region with 2.4%. When the density map of September was examined, it was observed that the highest increase in the number of cases was in the Western Anatolia region and the lowest number of cases was in the West Marmara region (Figure-2).

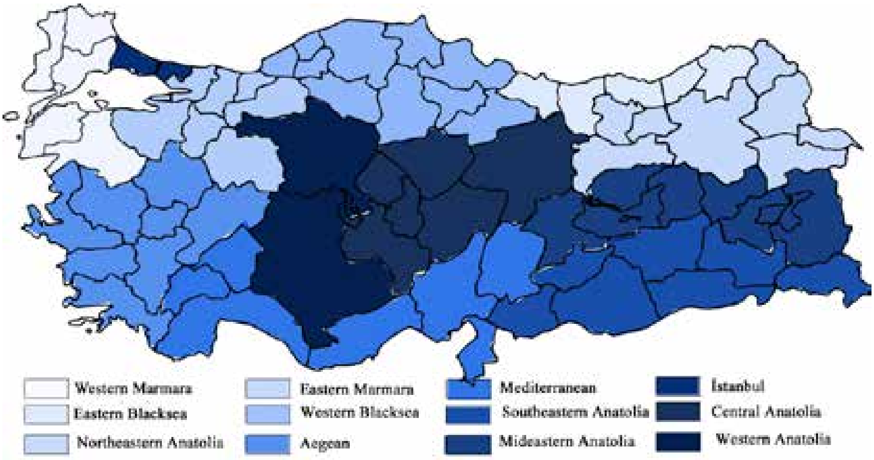


Figure 2. *September Case Numbers Density Map*

As seen in the map above, the region with the lowest number of cases is the West Marmara Region. The total population of the West Marmara Region is 3,609,092 according to 2019 TUIK data. This constitutes 4.34% of Turkey's population. In the second place, the region with the lowest number of cases is the Eastern Black Sea Region. The total population of the Black Sea Region is 5,539,702 people according to 2019 TUIK data. This constitutes 3.05% of the population in Turkey. The total population of the Western Anatolia Region, which has the highest number of cases, is 7,871,450 according to 2019 TUIK data. This constitutes 9.4% of Turkey's population. The second region with the highest number of cases is the Central Anatolia Region and Istanbul. According to TUIK data, the total population of Central Anatolia in 2019 is 4,082,686, while the total population of Istanbul is 15,519,267. This corresponds to the Turkey nüüfu 23.50's%. Considering the distribution of the number of cases, it has been observed that the number of cases is higher in cities with a high population.

The high number of cases in metropolitan cities and in the province of Zonguldak can be assessed as a result of the irregular population increase, which is considered as a natural formation in the economic development process. Urban areas accelerate the spread of the epidemic disease risk. Reasons such as the gathering of more individuals in narrow spaces, the proximity of multi-storey buildings, the public transportation carrying passengers over capacity etc. make it difficult to control the infection. In the first three metropolitan of Turkey, the number of person per square kilometer is 2 thousand 900 in Istanbul, 230 in Ankara and 595 in Izmir (Figure-3).

Figure 3. *Demographic Structure of Istanbul, Ankara and Izmir Metropolitan Municipalities*

The rapid spread, and the contact and airborne infection of 2019 nCoV increase the risk ratio in the crowded cities. However, when we look at small cities, it is determined that the speed of the virus spread is slower due to reasons such as lack of transportation, the construction limited to 4-5 storey buildings, and more open areas in these regions.

Figure 2 are examined, it is determined that the spread rate of epidemic diseases occurs faster in large and crowded cities and slower in small and calm cities. In order to prevent such epidemic diseases, it is necessary to be careful about social and urban factors. Attention should be paid to what should be done in order to prevent the epidemic by considering the laws and even urban planning, and how to proceed when we encounter such epidemic diseases in the future. The main basis for this is the urban planning process and development plans. First of all, all possibilities and probabilities should be taken into account in the National Development Plan. It is observed that the approaches to disaster issues in urban planning process are only limited to earthquakes, floodplains, landslides, erosion and it is determined that the precautions and strategic action plans for epidemic diseases are inadequate. Therefore, it may be asserted that Turkey is caught unprepared against the 2019 nCoV pandemic.

4.Dıscussıon &Conclusıon

Given the legal and administrative basis in Turkey, the environmental health and public safety is essential in the urban planning process. However, it is observed that the metropolitan cities, particularly Istanbul, have been weak in making decisions regarding the disaster phenomenon in the urban planning process and have only considered earthquake in the context of disaster. Urban planning concept, which bridges the past, the present and the future and is expressed as a whole of administrative decisions aiming at the protection of cultural and natural values, is a spatial design process that creates a balance between the development and demographic structure. This process is developing in line with international standards. In the world affected by the epidemic, there is an obligation to rethink many urban space standards and to redesign and implement them according to the effect and power of the epidemic. It is very important to develop user-oriented designs for healthy and livable living environments that will increase the quality of life and to ensure that they are implemented by local governments.

The right to live in a safe, healthy and orderly environment is a fundamental right under universal law. In line with statistical data, areas with high epidemic risk appear as regions with dense urban settlements or high density. On the other hand, it is seen that the risk of contamination is less in rural settlements where self-contained housing is dominant. Considering the distribution of the number of cases, it is observed that the number of cases is higher in cities with a high population and experiencing a dense urbanization process; It has been determined that the number of cases is lower in areas where the population is low and housing is not concentrated.

All possibilities and probabilities should be taken into account when designing the urban space. It is clear that Turkey exerts effort by mobilizing all resources in order to overcome the epidemic process experienced in the global scale with minimum loss of life and socio-economic damage. On the other hand, the local government units and the community have a major role in social cooperation, as well.

Metropolitan cities have started to change their urban planning approaches with environmental priority. Bicycle lanes are organized to reduce the use of public transportation systems. Basic food products are started to be grown on the balconies of the houses. Instead of high-rise and dense settlements, there is a return to the detached housing and houses with garden. In the coming years, we shall observe that 2019 nCoV is starting to change the design of urban space as well as the social relations.

5.References

Acuto, M., (2020). *COVID-19 Lessons For An Urban(izing) World*, One Earth, 2(4): 317-319.

Budak, F. and Korkmaz, Ş., (2020). *COVID-19 Pandemi Sürecine Yönelik Genel Bir Değerlendirme: Türkiye Örneği*, Sosyal Araştırmalar ve Yönetim Dergisi, (1): 62-79.

Chakraborty, I. and Maity, P., (2020*). COVID-19 Outbreak: Migration, Effects on Society, Global Environment and Prevention*, Science of The Total Environment, Volume 728, 1 August 2020, 138882: 1-7.

Demir, M., Günaydın, Y. and Şen Demir, Ş., (2020). *Koronavirüs (Covid-19) Salgınının Türkiye'de Turizm Üzerindeki Öncülleri, Etkileri Ve Sonuçlarının Değerlendirilmesi,* International Journal of Social Sciences and Education Research, Volume: 6(1), 2020: 80-107.

Es, M. Ve Ateş, H., (2004). *Kent Yönetimi, Kentleşme ve Göç: Sorunlar ve Çözüm Önerileri,* Sosyal Siyaset Konferansları Dergisi, 48: 205-248.

Ghosh, A., Nundy, S., Ghosh S. and Mallick, T.K., (2020). *Study of COVID-19 pandemic in London (UK) from urban context*, Cities, Volume 106, November 2020, 102928: 1-9.

Güven, A., (2016). *Kent, Kentleşme ve Kentsel Yönetim İhtiyacı, Journal of İnternational Management*, Educational and Economic Perspectives, 4(1): 21-36.

Kadıoğlu, M., (2008). *Modern, Bütünleşik Afet Yönetimin Temel İlkeleri*, Afet Zararlarını Azaltmanın Temel İlkeleri. s.1-34, (Ed.) Mikdat Kadıoğlu, Emin Özdamar, Ankara: JICA Türkiye Ofisi Yayınları.

Kadıoğlı, M., (2011). *Afet Yönetimi Beklenmeyeni bekleyerek En Kötüsünü Yönetmek*, TC. Marmara Belediyeler Birliği Yayını, 1. Baskı İstanbul.

Keleş, R., (1998). *Kentbilim Terimleri Sözlüğü*, Ankara: İmge Kitabevi.

Keleş, R., (2004). *Kentleşme Politikası*, 8. Baskı, Ankara: İmge Kitabevi.

Keleş, R., (2014). *100 Soruda Türkiye'de Kentleşme, Konut ve Gecekondu*, İstanbul: Cem Yayınevi Yayınları.

Lee, R. H., (1955). *The City*. Lippincott, New York.

Magazzino, C., Mele, M. and Schneider , N., (2020). *The relationship between air pollution and COVID-19-related deaths: An application to three French cities*, Applied Energy, Volume 279, 1 December 2020, 115835: 1-20.

Meydan Yıldız, S. G., (2018a). *Sürdürülebilir Kent, Kamu Yönetimi Ansiklopedisi*, s. 745-752, (Ed.) Yasemin Mamur Işıkçı ve Esmeray Alacadağlı, Ankara: Astana Yayınları.

Meydan Yıldız, S. G., (2018b). *Sürdürülebilir Kentleşme: İnebolu (Kastamonu) Örneği, Kentleşme Politikası*. s.260-280, (Ed.) Ayşegül Mengi, Deniz İşçioğlu, Ankara: Palme Yayınevi.

Öner, Ş., (2020). *Yerel Yönetim Yaklaşımları Açısından Onbirinci Kalkınma Planı (2019-2023)*, Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 23(43): 383-410.

Özden, K., (2014). S*algın ve Kent: 1347 Veba Salgınının Sosyal, Politik ve Ekonomik Sonuçları*. İdealkent Kentsel Araştırmalar Dergisi, 12: 60-87.

Öztaş Karlı, R. G. and Çelikyay S., (2020). *Akıllı Kentlerin Gelişiminde COVID-19 Etkisi*, Yüzüncü Yıl Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, Salgın Hastalıklar Özel Sayısı: 321-338.

Sharifi, A. and Khavarian-Garmsird, A.R., (2020). *The COVID-19 Pandemic: Impacts On Cities and Major Lessons For Urban Planning, Design, and Management*, Science of The Total Environment, Volume 749, 20 December 2020, 142391: 1-14.

Şahin, M., (2020). *Impact Of Weather On COVID-19 Pandemic İn Turkey*, Science of The Total Environment, Volume 728, 1 August 2020, 138810: 1-6.

Şengün, H. and Meydan Yıldız, S. G., (2017). *Birleşmiş Milletler Öncülüğündeki Afet Risk Azaltma Çalışmaları. Disiplinler Arası Afet Yönetimi Araştırmaları*, s.181-195, (Ed.) Zerrin Toprak Kahraman, Oguz Sancakdar, S. Ilkim Kaya, İzmir: Birleşik Matbaa Yayınları.

T.C. Ministry of Health., (2020*). Türkiye'deki Güncel Durum Raporları*. https://covid19.saglik.gov.tr/ (Erişim Tarihi: 01 Ekim 2020).

T.C. Ministry of Transport and Infrastructure., (2020), *Türkiye'deki Uluslararası Seyehat Kısıtlaması,* https://www.uab.gov.tr/basin-aciklamalari , (Erişi Tarihi: 01 Ekim, 2020).

Tezcan, B., (2020). *Biyolojik Afetler ve COVID-19*, Paramedik ve Acil Sağlık Hizmetleri Dergisi, 1(1): 41-50.

Yıldırm, A., (2004). *Kentleşme ve Kentleşme Sürecinde Göçün Suç OlgusuÜzerindeki Etkileri*, (Yüksek Lisans Tezi). Ankara Üniversitesi, 27836/847.

2872 Sayılı Çevre Kanunu, Resmi Gazete 11.08.1983/18132.

3194 Sayılı İmar Kanunu, Resmi Gazete 09.05.1985/ 18749.

6306 Sayılı Afet Riski Altındaki Alanların Dönüştürülmesi Hakkında Kanun Resmi Gazete 31.5.2012/28309,https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6306&MevzuatTur=1&MevzuatTertip=5 (18.05.2020).

5216 Sayılı Büyükşehir Belediyesi Kanunu Resmi Gazete 23.07.2004/25531.

5393 Sayılı Belediye Kanunu, Resmi Gazete 13.07.2005/ 25874.

Chapter 3

INVESTIGATION OF INDUSTRIAL AREAS IN TERMS OF LANDSCAPE URBANISM

***Demet Ülkü GÜLPINAR SEKBAN*[1]**

1 Demet Ülkü GÜLPINAR SEKBAN, Karadeniz Technical University, Department of Landscape Architecture, Trabzon/ TURKEY, demetsekban@ktu.edu.tr

Introduction

With the realization of the industrial revolution, people who continue their lives in rural settlements have begun to move towards the cities (Gülpınar Sekban, Bekar, & Acar, 2019). The problems associated with industrialization, such as increased population, unhealthy living conditions, and urban inadequacies of cities, have produced the first major transformations in cities during the industrial era. It is clear that cities are indispensable in terms of bringing industrial areas such as the development of cities, technological progress and economic gains. These areas are often abandoned or left idle after their activities are terminated as they contribute to the city they are in during economic, social, and visual sense. It has become popular in developed and developing countries in recent periods where it is necessary to transform the economic value that exists in the city and its time into new usage areas with different types of use within the scope of urban transformation projects in order to reintroduce lost industrial areas to the public sector (Gülpınar Sekban, 2018).

These transformations create a strong urban image for the city, with a rich identity of the city. Thus, even after the industrial areas have exhausted their potential life span, the city becomes very important as a whole system that continues to work for the benefit of the urban people. Especially in Europe, the re-evaluation of industrial areas has been so significant that industrial fields have occupied a great deal of space. Therefore, there are many studies, especially in Europe, that have gained to the literature. Within the scope of this study, some successful projects were examined in order to examine the achievements of industrial areas in the city (Figure 1).

Figure 1. Industrial areas have been improved in Turkey and the world

Bethlehem SteelStacks Arts + Cultural Campus

This example examined is a study based on sustainability. This area, where only industrial production was used before, has been transformed into an area hosting education and art activities as a result of the studies. Although there are many important problems in and around the area, the appropriate decisions and ideal uses have been determined. Within the scope of the project, decisions supporting the concepts of sustainable landscape and architecture were taken and implemented. Considerable attention has been paid to the use of rainwater to increase biomass. The project area, which once did not have any green areas around and inside, has gained many green areas as a result of the studies. The area that supports social life reveals the concept of "green city" for future uses of urban life. It is defined as an ecological project that carries cultural ties to the future without losing its former identity as a result of the decisions made for the area. It constitutes a very successful example of typology for post-industrial fields. It contributes to both the economic gain of the field and its ecological structure (Figure 2) (Landezine, 2020a). The place of urban identity in memory is very important (Bekar & Gülpınar Sekban, 2018). In this project, kept the old structures up to date in order to protect the identity.

Figure 2. General features and photos of Bethlehem SteelStacks Arts + Cultural Campus (Landezine, 2020a)

Museum Park Louvre Lens

The purpose of the construction of the project is to make an area that will not be used by the user, respecting the memory of the old, into an area that the user will be satisfied with again. This study shows that the reuse of industrial areas may not be demolishing and rebuilding but the bridges where the old and the new connect (Mosbach Paysagistes, 2020). This study proved that the areas that provided economic gains to the place and its surroundings but abandoned with the decrease in gains can provide gains to the economy in different ways. Together with the satisfaction of the users, these studies make a positive contribution to the social and economic well-being of the region. They are referred to as social and cultural areas that give importance to ecological achievements that respect the past. It is their first priority to make positive the negative effects they have created in nature in the past. In the study, rail systems used in the past were used for the production of plants. This contributes to sustainability by using what is positively again instead of destroying the rails and using other systems (Figure 3) (Mosbach Paysagistes, 2020).

Figure 3. General features and photos of Museum Park Louvre Lens (Mosbach Paysagistes, 2020)

Historical Coal Gas Factory Cultural Center

A large part of the factory buildings, which were closed in 1955, have not reached the present day (İzmir Büyük Şehir Belediyesi, 2020). Finally, restoration work started after the necessary permissions were obtained from the factory building protection board used by Eshot and İzulaş. While the foundry building of the factory was planned as a cafeteria, the depot buildings were organized as exhibition halls and art workshops. Other registered buildings were restored to be used as a reading room sales unit and an administrative building. The two-storey reinforced concrete building behind the site was also renovated (Figure 4) (İzmir Büyük Şehir Belediyesi, 2020).

Figure 4. General features and photos of Historical Coal Gas Factory Cultural Center (İzmir Büyük Şehir Belediyesi, 2020)

Millenary Park

Millenary Park has an area of 8.6 acres close to the center of Budapest. This area used to be home to the factory producing electronic components in the past. However, in 2001, the factory closed and the area became abandoned. As the city grew around the area, it was brought up to be revised while respecting the past identity of the area. As a result of the renovation, Millenary Park emerged as an open public space that respects the modern and past identity of the city (Figure 5) (Landezine, 2020b). The re-used buildings reveal a study that lives with the landscape and the building interacts with the landscape. There are no hard distinctions between indoor and outdoor activities. On the contrary, in this project, the transitions between indoor and outdoor activities are intertwined. Millenary Park has taken very important steps to achieve ecological balance. At the beginning of these steps, it was to purify the soil and groundwater, which was heavily contaminated from old use, from toxins. For this, the drainage system was given importance.

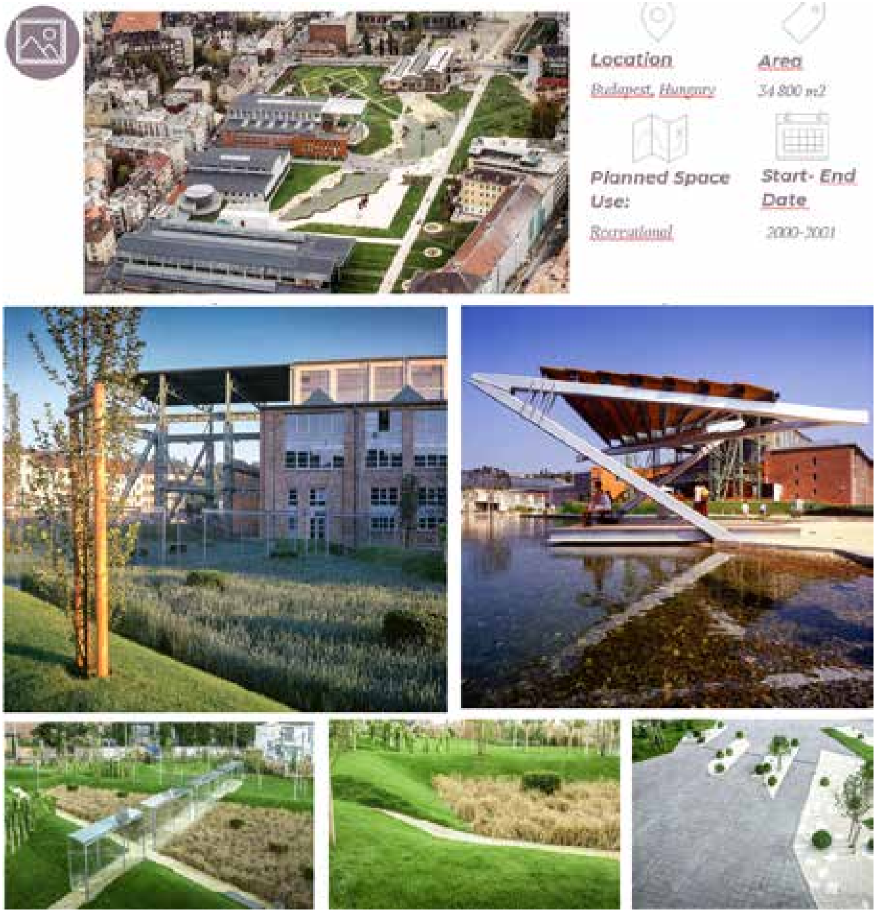


Figure 5. General features and photos of Millenary Park (Landezine, 2020b)

When the literature is examined, the transformation of industrial areas for urban development includes urban design studies aimed at making interdisciplinary studies of urban architects, architects, urban planners and urban sociologists a habitable place for people. In these studies the concepts of “landscape” and “urbanism” are considered together. A combination of these concepts brings together many ecological approaches to support the ecological balance of nature, to increase biodiversity, and to increase the ability to harbor flora and fauna. In this context, “landscape urbanism”, one of the important approaches that nature and design integrate with cities from the contemporary approaches of landscape architecture, is at the forefront. Landscape urbanism is the theory of urbanization that argues that landscape can further enhance urban organization and urban experience (Gray, 2006; Karaçizmeli, 2015).

Landscape urbanism is an innovative approach that sees the landscape as the cornerstone of the whole city and city organization, apart from the traditional understanding. It is an approach that defends that the concept of landscape should replace the architecture that shapes the city and that many different disciplines should be found together. Rather than defining the city as a system consisting of architectural structures and roads, it is an innovative perspective that sees the city within the framework of a holistic landscape (Serdar Köknar, 2012). When many definitions of landscape urbanism are examined, it has been argued that the city should be in ecological balance within itself. In addition, it was underlined that cities should create urban structure with gaps in which different and intense social activities are in ecological balance. In this approach, the landscape is not seen as green spaces and systems that beautify the city and provide the user with opportunities to socialize or relax. On the contrary, in this approach, the landscape system is the city itself. The time bridge connecting the past and the future is seen as the concept of scale. Landscape is the shaping of the urban process with ecology. Landscape urbanism advocates the use of the dynamic of the landscape and its vibrant power as a solution to these problems of vacancy and abandonment in the cities. Landscape urbanism advocates multi-discipline as a goal. It goes beyond landscape design and brings together knowledge and techniques from disciplines such as environmental engineering, urban strategy, landscape ecology, industry and architecture development to think about the complexity of contemporary urban dynamics (Akyol & Özbek Sönmez, 2018; Serdar Köknar, 2012; Shane, 2003).

In some studies, landscape urbanism has even compared the development stages of the city to egg types (Figure 6). The city, which is defined as solid eggs, mostly defines the city system in ancient times. Here, the city is formed and defined within distinct walls and defined borders. The urban system defined as "the phonetic egg" is the formation of the city with unclear urban boundaries. This unclear city boundary is usually a boundary created by the rail system. The city is formed within and outside this boundary, and the interaction is defined within unclear boundaries. Omlet, on the other hand, defines the system where everything is formed in the landscape with small and interlocking structures and where everything is shaped in line with the landscape and the interaction with the landscape is at the maximum level (Gray, 2006; Karaçizmeli, 2015).

Figure 6. Cedric Price's definition of landscape urbanism (Gray, 2006)

When the definitions and important points of landscape urbanism are examined, it is seen that the main structure of landscape urbanism consists of roughly four features. These; uncertainty, open flow, flexibisity and complex systems. The main structure and heaslines of landscape urbanism have been defined as a result of the studies (Table 1).

Table 1. The main structure and heaslines of landscape urbanism (Gray, 2006; Karaçizmeli, 2015)

Main Structure		
	Uncertainty Open Flow Flexibility Complex Systems	
Primary Headlines		
	Water	Water evaluation, storage and filtration
	Urban Infrastructure	Wastewater, ground water, drainage, green infrastructure Education, social, law, public systems
	Bioactivity and Ecological Systems	Landscape ecology, geomorphology, hydrology, climate and vegetation, identification of existing ecological resources, wild life
	Process and Natural Subscription	Ecological system
Second Headlines		
	Urban agriculture	Food supply, sustainability
	Energy	Alternative energy use, renewable energy, energy-saving
	Recreation	Flexible use

The purpose of this study is; with Landscape Urbanism approach, it is the reintegration of the industrial areas which are the urban lost places in the city. It is aimed that the industrial areas will meet the expectations and needs of the users and re-function to open the public use, social, economic and cultural cooperation at the urban scale.

Material and Method

The study area is located in the province of Trabzon. The Trabzon Cement Factory, which is 3.5 km from the city center, has a convenient location in terms of transportation facilities (Figure 7).

Figure 7. General features of study area

The project of the Trabzon Cement Factory was approved on 25.05.1964 and the construction of the factory started on 23.04.1965. The plant, which has been operating for 51 years, was discontinued as of the end of 2015 and its move decision was taken. The factory is now abandoned with certain rough structures, mainly the main production areas and borders (Figure 8).

Figure 8. General photos of the study area (Kuzey Ekspres, 2017)

Study; taking into consideration the current situation and revealing the development of the space, taking into consideration the needs of the users. Questionnaire method has been used. The questionnaire survey was conducted at the KTÜ Kanuni Campus and the Trabzon Square near the research area. Land work was done on Saturdays and Sundays between 14.00 and 17.00 hours, especially when the user density was high. Questionnaires were given to the users and the questionnaires were asked to be filled in on average 5 minutes. A total of 250 people were surveyed.

The questionnaire consists of three main sections. The first part is composed of the questions asked to obtain the demographic data of the participants. The second part consists of the questions asked to obtain the participants' views on the industrial activities of the participants. The third part is the participants' main structure of landscape urbanism, its important headings and secondary headings.

Findings

Participant diversity was given importance in the survey study. In this context, the demographic structures of the participants were examined (Table 2). A total of 250 people participated in the survey study. Most of the participants are from the 20-30 age group. When we look at the gender, 54.8% of the participants are women. Most of the participants are university graduates or studying at a university. When the places where the participants live were examined, it was seen that 68% of them lived in the urban area.

Table 2. Demographic characteristics of the participants

Demographic Variables	*The number of participants*	*Percentage of Participants*	*Demographic Variables*	*The number of participants*	*Percentage of Participants*
Age			**Professional Status**		
-15	20	8%	Jobless	13	5.2%
15-20	23	9.2%	Student	47	18.8%
20-30	119	47.6%	Officer	65	26%
30-40	57	22.8%	Retired	49	19.6%
40+	31	12.4%	Academist	15	6%
Total	250	100%	Independent business	57	22.8%
Gender			Others	4	1.6%
Female	137	54.8%	Total	250	100%
Male	113	45.2%	Place of Residence		
Total	250	100%	Urban area	170	68%
Education Status			Rural area	48	19.2%
Uneducated	9	3.6%	Industrial area	32	12.8%
Primary school graduate	31	12.4%	Total	250	100%
Secondary school graduate	27	10.8%			
High school graduate	59	23.6%			
University graduate	79	31.6%			
Master	45	18%			
Total	250	100%			

Ideas of Participants' Industrial Activities

In the second part of the study, the participants' approaches to industrial activities were questioned. Of the respondents who made up the second part of the questionnaire, 36 respondents (14.4%) were 'positive / positive', 159 (63.6%) responded to the question "What is your approach to industrial activities?" 'Conditional acceptance / tolerance', 21 persons (8.4%) were 'negative / negative' and 34 persons had 'no attitude / indifference' (Table 3).

Table 3. Participants' approach to industrial activities

Approach to Industrial Activities	*The number of participants*	*Percentage of Participants*
I'm positive	36	14.4%
Conditionally I can accept / I am tolerant	159	63.6%
Negative	21	8.4%
I don't have an approach / I'm indifferent	34	13.6%
Total	250	100%

The Importance of the Study Area for Trabzon City

The study area has a very important position in Trabzon city structure. It is located very close to both the coast and the city center. Some questions were included in the questionnaire in order to determine what this area means to users in both personal and physical conditions. In the survey, the users were asked "Which of the following does Trabzon Cement Factory tell you?" 31.6% of the participants stated "investment area" and 24.8% "landmark point" to the question. The lowest answer was "transport network" with 2% and "living space" with 4%. "How should this area be evaluated?" When asked the question, the majority of the participants answered "must be revised" with 50% (Table 4).

Table 4. Evaluation of the criteria (Tırnakçı, 2020)

<table>
<tr><td colspan="6">Which of the following refers to you Trabzon Cement Factory?</td></tr>
<tr><td>Criterion</td><td>The number of participants</td><td>Percentage of Participants</td><td>Criterion</td><td>The number of participants</td><td>Percentage of Participants</td></tr>
<tr><td>Living Space</td><td>10</td><td>4%</td><td>Landmark Point</td><td>62</td><td>24.8%</td></tr>
<tr><td>Urban Identity</td><td>22</td><td>8.8%</td><td>Industrial Heritage</td><td>37</td><td>14.8%</td></tr>
<tr><td>Investment Area</td><td>79</td><td>31.6%</td><td>Cultural Value</td><td>17</td><td>6.8%</td></tr>
<tr><td>Transport Network</td><td>5</td><td>2%</td><td>Commercial / Economic Value</td><td>18</td><td>7.2%</td></tr>
<tr><td colspan="6">How should this area be evaluated?</td></tr>
<tr><td colspan="2">Must be protected</td><td colspan="2">91</td><td colspan="2">36.4%</td></tr>
<tr><td colspan="2">Must be restructured</td><td colspan="2">34</td><td colspan="2">13.6%</td></tr>
<tr><td colspan="2">Must be revised</td><td colspan="2">125</td><td colspan="2">50%</td></tr>
</table>

Parameters Determined by Participants for Use

In the survey where landscape urban planning parameters were questioned for the Trabzon Cement Factory, the majority of the participants answered that the "recreation" parameter is important (Table 5). When the participants wanted to compare parameters with each other, it was observed that the "Recreation" parameter was 75.2%, "Flexibility" 62.8% and "water" 62.8%.

Table 5. Evaluation of landscape urbanism characteristics for Trabzon Cement Factory (Karaçizmeli, 2015)

Parameters	Frequency Analysis	Parameters	Frequency Analysis
Uncertainty	17%	Biodiversity and ecological systems	54.8%
Open ended	42.8%	Process and natural succession	50%
Flexibility	62.8%	Urban design	50%
Complex Systems	10%	Energy	32%
Water	62.8%	Recreation	75.2%
Urban infrastructure	48%		

Conclusions

Resolving the problems that arise due to the rapid development of cities will be accompanied by new approaches and new sustainable environmental policies that will coordinate the preservation of the economic development (Güneroğlu & Bekar, 2017). Especially when the industrial activities are inevitable, the abandoned areas need to respond to the expectations and needs of the city. As we have seen in our research, the vast majority of users accept industrial activities as conditional. This indicates that these areas need to be changed in accordance with the conditions, both during use and at the end of use. However, when the concepts of landscape urbanism are taken into account, the parameters determined by the participants for the use of the Trabzon Cement Factory are recreation, flexibility and water. When examined in the literature, this type of field in the world is compatible with its use for recreational activities. When the spatial and operational activity lists of the examples in the literature are examined, one area does not consist of only one place or activity. Uses, spaces and user profile are quite flexible. This supports the increase in the flexibility parameter in the result of the survey. As it is known, water is a very effective factor in the choice of usage and location (Bekar, Gülpınar Sekban, & Acar, 2018).

Recreation and functioning of industrial areas such as Trabzon Cement Factory, which is an image for the city and a part of the memory, will provide the city identity and the opening of public use will bring social and cultural cohesion to the city scale. That's why; it is necessary that such administrations should be consulted in the context of landscape urbanism by bringing together governments, non-governmental organizations, landscape architects and many disciplines.

Referances

Akyol, D., & Özbek Sönmez, İ. (2018). Kentin Yönetiminde Ekolojik Yaklaşımlar: Ankara, İstanbul ve İzmir Uygulamaları Üzerinde Bir Değerlendirme. *Çağdaş Yerel Yönetimler, 27*, 45-70.

Bekar, M., & Gülpınar Sekban, D. Ü. (2018). Kentlerin Zihinde Bıraktığı İzler Trabzon Örneği. *The Journal of International Social Research*, 331-339.

Bekar, M., Gülpınar Sekban, D. Ü., & Acar, C. (2018). Determination of Recretion Potential to Users Requirements; Case Study Trabzon Sera Lake. *The Journal of Academic Social Science*, 349-359.

Gray, C. D. (2006). *From emergence to divergence: modes of landscape urbanism.* (Master), School of Architecture Edinburgh College of Art, Edinburgh

Gülpınar Sekban, D. Ü. (2018). *Islah edilmiş maden alanlarında peyzaj tasarım yaklaşımlarının değerlendirilmesi (İstanbul Çiftalan-Kısırkaya yöresi maden alanı örneği).* (Yüksek Lisans), Karadeniz Teknik Üniversitesi, Trabzon.

Gülpınar Sekban, D. Ü., Bekar, M., & Acar, C. (2019). Evaluation of Sustainability Potential According to Cittaslow Criteria in Turkey/Trabzon. *Fresenius Environmental Bulletin, 28*(7), 5435-5446.

Güneroğlu, N., & Bekar, M. (2017). Dönüşüm ve kimlik kavramı: Trabzon Örneği. *Kastamonu Üniversitesi Orman Fakültesi Dergisi, 4*, 580-593.

İzmir Büyük Şehir Belediyesi. (2020). Tarihi Havagazı Fabrikası. *Projeler.* Retrieved 22.09.2020, 2020, from https://www.izmir.bel.tr/tr/Projeler/tarihi-havagazi-fabrikasi-/1382/4

Karaçizmeli, E. B. (2015). Peyzaj Şehirciliği (Landscape Urbanism). Retrieved 23.10.2018, 2018, from https://docplayer.biz.tr/6093856-Peyzaj-sehirciligi-landscape-urbanism.html

Kuzey Ekspres. (2017). Trabzon Çimento Fabrikası. Trabzon. Retrieved 21.09.2020, 2020, from https://www.kuzeyekspres.com.tr/trabzon-cimento-fabrikasi-muhurlendi-56068h.htm

Landezine. (2020a). Bethlehem SteelStacks Arts + Cultural Campus. *Landezine International Landscape Award.* Retrieved 19.09.2020, 2020, from https://landezine-award.com/bethlehem-steelstacks-arts-cultural-campus/

Landezine. (2020b). Milenary Park. Retrieved 23.11.2020, 2020, from http://landezine.com/index.php/2015/10/millenary-park-by-ujirany-new-directions/

Mosbach Paysagistes. (2020). Museum Park Louvre Lens. Retrieved 15.09.2020, 2020, from http://landezine.com/index.php/2016/09/museum-park-louvre-lens-by-mosbach-paysagistes/

Serdar Köknar, A. B. (2012). *Kentsel Dönüşüm Alanlarında Gerçekleştirilen Peyzaj Tasarımlarının Eleştirel Teori ile Bir Okuması.* (Doctoral Doctoral), İstanbul Teknik Üniversitesi, İstanbul.

Shane, G. (2003). The Emergence of "Landscape Urbanism". *Harvard Design Magazine, 19*, 1-8.

Tırnakçı, A. (2020). İşlevini yitirmiş endüstriyel peyzajların yeniden işlevlendirilmesi: Sümerbank Kayseri Bez Fabrikası örneği. *Artvin Coruh University Journal of Forestry Faculty, 21*(1), 82-92.

Chapter 4

THE USE OF DESIGN ELEMENTS IN PLANTING DESIGN AND ITS EFFECT ON VISUAL PERCEPTION

Ahmet CILEK[1]

Muge UNAL CILEK[2]

1 Ahmet Cilek, Cukurova University, Architecture Faculty, Landscape Architecture Department, 01330, Balcali, Adana, TURKEY, acilek@cu.edu.tr

2 Muge Unal Cilek Cukurova University, Architecture Faculty, Landscape Architecture Department, 01330, Balcali, Adana, TURKEY, unalm@cu.edu.tr

1. Introduction

Landscape architecture is a branch of art and profession that deals with the analysis, planning, design, management, conservation and rehabilitation of the land. Study subjects of landscape architecture are very diverse. The basic principles of landscape architecture are considering natural and cultural resources and physical environment within the framework of aesthetic and scientific principles, creating space and living environment, covering biodiversity supporting land planning, design, management, conservation, restoration and inspection, researching and making physical plans at national, regional, urban and rural scales. Landscape, based on sustainability, also aims to act as a bridge between the past and the future in the light of natural and cultural values. The landscape planning and landscape design branches emerge by ensuring ecological priority projects to protect cultural and natural values and sustainability (Anonymous, 2018).

- ***Landscape planning;*** It is the planning that produces land use/management projects based on maintaining and including the implementation of plans and projects with conservation, repair, renewal, restoration, and management to create open spaces by considering the public and public interest.

- ***Landscape design*** takes part in urban design and urban renewal studies covering a part or all urban settlements. It makes the structural and planting design of public spaces (parks, squares, recreation areas, pedestrian paths/zones, coastal strips, botanical gardens, zoos, children's gardens, playgrounds, sports areas, car parks, etc.), executes and maintains them. It performs planting and structural design, application and maintenance work in collective housing areas and common use environments (university campuses, shopping malls, communal workplaces, etc.). It designs, implements, and carries out the structural and planting design of tourism and recreational facilities, entertainment facilities (amusement park, aquapark, etc.), and waterfront recreation facilities. It also designs, implements, and maintains agricultural farm and hobby gardens (Anonymous, 2018).

Plants have a special place among the materials used in landscape design studies. In particular, plants undoubtedly play an essential role in the design of aesthetic and functional spaces. For this reason, the hard, solid, dull and lifeless appearance of the structural materials is brought to a more natural state by using mostly plants.

Vegetation constituting the natural features of the landscape gives rich appearances to the environment we live in and creates physical and visual pleasures. Planting design concepts emerge as they are designed in line with various design ideas and compositions with plants. In order to make this composition, it is necessary to know the characteristics of the plants well, as well as their relations with the environment and the conditions of coexistence. Plants grow and develop with their dynamism over time, exhibit their characteristics and give the landscape the fourth dimension. Plants have many different characteristics such as evergreen or deciduous, changing color in autumn, being effective with their flowers, to become prominent with their stem shell colors in the leafless period, and gaining linear weight. Successful landscape work will be created in all these variations by creating a composition using the main planting design principles (Gultekin, 1994). As a basic design principle, plants can express each of the art elements defined as form, line, shape, color, texture, space and value. When these artistic elements come together, they begin to express the design principles such as emphasis, balance, harmony, variety, movement, rhythm, proportion and unity (Chappell et al., 2014).

In planting design projects, basic design elements that are line, form (shape), size, color and texture are used in landscape design studies like architecture and other fine arts professions. In this study, visual/physical/functional effects in the planting design in landscape architecture are analyzed to evaluate the simulatively created plant compositions in terms of design elements (line, form, size, color, and texture).

2. Design elements used in planting design

2.1. Line

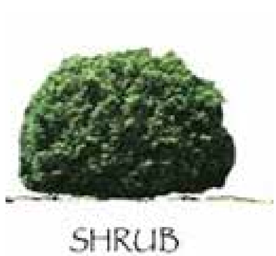
The line is the designer's basic tool to create a work or control to create physical flow and connectivity (Gultekin, 1994). In a landscape composition, a carefully planned group of lines directs the observer or user's attention to a focal point or a unique area that is interesting in the design. Also, these lines are useful in controlling visual or physical movement in linear or curvilinear directions. Vertical lines move the eye towards the sky and help expand small spaces (Toscano, 2019). Straight lines are effective and steady, direct the observer's eye to a point more than curved lines. On the other hand, curved or free lines are fluid, attractive, and relaxing; they create natural feelings (Ingram, 2005). In planting design, hedges are indicative of the use of the line. Lines in plants originate either from the plant's contour or branching structure. Vertical, horizontal, curved, inclined, upward, extending sideways and downward hanging lines emerge from the branching structure. This situation causes plants to exhibit different line characteristics due to their size and branching characteristics. It creates line diversity with other species or mixed sequences of the same species in planting design.

2.2. Form (Shape)

Lines come together to reveal the shapes of objects. The form is the design component that creates space with distance and light in 3 dimensions. With this feature, it is the only continuous element in the design. The importance of form in the design is directly related to visuality (Uzun, 1999). The form can be functionally used either as an emphasis or as a trap, as it is the first design element to attract the eye. Other functions can be listed as creating focus and contrast, breaking and softening the dominant horizontal and vertical lines in the environment (Ayasligil, 2004). The combination of forms, the relationships between them, proportions and mobility dimensions, and size can be listed as the form features formally affecting the design (Uzun, 1999). The plant's form is not only its silhouette; It has a certain mass and volume due to its depth, width, and height (Ayasligil, 2004). Plants grow horizontally and vertically at different rates. This development can be defined with geometric concepts (Table 1). The form generally reflects the external appearance of the plant in its maturity period. Many plant species exhibit different outward appearances during their growth or old age (such as conical, midfoot, and umbrella-like external appearance of some coniferous species from young to old). In addition, the masses and forms of the plants may vary according to the seasons. This situation causes plant forms to be perceived differently. For example, while the plants that shed their leaves in winter are perceived stronger as they have a larger mass and form; After the leaves fall, they lose their effect by having a weaker mass and form, and perception decreases (Uzun, 1999; Walker, 1991). On the other hand, the shapes of plants can be perceived in different ways at different distances. For example, if it is far away (more than 500m), it can be perceived as a silhouette; at the middle distance (an average 100m distance), the shape created by the lines forming the plant becomes more pronounced, it ceases to be a silhouette. If the plant is under or near the crown, its image becomes complicated; leaves, stems, etc., are effective with organs.

Table 1. Plant forms and their effects on planting design

Plant forms	General characteristics of the form
 (Farm, 2020)	• A columnar plant differs from an oval plant by the blunting of the top point. • When used in small numbers, it has effects that emphasize the focal point or scene. • They act as a border effect when used in large numbers.
 (Farm, 2020)	• It has a distinctly round and spherical shape. • It is one of the most common plant forms, so it is the most widely used plant form in planting designs. • The form does not have a particular aspect of attracting the eye's attention. Therefore, unity and harmony can be created in the design by repeating round plants. • It gives a neutral or soft feeling. • It is used to create large audiences. • Makes you follow the look with its rounded silhouette
 (Farm, 2020)	• The plant can develop its crown on a single strong main stem and form multiple stems. The stem, branching, leaves, flowers and fruits of the plant also show different forms. • The branches of the weeping plants are curved downwards. • Direct the visual aspect to the ground • When used near the water, the wavy form of the water is emphasized. • These forms are used to create an attractive accent and soft lines in the garden. • It gives sadness and it draws the visual look to the ground. • Most of the weeping plants have calligraphic features. • These types of plants evoke sad feelings in the space and create a gloomy atmosphere. • When used as a group, their visual impact is reduced.

  (Farm, 2020)	• It gradually gets narrower from the base to the peak. • They should be carefully used as they give a sense of dominance in the landscape. • As their size increases and depending on how they are used, they create loneliness and sadness. • Vertical lines cause pride, arrogance and serious feelings in people. • They create refreshing and exciting effects in landscapes dominated by horizontal lines. • Direct the visual aspect upward
 (Farm, 2020)	• They are generally mature plants that have adapted to the conditions of their environment. It has sculptural features. • They are the best options to place the salient, important points in the design as an example. • In the field of view; Usually, it should not be used more than once to avoid creating an uneven, confusing landscape. • They are used to create natural landscape spaces. • They provide a feeling of relaxation in the environment in which they are used. • Since their crown structures are informal, they create opposite effects to symmetrical forms. • There is a wide variety in species such as leafy and coniferous, broad-leaved, or evergreen.
 (Farm, 2020)	• These plants focus the eye along a horizontal line; therefore, they are used to link other forms in a composition visually. • It can be used to contrast with other forms of plants. • They reduce architectural lines to the ground when used around buildings

Oval  (Farm, 2020)	• It has a vertical, narrow and tapering structure. • They strengthen vertical perception by directing the eye towards the sky. • They add height and verticality to the plant community. • Oval plants should not take place in many parts of a design. Because they attract attention where they are, and a design that creates a hard feeling emerges. • The stem, branching, leaves, flowers and fruits of the plant also show different forms.

2.3. Size

The volume effect plants show in the space horizontally and vertically. It is the first factor to be evaluated for planting design. The size directly affects the dimensions of the area and the whole design. Human factors should be taken as a standard while creating sizes in landscape design because the size can include a wide variety of perceptions from person to person. The impact of the design should always be considered to be related to the size of the space. In small areas, the visibility is short and the perception is therefore very high. Great details in solitary plants and color changes in leaves and flowers can be easily noticed in such designs. The sizes of plants should be examined in four groups, including height, crown width, branching height, and stem diameter or circumference.

The climate's growth characteristics should be considered since the plants' size can vary according to the growing environment's conditions. For example, a species originating in a warm zone can be used in the form of a tree in its homeland, while the same species can be used as a living room plant or a shrub-shaped outdoor plant in a cold or temperate region. It is also possible to bring the plant's branching pattern, crown structure and stem shape to the desired appearance and dimensions with proper pruning. For this reason, it is challenging to define plants with exact numerical values in terms of size. Plants can be classified into six groups according to their size (Table 2).

There are typically four elements when talking about plant size:

• Plant height is the plant's measure from the ground to the plant's top at the end of maturity.

• Plant spread is the maximum width of the plant measured at its widest point from leaf tip to leaf tip at maturity.

• A plant's density refers to the amount of open space in the plant's stem, leaf, and flower growth. An excellent visual assessment of a plant's density shows how much background can be seen throughout its development.

• A plant's footprint refers to the amount of space a mature plant would occupy, usually measured in square feet.

Plant height can also be used to arrange the plants to avoid or take advantage of taller plants' shading effects (Lurie, 2020). When you look at a garden, your eyes are naturally drawn to unique and exciting elements. The designer uses the plant size to move your eye around the area.

Table 2. Size classes in plants

Size	**Height**	**Width/ Height ratio**	**General characteristics of the size**
Large trees	>15m	1:2 (broad-crowned) 1:5 (narrow-crowned)	• They generally branch close to the surface. • There is not enough space under the crown for activities. • They are suitable as background, wall, or screening plants.
Medium trees	7-15 m	1:1 1:1.5	• They create spaces under the crown allowing human activities due to their branching on a single stem. • They can function as background, wall, encirclement and screening singly or in clusters.
Small tress	5-7m	-	• It is separated from large scrubs by branching on a single stem. • They facilitate harmony and balance as a transition element between large trees and small scrubs. • It is capable of constraining in the vertical plane. • It can give a sense of depth to a person Together with other tree trunks or branches (Booth, 1996)
Large scrubs	>5m	-	• They are separated from small trees by forming multiple trunks. However, by making appropriate pruning, they can get the appearance of a shrub with a trunk, branching and crown shape. • They function to provide harmony and balance. • They are suitable for purposes such as restraint, visual blocking, and privacy creation. • They can be used in sparse or dense clumps.

Medium scrubs	1.5-5m	-	• They are bushes above the eye level of a standing person. • Branching starts from the surface. • It has the same design functions as medium shrubs and short shrubs. • They serve as a visual transition between tall and short people in design (Booth, 1990). • They create a visual barrier for a standing person, privacy in space. • They perform essential functions such as limiting or directing the use of space or parts of the area. • Color and texture effects become evident when used in batches. They can come in any shape, color and texture.
Small scrubs	1-1.5m	-	• Branching is from the surface and they form the lower layers in the hierarchy. • Generally, they perform essential functions such as visual obstacles for a seated person, limiting and directing space areas. • When used as a cluster, color and texture effects become evident. They can be used to create a ripple effect in the field.
Groundcovers	<1m	-	• They stay below the sitting human eye level. • They allow larger plants and structural elements to be perceived to be larger than they are. • When used in dense clusters in large areas, the texture and color effects become evident. • It provides a vital unifying function between plants with different characteristics. • It can limit the area or divide spaces without obstructing the view. • It is used to lower the effect of tall plants to the ground in the design. • The visual effect is provided when used in large masses. If used in small groups, they can disappear. • It is used along footpaths and roadsides without obstructing the view of pedestrians (Booth, 1996)

2.4. Color

Color is a powerful design element and can be used to attract attention and guide the human eye. It can also be a problem when misused due to color strength (Chappell et al., 2014). Each of the sensations that occur in our eyes with the reflection and reflection of the sun's rays on nature's objects is called color. It is the emotion created by the visual perception of the rays coming from various objects. In other words, color is the effect that light leaves on our sense of vision by reflecting after it hits objects.

The fact that colors are brighter and more vivid on a sunny day, losing their brightness and vividness in indoor weather and looking darker than they are, indicates that the color is dependent on light. When there is no light, everything is lost in shape and color in the dark.

Colors can be described as cool or warm. Green and blue are cool colors. They are often associated with water, sky and forest and they evoke feelings of relaxation and calm. Red, orange and yellow are exciting warm colors often associated with heat, fire and the sun (Chappell et al., 2014). Cool colors (blue, pink) will attract the scenery and make your space look bigger. It is important for people who have small gardens and want their space to appear larger. Cool colors are calming (Roppolo, 2019). Purple color can be a cool or a warm color depending on other colors that appear adjacent to it in a landscape. While purple and blue give a feeling of cold color side by side, when purple and red are combined, they are perceived as a warm color. Since colors can affect people psychologically, they are used to design many products and places (Chappell et al., 2014).

It is necessary to know which colors are considered a neutral color. White, black, gray, silver and shade of brown are considered neutral in all areas. Green also functions as neutral in the landscape. Neutral colors can be used with any other color without changing the effect you are trying to achieve. Neutral colors have a transitional task in regulating complexity by tending to reduce other colors in one area (Meyer, 2020).

A theme is created by planning which colors will be seen in the design. There are at least six different color schemes to choose from, each with a different psychological effect (Chappell et al., 2014).

Monochromatic color schemes are usually using a single color or color variety. Such arrangements are not preferred as they represent monotony. Such arrangements are not always preferred as they represent monotony. It can only be evaluated in terms of representing the field in vast environments.

Analogous color schemes use colors that are next to each other on the color wheel. With the use of these colors, a visually harmonious, rich color mixture is created. Depending on the color, a warm or cool effect can be achieved. Green and yellow colors are visually pleasing and make a warm impression.

Complementary color schemes use contrasting colors on the color wheel. Each complementary color contributes to the intensity of the opposite. For example, purple and yellow are opposite each other on the color wheel. Both colors compliment each other and increase the brightness of the other. Purple and yellow colors are a popular combination because the colors accentuate each other. In a landscape, complementary colors are successful not in equal proportions but when one color dominates the other (Chappell et al., 2014; Meyer, 2020).

Primary color schemes use the three primary colors red, yellow, and blue. When used together, they become bright and energetic. It is usually designed using three primary colors to attract the play equipment's attention in children's playgrounds and stimulate the developing mind. In other settings, primary colors can be very visually jarring. This can easily be corrected by using the shades or tints of the primary colors together. The emphasis on primary colors draws attention and invites the garden visitor to enter and explore.

Riotous color schemes are defined as the use of multiple colors in a vibrant and bold combination. With so many colors, it can sometimes confuse and there may not be a point to focus. Therefore, such schemes can often be challenging to implement successfully. Since it can be very energetic and visually stimulating, it is important to repeat colors to ensure unity in design.

Pastel color schemes are used to create soft and subtle effects in the landscape. It combines best with other pastel colors and fits well with plants with silvery or gray leaves.

In planting design, color selection depends on the area's characteristics (e.g., education, health, shopping, leisure-entertainment, etc.) and the desired sensation and behavior style (enthusiasm, productivity, calmness, movement, direction, motivation, etc.). Here, success can be revealed by knowing the language of flowers, leaves, fruit and twig colors of plants and establishing the harmony and balance between colors.

The value (hue) of color is the lightness or darkness of the color and depends on reflected light. Surfaces that reflect a lot of light have a light tone; on the other hand, surfaces reflecting very little light have a dark tone (Ayasligil, 2004; Leszczynski, 1999).

Light tones have high visual energy when observed near distance, but their visual effects are low at medium and long distances. Bright green plants create airy and wide view spaces in addition to add brightness, joy and vitality. In addition, they direct the view upwards by giving the feeling of moving away from the sensor (Booth, 1996)

Dark tones, on the other hand, have a very high value of visual energy and the observer feels close to each other. If dark tones are at the end of the field, it causes the distance between the object and the sensor to appear shorter. It looks smaller when it is a place where dark colors are dominant. For this reason, light tones should be preferred to expand the space in small areas, and dark tones should be preferred to reduce the space in huge sizes.

While dark tones are relaxing and peaceful, the extensive use of dark tones can create a gloomy atmosphere in the space. If they are used to contrast with a light tone, they will attract more attention. In other words, light color plants can be used in front of or behind a dark color (Booth, 1996).

The important points in the use of color in planting design are listed below:

- When you want to draw attention using the color effect in an area, the light-colored plants are located in front of dark-colored plants. Thus, they can create focal points in plant composition (Gunning, 2020).

- While deciding on the plant's color in the design, it should be ensured that the natural green tone dominates all other colors. Such a color connects all the other colors as a unifier.

- Plants with brightly colored flowers should be used in groups and specific areas. If bright colors are found individually in many different places, this may cause confusion and an irregular appearance in the design (Booth, 1996).

- Variegated colored plants are not distributed throughout the garden space. These plants are used for accent. It should be used in small repetitions, not using it frequently in the design.

- Warm colors are often used in front yards and entrances. Bright and warm colors cause the sensor's excitement and movement into the landscape area (Austin, 1982).

- The majority of coniferous plants are monotonous trees that do not change color according to the seasons. Excessive use of these herbs creates monotony. Although coniferous plants do not show effective color properties as leafy plants, some forms can offer beneficial color properties (Var, 1997).

- Plants have a color effect with their stem shell, leaves, flowers and fruits (Table 3). This effect is seasonal. The longest-lasting color effect is on the leaves. Evergreen plants carry green tones (such as light green, gray-green, blue-green, yellow-green and dark green) throughout the year, but most deciduous plants evoke a very different emotion to the audience with their leaves turning from green to red or yellow in autumn.

Table 3. Plant organs having color effect according to the seasons (Unal Cilek, 2019)

SPECIES	SPRING	SUMMER	AUTUMN	WINTER
GROUND COVER				
Aizoaceae	Various, Green		Green, grey, blue	
Ajuga reptans	Blue, Purple			
Convallaria majalis	White			
Dianthus chinensis	Various			
Fragaria vesca	White	Red		
Gazania spp.	Various			
Hosta spp.		Blue, Purple	Variegated	
Liriope spp.		Blue, Purple		
Sedum spp.	Various	Green, grey, blue		
Thymus spp.		White, pink		
Vinca spp.	Various			
SHRUBS				
Abelia grandiflora		White, pink	Red-green	
Acacia longifolia	Yellow			Yellow
Berberis spp.	Red			
Callistemon citrinus	Red			
Calluna vulgaris		White, lilac		
Camellia spp.			Red, pink, white	
Carissa grandiglora	White			
Cistus spp.	Red-purple, lavander			
Cornus spp.	White, pink	Red	Red	
Cotoneaster spp.	White, pink		Red orange	
Enkianthus campanulatus		Pink	Red, yellow	
Erica spp.	Pink, white, yellow			
Euonymus spp.	Yellow-green			
Forsythia spp.	Yellow		Brown red	
Fuchsia cv.		Various		
Hebe spp.		White, lilac, pink		
Hydrangea spp.		Pink, blue, white		
Lantana spp.	Various			

Lavandula spp.	Blue, purple			
Ligustrum japonicum	White			
Lonicera tatarica	White, pink, red			
Mahonia spp.	Yellow		Red	
Nandina domestica		Pinkish	Red	
Photinia fraseri	White	Red		
Pieris spp.	White	Red	Green-Yellow	
Pittosporum tobira	White	Light Green		
Potentilla fruticosa	White, pink, red, yellow			
Pyracantha spp.		Cream	Orange-red	
Raphiolepis indica	White, pink, red			
Rhododendron cv.	Various			
Rosa cv.	Various			
Santolina spp.	Grey	Yellow	Grey	
Senecio cineraria	Grey			
Skimmia japonica	Red		Red	
Spiraea spp.	Pink, white		Brown red	
Viburnum spp.	White		Yellow red	
TREES				
Acacia baileyana	Yellow		Purple	Yellow
Aesculus spp.	White, pink, red	Brown	Yellow, red, orange	
Amelanchier spp.	White, pink		Red-orange	
Arbutus spp.	Pinkish			Pinkish
Callistemon citrinus	Red			
Cercis siliquastrum	Pink		Red-yellow	
Chorisia speciosa			Pink, red	
Citrus spp.	White			Orange
Cornus spp.	White		Red	
Cotinus coggygria	Lilac-gray, white		Red	
Erythrina spp.			Red-orange	
Franklinia alatamaha		White	Red	
Fraxinus spp.	White		Red	
Jacaranda mimosifolia	Lavander, blue			
Koelreuteria spp.		Yellow	Orange	
Lagerstroemia indica	Pink, white		Red	

Liriodendron tulipifera	Cream		Yellow	
Liquidambar spp.			Yellow	
Magnolia spp.	White			
Ostrya carpinifolia	Cream		Yellow	
Prunus spp.	Pink, white	Green, red	Red	
Salix spp.			Red	
Sophora japonica	Yellowish		Yellow	
Sorbus aucuparia	Pink	Red, yellow,	Red	Red
Styrax japonicus	White		Red-orange	
IVY AND VINES				
Actinidia chinensis	White	Brown		
Antigonon leptopus		Pink		
Bougainvillea spp.	Various			
Celastrus spp.		Orange-red	Red	
Clematis spp.	White, pink, red, orange, blue, purple			
Gelsemium sempervirens	Yellow			
Hedera helix	Variegated			
Jasminum spp.	Yellow, white, rose			
Lonicera spp.	Various			
Parthenocissus spp.			Red	
Passiflora edulis	Various			
Polygonum spp.		Yellow, white, pink		
Rosa cv.	Various			
Wisteria spp.	purple, blue, white, pink			
=Flower, = Fruit, = Leaves, =Twig				

2.5. Texture

Objects have a characteristic external structure. The texture consists of the effects and properties of these external structures. The texture is the effect that expresses the functional qualities of the object's internal structures. It is also a structural feature of nature. The objects' external appearance differences arise from the textural structure's differences; therefore, every item has its unique outer surface. The designer can obtain new creative possibilities by using the textural formations in living nature. General features about textures can be listed as follows:

• The texture is formed by the combination of identical or complementary unit forms with individual systems. Regardless of the type of surface, there may be some basic connections between the part and the whole surface.

• A rough surface and suitable light are required to form a texture. The tissue depth is perceived when the indentations and protrusions on the surface occur in a proper light. Moreover, the color change adds visual character to the texture.

• The texture is formed with a light-dark variability that does not change direction.

• Natural texture, complementing each other as a whole, form a structural system.

• Structural characters in tissues are related to their functions. The unit forms that make up the textural surfaces and their juxtaposition systems always differ. Sometimes the unit forms in different objects may be similar, but since their functions are separate, the side-by-side arrangement systems may vary.

• The size increases without any change with their repetition.

• The rhythm develops in opposite directions and within the same measure or to a different extent.

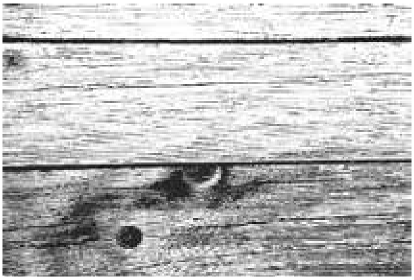
• It emerges from a certain center and moves from outside to inside and from inside to outside.

Each material has its own natural or artificial texture. Textures are perceived differently according to their hard or soft effects. They may exhibit different effects depending on the processing technique of the material. For example, there may be variation between different patterns and lines in the textures of felled trees and textures achieved by planing, rasping, sanding or polishing, or even burning. We can see the best examples of the textures we obtain through drawing in a hatch in the designs.

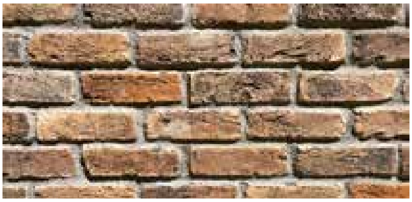
The physical structure of the texture consists of several small volumes. This volume is lost on gleaming and smooth polished surfaces. Therefore texture can be considered both two-dimensional and three-dimensional. The volumes give shape to the light. These volumes are the ones that make sense, collect, distribute, lighten and harden the light. While rough, bright and dark warm-colored textures are perceived closely in texture perception, soft textured matte and cold colors give a sense of distance in design.

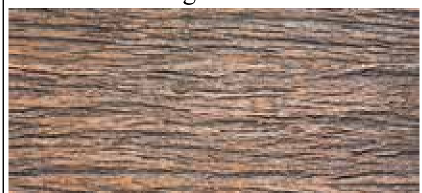
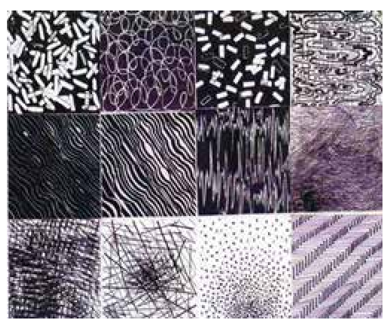
Concepts such as hard, soft, alive, dead, light, heavy, still, moving, stinging, blind, shiny, matte, crystal are the object's characteristics and the object's textural structure characteristic. The texture types can be grouped in Table 4 in line with the visual and tactile characteristics. The texture is the surface structure of two or three-dimensional objects, unlike color and form.

Table 4. Texture types

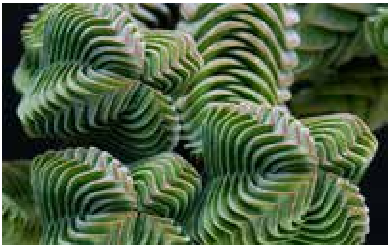
Texture types	Definition and characteristics	Examples
Tactile Texture	• It is a type of texture obtained by touching surfaces. • Textures are mostly real. • Real tissues perceived with a finger give emotional effects on the person, such as roughness, softness, smoothness and coldness. • Textural values are affected depending on the object surface quality. However, besides the tactile sensation sensed by fingers, there is also visual texture affecting the eye. These are two-dimensional textures formed with colors, motifs and values.	**Example 1:** When we close our eyes and run our fingers over tree bark, an orange surface, or on the back of a lamb, we are stimulated with different effects. **Example 2:** When we are in a dark room, we can distinguish between glass and wall surfaces with our fingers. The textures of grass, concrete, soil, silk, paper, snow, and bark give our fingers different meanings. All surfaces create textural emotions when touched. For this reason, surfaces have different textural effects and values unique to them.
Visual texture	• Textures were obtained through a vision that is not perceived by touching surfaces. • It gives a texture effect as an image on a flat surface. When making a two-dimensional image of a three-dimensional object on paper, the degree of roughness of its surfaces is specified with the help of several hatches and points. This depicted texture is an artificial texture that is perceived only visually.	 (Timoshenko, 2018)

Rigid texture	• In general, hard texture guide the spiritual structure, create mobility and struggle effect. • They evoke a dynamic feeling in people; they are attractive, strong and warmer; they give excitement. • They seem to be closer to their current position. **Example:** Bark, cactus, sculptures, busts, monuments, etc.	 (Christie, 2020)
Soft texture	• Soft textures have more curved lines. • Soft texture gives comfort, peace, silence, monotony, cold and powerless, and relaxing. • They are preferred in places that require tranquility, such as hospitals and restaurants. **Example:** Herbaceous plants with hairy structure (*Cortaderia selloana, Pennisetum* sp., *Arundo donax*, etc.), flowers, etc.	 (Seeds Gallery, 2020)
Natural textures	• All textures on nature are natural textures and there are significant differences in nature in terms of structural and visual activities. • Although natural tissues do not show mathematical equality, they complement each other and form the structural system. • Their natural characteristics portray them. It is the juxtaposition system of the unit forms that make up the object's tissue structure and the perception of the shapes that the units take in the system. **Example:** Rock, bark, leaf, wood, fish, orange, cones, leather, etc.	 (Wikipedia, 2020)  (Dendro Press, 2020)

Organic texture	• It is the texture character related to the skin and organs of living creatures. It also expresses the organic structure formed by interdependent, logical shapes and surfaces with this definition. • All textures in nature are natural textures and there are significant differences in natural textures in terms of structural and visual activities. **Example:** Organic texture, cell-based texture, butterfly wing or leaf texture, etc.	 (Duru, 2015)
Artificial texture	• It is possible to create mathematical orders with unit element systems. • While there is no texture effect felt on the object's surface when the painting is touched by hand, the roughness level on that object's surface can be understood quite well when viewed with the eye. **Example:** brick, concrete, iron, paper, fabric, glass, etc.	 (Sena Stone, 2020)

Rough texture	• The surfaces where the texture sensation occurs when we feel our hands or see the different surface that draws attention with our eyes is called rough texture, and the texture without this feeling and perception is called smooth texture. • Textural values are affected depending on the surface quality of the object. These textures can be perceived in different ways, such as rough (bark, rough plaster, etc.), medium roughness (sandpaper, plaster, etc.) and smooth (glass, wall, marble, granite, wood surface, etc.). • One of these examples is seashells. The shell, which is very thin and non-resistant to resist tons of water weight, has created a texture suitable for it and thus gained a high resistance. These seashells that are flat and plain without any protrusions give us a feeling of smooth texture. This texture that he creates is natural.	 Rough texture  Medium Roughness texture  Smooth texture
Optical texture	• It is a type of tissue that is formed by delusion. This texture is obtained by performing movement and deformation processes. The texture is an accent element that becomes evident in cases where the light is oblique. • The texture disappears when the direction of incidence of light is the same as the optical axis. A surface with indentations and protrusions is seen as empty space without giving details under perpendicular light	

Instant texture	• They are instant and variable textures. • Changes occur in the superficial appearance of this tissue over time due to external factors. **Example:** Sea wave, a vibration of water with wind, sands, change of forest texture according to the season, change of plants according to age and natural conditions, etc.	 (Collins, 2020)
Crystalline textures	• It is found in crystalline elements in nature. **Example:** Snow, salt, ice minerals are textures formed by crystalline materials.	 (Nix, 2017)
Geometric structured textures	• Different processes create it by starting from a geometric form. **Example:** The honeycomb, spider web, some succulent and cactus species have geometric texture as well as natural texture.	 (Meurer, 2005)
Dynamic texture	• They are tissues based on energy and movement. • They are opposite to each other in quality and effect.	 (Ideas Flower, 2020)

Chemical texture	• They are atom-based textures.	
Deep tissue	• When looking at an object or plant, if the depth of the object in the third dimension can be seen very easily with the eye, the object is deep-textured.	 (Etsy, 2020)

The texture is perceived by our eyes as well as by our sense of touch. The hand-perceived texture does not give the aesthetics, excitement and feeling of eye perception. The most important aspect of the tissue is that the eye aesthetically and well perceives it. Therefore, the texture is a visual design component.

Texture in planting design is the whole of the elements that make up a plant. It can be defined as the time-varying properties of the visual and textural characters of the physical surface properties revealed by size and shape (Austin, 1982). The texture is the least used design element of plants but has the most potential for creating visual interest. Texture makes a misleading perspective and affects the observer's perception of distance. The textures considered in planting design can be grouped into fine, coarse and medium textures (Table 5). Fine, medium and coarse grades of plants may differ depending on the situation. For example, deciduous trees in winter may appear coarse-textured when leafless but fine-textured when leafy. Fine textures appear to move away from the observer, while coarse textures appear to move towards the observer.

Table 5. Texture in planting design

Fine texture	• It gives a sense of closeness and sharpness. Scattered, detailed and uncertain textured surfaces give the effect of distance. • They are plants with small leaves, small and thin branches or dense and dense growth. • They are less prominent in the landscape. • They have a soft and fragile structure. • They visually disappear when put too far out of sight. • Fine-textured plants are generally the last plants to be noticed in a composition and the first to be visually lost as the distance between the sensor and the composition increases. • It is used to create a neutral background and to complement other textures. With their fine, soft and translucent texture, they dominate the feelings of calmness, joy and relaxation. These plants; used to create regular, precise, specific, formal characters.
Medium texture	• Most of the plants are medium textured. They are often used in design to create a neutral ensemble. • Less transparent and robust silhouette • Coarse and fine-textured plants are effective in visual integrity, providing unity in plant composition. • It is a little more transparent than the coarse texture and has a more robust, more pronounced silhouette. t is a transition element between coarse and fine-textured plants (Booth, 1996).
Coarse texture	• It has broad leaves, thick, large branches and a sparse appearance. • The coarse texture is quite noticeable and creates a dark appearance. • Coarse textured plants create dark shaded spaces. • Coarse texture can be used as a focus to attract attention or to give a sense of power (Booth, 1996). • A rough-textured plant feels close to the sensor. They cause the distance between the sensor and the plant to be perceived as shorter than it is. • Coarse textures give the impression that the area is getting smaller. It is also undesirable as narrow spaces can overwhelm the environment. • Coarse textured plants, the borderlines are not clearly defined compared to fine-textured plants. Because of these features, they are used more comfortably in informal designs. It is more difficult to use informal spaces with distinct shapes and sharp lines (Booth, 1996).

A landscape architect aims to emphasize different textures in the selection of plants and building materials. Although the texture is generally defined as a visual characteristic of objects, it can also be noticed by touch.

Some leaves are fine or smooth; some leaves have a rough or coarse texture. In addition, barks have different texture characteristics, from smooth to very rough. In space, the human interacts with his environment. During this interaction period, human beings determine objects' position, perceive and evaluate other properties with visual stimuli from the environment. Space perception is determined depending on the space size, openness, and difference caused by the size, illuminance, and brightness of surfaces. Space's illumination level depends on the surfaces' texture characteristics and color, light, proportion, depth, and height effects. The decreasing and increasing or weaken and strengthen factors of texture are given in Table 6.

Table 6. The properties of factors affecting the texture perception

• The texture effect varies according to the size of the plant elements (leaves, branches, etc.) that create the texture				
Fine texture	← Smaller	Objects size	Bigger →	Coarse texture
• Texture effect varies according to the distance (spacing) between elements that create the texture.				
Coarse texture	← Decrease	Distance	Increase →	Fine texture
• Texture effect varies depending on the location of the observation point				
Fine texture	← Further away	Observation point	Closer →	Coarse texture
• The texture effect varies according to the light intensity and angle.				
Fine texture	← Further away	Light intensity and angle	Closer →	Coarse texture

Texture not only has an emotional quality, but it is also located in sub-memory intuition. Texture in nature and art makes people think and direct the designer towards creating new and unconventional beauty (Uzun, 1999). In the landscape design, especially, plants' fine or coarse texture makes them appear light or shadowy, light or dark. Fine-textured plants cause a broad perception of the environment due to adding depth to the surroundings, while coarse-textured plants cause a narrow perception of the environment. Open areas (especially meadows and grass areas, areas covered with flooring elements, water surfaces, roads, slopes) have plenty of light and give a great comfortable feeling. Shady places have a contrary (troublesome) effect.

3.Conclusion

Texture, line, size and color show plastic features of materials with visual effects and psychological results in landscape design. Contrasting texture features such as smooth-rough, hard-soft, light-heavy, etc., are visually perceived and felt by touch. Landscape architecture uses many non-living building materials (stone, brick, concrete, wood, metal, etc.) used by architecture and living materials (grass, trees, shrubs, etc.). Although each building material has a texture, different textures can be obtained using them together in different sequences.

Plants are the raw material of the creation for the designer. Each plant has its unique color, form, size, hardness and texture. These features are inherent in plants and cannot be changed. Therefore, plant selection in planting design is a versatile process. Using a wide variety of plant species in a different order may be caused by complex landscapes to view without visual effects.

For this reason, the characteristics of plants should be well-investigated and well-known before deciding on suitable plants for design. It is necessary to know the plants in terms of their aesthetic and functional qualities for successful studies. Moreover, it is required to understand the aesthetic and functional qualities of plants for successful design studies. However, plant design studies should be carried out by examining plants' textures, their seasonal colors, the physical characteristics of plant species, which plant creates harmony or contrast, and their relationship with other design elements. Therefore, the general results of the study can be summarized as follows:

Form: Youth, maturity and old age periods of the plants can have different forms. Moreover, the perception of the forms of the plants may change according to the seasons. In addition, plants, not have suitable habitat and growing conditions may not have their real forms. Therefore, it should be paid attention to the forms in suitable growing conditions before selecting plants.

Size: Large and medium trees are visually dominant elements due to their height and width (crown). These trees are first perceived in a design; consequently, they become the focal point when used with smaller plants. For this reason, large and medium trees should generally be firstly positioned in the planting design because their location has the most significant effect on the perception and is essential for holistic design (Booth, 1996). Large trees generally do not prevent a person's relationship with the environment. These plants have important functions in creating space. Therefore, they can be used in open spaces, urban parks and large areas in the city. Large trees should not be preferred in small spaces because they will not be in harmony with the design scale and put pressure on small elements.

Color: Landscape architects can benefit from the color effect in many areas. There are plenty of color features, including leaves, flowers, fruits, branches, twigs, and bark colors. The important color effects stem from seasonal leaf colors. Although flower colors and autumn leaf colors remain in memory, their effects are usually short-lived. Thus, this effect lasts no more than a few weeks. Therefore, flower or autumn leaf color is not the primary criterion for plant selection. The plant should not be chosen just by paying attention to these features in the planting design.

Texture: The balanced combination of three basic texture types (fine, medium, and coarse texture) is necessary for an attractive planting design. While less textural variety creates monotony, too much creates complexity. It is appropriate to use coarse-textured plants behind structures and fine-textured plants in front of structures. Likewise, it is reasonable to use soft-looking objects or fine-textured plant species in front of green plants with a coarse texture. In large areas, medium texture plants are suitable for the transition between coarse and fine textures. Usage of different textures in small spaces or the spaces causes a complicated and disorganized appearance. Moreover, the fine texture appears brighter due to reflect more light than coarse texture. Also, smooth leaves reflect more light than rough leaves. These situations change the appearance of the plant surface.

References

Anonymous. (2018). *Landscape Architecture*. https://conversation.poxox.com/2018/10/landscape-architecture.html

Austin, R. L. (1982). *Designing with Plants*. Van Nostrand, Reinhold, NY.

Ayasligil, Y. (2004). *Planting Design Course Notes*. Istanbul University, Faculty of Forestry, Landscape Architecture Department, Istanbul.

Booth, N. K. (1996). *Basic Elements of Landscape Architectural Design*. Waveland Press, Inc. Illinois.

Chappell, M., Davis, B., Pennisi, B., & Sullivan, M. (2014). Landscape Basics: Color Theory. *UGA Extension Bulletin*, *November*(1396), 1–6. http://extension.uga.edu/publications/files/pdf/B 1396_2.PDF

Christie, S. (2020). *Texture*. Pinterest. https://i.pinimg.com/564x/25/32/4c/25324c68c916428cc84c4e5108047275.jpg

Collins, K. (2020). *Are transitional seasons like spring and autumn getting shorter thanks to a changing global climate?* Howstuffworks, Getty Images. https://resize.hswstatic.com/w_796/gif/redefinefourseasons-1.jpg

Dendro Press. (2020). *conifersaroundtheworld.com*. Pinterest. https://i.pinimg.com/564x/e0/5f/71/e05f7172ab40d94382f4915b9c63b861.jpg

Duru, S. (2015). *Bir haftasonu aktivitesi: İskelet yaprak yapımı*. Yesilist. https://www.yesilist.com/wp-content/uploads/2015/10/iskelet-yaprak.jpg

Etsy. (2020). *Crassula colomnaris*. https://i.etsystatic.com/13841971/r/il/fdbb83/1312311268/il_1588xN.1312311268_epl6.jpg

Farm, W. H. T. (2020). *Tree Form*. https://www.winterhill.com.au/

Gultekin, E. (1994). *Plant Composition*. Faculty of Agriculture, Course Book, Number 10, Adana.

Gunning, A. (2020). *R2111 Using Colour in Garden Design*. Leafy Learning. https://www.leafylearning.co.uk/post/using-colour-in-garden-design

Ideas Flower. (2020). *Ideas flower*. Red Flowers. http://ideasflowers.selbermachendeko.com/wp-content/uploads/2019/10/Mysterieuse-et-magnifique....Exoticflowers.jpg

Ingram, D. L. (2005). *Basic Principles of Landscape Design*. Institue of Food and Agricultural Sciences, University of Florida.

Leszczynski, N. (1999). *Planting the Landscape-A Professional Approach to Garden Design*. John Wiley&Sons, Inc., New York.

Lurie, G. (2020). *Exploring Elements of Garden Design : Plant Size*. https://www.luriegarden.org/2016/05/28/exploring-elements-of-garden-design-plant-size/

Meurer, A. (2005). *Green Spiral*. Flickr. https://www.flickr.com/photos/meurer/56825707/in/faves-worshiptheglitch/

Meyer, K. (2020). *Basic Design Principles - Using Color in the Garden*. Proven Winners. https://www.provenwinners.com/learn/basic-design-principles-using-color-garden

Nix, S. (2017). *Dealing With Ice and Snow Damage to Trees*. ThoughtCo. https://www.thoughtco.com/thmb/ka_r4Iu6KmEY_KfvWmz3-rbnZCU=/768x0/filters:no_upscale():max_bytes(150000):strip_icc():format(webp)/490663517_5-56af626a3df78cf772c3c943.jpg

Roppolo, L. (2019). *Color Theory and Its Application in the Garden Landscape*. Den Garden. https://dengarden.com/gardening/Color-Theory-and-Its-Application-in-the-Garden-Landscape

Seeds Gallery. (2020). *Pink Pampas Grass Seeds (Cortaderia Selloana)*. https://www.seeds-gallery.shop/8670-large_default/pink-pampas-grass-seeds-cortaderia-selloana.jpg

Sena Stone. (2020). *Decorative brick*. Pinterest. https://tr.pinterest.com/pin/331718328796274002/

Timoshenko, A. (2018). *Visual texture image*. https://st4.depositphotos.com/8107280/23443/v/1600/depositphotos_234433894-stock-illustration-distressed-overlay-wooden-texture-grunge.jpg

Toscano, K. (2019). *Understanding Mass, Form and Line*. 3 Key Landscape Design Elements. https://southernlivingplants.com/plan-your-garden/3-key-landscape-design-elements/

Unal Cilek, M. (2019). Çocuk Merkezli Öğrenme Ortamları Okul Öncesi Çocuklar İçin Bir Okul Tasarla (Planting Principles in Ecological Areas in School Gardens). In Y. Aktas Arnas (Ed.), *Child-Centered Learning Environments: Design A School For Preschool Children (Çocuk Merkezli Öğrenme Ortamlari: Okul Öncesi Çocuklar Için Bir Okul Tasarla)* (pp. 149–184). Pegem Akademi Yayıncılık. https://doi.org/10.14527/9786052416082

Uzun, G. (1999). *Basic design*. Cukurova University, Faculty of Agriculture Landscape Architecture Department General Publish Number 196, Course Publish Number A-62, Adana.

Walker, T. D. (1991). *Planting Design*. New York, Van Nostrand Reinhold.

Wikipedia. (2020). *Ladin (Picea)*. https://www.wikiwand.com/tr/Ladin

Chapter 5

THE STUDY ON THE ACCESSIBILITY IN ULUDAG UNIVERSITY GÖRÜKLE CAMPUS SAMPLE

Kasım HANİK[1]

Nilüfer SEYİDOĞLU AKDENİZ[2]

1 Kasım HANİK, Bursa Uludag University, Institute of Science, Department of Landscape Architecture, Bursa - Turkey.

2 Doç. Dr. Nilüfer SEYİDOĞLU AKDENİZ, Bursa Uludag University, Faculty of Agriculture, Department of Landscape Architecture, Bursa- Turkey

INTRODUCTION

Universities, which are located in public open green spaces, provide unifying and integrity, aim to spread knowledge, and add vitality to cities in terms of socio-economic aspects, are areas that contribute to the social and cultural development of individuals and strengthen social communication. Universities are educational institutions that symbolize unifying and integrity, and that provide universal knowledge production and dissemination. In addition to training professionals, these institutions spend their services on the development of people who will be trained in this field by researching in the academy (Taş 2015; Bolay 2011).

Campuses, on the other hand, can be regarded as sections of university departments located together, sometimes as a network, or in different parts of cities. The idea of campus first emerged in the United States of America, and it was influenced by the Castrums (camps) of the Middle Ages, as a form of repeated development of units on a common order. The campuses have mixed-use features to meet all the needs of the individuals in their surroundings by revealing the integrity of the indoor-outdoor space. University campuses direct the development of the city where they are located, and they bring vitality to the city by integrating with the city over time. Campuses, which are an indicator of culture and identity, are a social phenomenon that enables the production of social values and have an important role in the transfer of knowledge and experience in cooperation with the city and the region (Şahin 2012; Ergun 2014; Taş 2015).

University campuses are the image of the city as open green spaces, and they should be well-designed in terms of aesthetics and functionality so that the users of them can spend quality time. Universities provide specialization training in various fields and also provide recreation opportunities to their users. A well-designed campus should be sustainable in the long term and raise the quality of life to high levels (Tanfer ve Yener, 2020). While making landscape design, structural and vegetative implementations should be well planned and sustainable in order to increase the quality of life to high levels (Yılmaz 2015; Yener ve Akdeniz, 2020). Campuses that include mostly young people in society should serve individuals from each user group. Disabled individuals, who are an integral part of society, have an important place in this user group.

A disabled individual is defined as a person with physical and mental abilities who cannot do the work they need to do in their social life due to a hereditary or acquired disability (Gökçe, 2012). According to another definition, a disabled individual is a person who is unable to adapt to the requirements of normal life by losing various degrees of physical, mental, spiritual, sensory, and social abilities that occur congenitally or for any reason and needs special physical arrangements in open spaces to act independently (Aykal et.al. 2017; Özdener, 2006). Throughout human history, individuals with disabilities have been an integral part of society. It has always been an important issue for disabled individuals to be under equal conditions with other individuals in terms of their participation in life because, as in all areas of life, disabled people have difficulties in the social life on campuses, and especially in terms of accessibility (Pouya 2016; Feyzioğlu 2013). The needs of disabled individuals should be taken into consideration in the campuses and the physical conditions of the campuses should be arranged with analytical designs according to the disabled standards (Yılmaz et al., 2012; Ergun 2014). Designs should be supported to ensure equal opportunity for disabled users for them to use and access the area as a whole in the campus (Şahin 2012; Öter 2018).

For this purpose, standards defined for disabled individuals in the design of open green spaces are used on the campuses. These standards are standards set at national and international levels. International standards are the standards determined according to the World Health Organization (WHO) and National Standards Administration for Disabled People (ÖZİ) and Turkish Standards Institute (TSE 12576) (TSE 1999; ÖZİ 2011; URL-1). It is important to determine the current situation and reveal the problems considering that the designs made in campuses comply with the standards and these designs are addressed in detail from the point of view of disabled individuals. In this context, this study compares the Görükle Campus of Uludag University that is the first university in Bursa – Turkey's fourth-largest city – in the light of the standards by putting forth the present situation for people with disabilities and develops recommendations based on the creation of trouble-free access possibilities for a good design.

Material and Method

In this study, Uludağ University Görükle campus was determined as the study area. Bursa Uludağ University Görükle campus is located in the west of Bursa, between the coordinates of 40° 13' 4.8360" North and 28° 52' 52.6332" East. Bursa Uludağ University is founded in 1970 as the Bursa Faculty of Medicine, which was established under Istanbul University, and Bursa Faculty of Economics and Social Sciences, which was established in 1974. As the first university of the city of Bursa, the university was established on April 11, 1975, under the name of Bursa University and was named "Uludağ University" with the Decree-Law No. 41 on 20 July 1982. The name of the university was changed to "BURSA ULUDAĞ UNIVERSITY" with law no. 7141 dated May 18, 2018. The largest and main campus of the campuses located in different districts of Bursa is the Görükle campus (Figure 1) (URL-2).

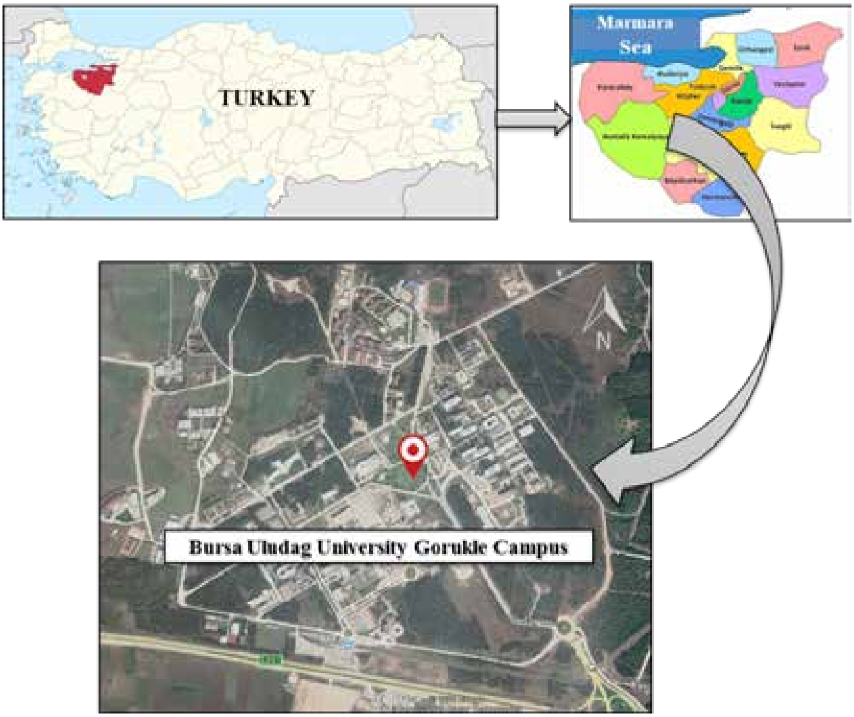


Figure 1. Location of study area

In Bursa Uludağ University Görükle Campus, Faculty of Medicine, Faculty of Economics and Administrative Sciences, Faculty of Engineering and Architecture, Faculty of Veterinary Medicine, Faculty of Agriculture, Faculty of Education, Faculty of Arts and Sciences, State Conservatory, School of Health, Vocational School of Health Services and Vocational School of Technical Sciences, Prof. Dr. Mete Cengiz Cultural Center, Student Cultural Center, Central Library, Institutes, Department Heads and Rectorate Headquarters are located. Approximately 43,000 students study at Görükle Campus, and there is a total of 6619 academic and administrative staff. 127 disabled personnel and 118 disabled students consist of the total number of disabled individuals. In terms of transportation, the Görükle campus is located in the Bursa-İzmir ring road Bursa exit Görükle District and it is possible to get access to the campus via the Istanbul-Izmir Highway, Bursa link road, and the city center-İzmir road. It is possible to reach the campus from Bursa center and its districts by public transportation system (Figure 3.2) (URL-2).

The research method consists of data collection, observation, analysis, and evaluation. First, data was collected by researching different sources such as the literature, theses, books, etc. related to the research subject

(Çınarlı, 2008; Çınar, 2010; Ergun, 2014; Evliyaoğlu, 2015; Gökçe, 2012; Kurşun, 2014; ÖZİ, 2011; Şahin, 2012; TSE, 1999; Taş, 2015; URL-1). Within the scope of the study, the Görükle campus has been divided into six main headings: Entrance, Pedestrian roads and sidewalks, Ramps, Stairs, Vehicle parking spaces, and Urban facilities. The necessary measurements were made with the field studies carried out in the sections under six main headings and they were registered into the forms. Measurements were made using a tape measure. Also, visual material was obtained by taking photos in the area and taking images with a drone. The data obtained were compared within the framework of the criteria determined by the Disability Administration (ÖZİ), the Turkish Standards Institute (TSE 12576), and the United Nations (TSE, 1999; ÖZİ, 2011; URL-1) and evaluated and analyzed as appropriate, inappropriate, and partially appropriate.

FINDINGS

Entries

The main entrance gate of Uludağ University Görükle Campus is located on the Bursa-İzmir road, on the Bursa side, and there is no arrangement for pedestrians but only for vehicle entrance. The second entrance gate of the campus area is located on the side of the Görükle district. This entrance has a road for both vehicle and pedestrian entrance. Also, there is a light rail stop in the area where the Faculty of Medicine is located on the campus, and access can be gained from different districts of the city. Light rail entrances were found to be suitable for disabled access (Figure 2)

Figure 2. Uludağ University Görükle Campus Entries (Hanik, 2019 – Original)

The entrance to the campus was evaluated according to 8 criteria (Table 1). The evaluation revealed that 50% of the criteria comply with the standards, while 12.5% are partially suitable and 37.50% are not suitable. While the width of the roads, road material qualities, and typefaces are appropriate, it has been concluded that the passing spaces of the pedestrian paths without obstacles are not suitable. Observations also exhibited that there were no guide tracks in the entrance (Figure 3).

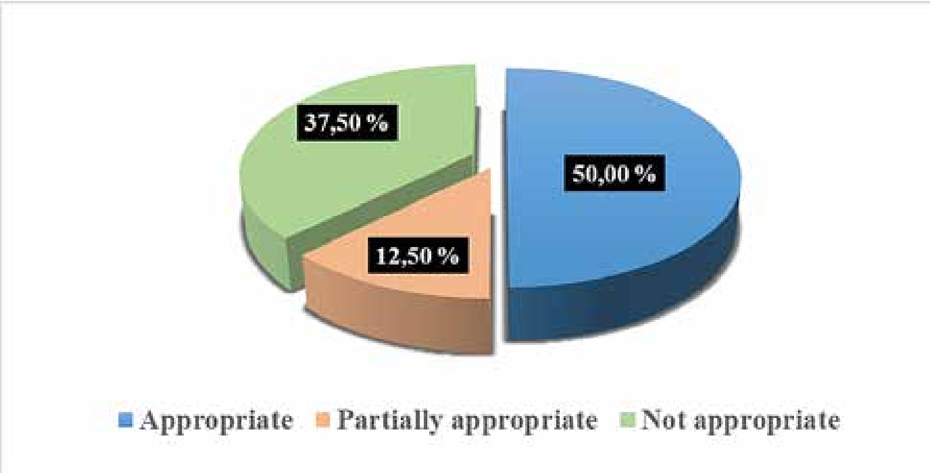


Figure 3. Distribution of the entrance according to the standards

Table 1. Comparison of entrance with standards

Criteria	Standards			Size in the area	Evaluation
	International Standards	TSE 12576	ÖZİ		
Width of the road	90 cm	150 cm	120 cm-200 cm	150 cm	Suitable
Guide track	-	Width 60 cm	-	Not in the area	Not suitable
The material of the roads	-	Non-slippery material	It should be directive and reliable.	Not meet	Not suitable
Pedestrian road unobstructed clearance	90 cm	150 cm	-	Doesn't meet standards in some areas	Not suitable
Maximum height of ground and direction signs	250 cm,	250 cm	-	Partially suitable	Partially suitable
Minimum bottom clearance of hanging signs and advertising signs	200 cm	220 cm	-	220 cm	Suitable
Character width and height ratio of letters	3.5 -1,1	-	-	15/20 cm	Suitable
Smallest letter style	0.15 cm	-	-	30 cm	Suitable

Pedestrian Roads and Sidewalks

The pedestrian roads and sidewalks in Görükle campus were divided and evaluated according to 9 criteria (Table 2). As a result of the evaluations made, the guide track, which is one of the nine criteria, was not found in the area sufficiently and did not provide continuity. The guide track is usually located around a University Research and Practice Hospital and the newly built faculty buildings and social areas (Figure 4). While 13% of the criteria were found to comply with the standards, 62% of them were partially appropriate and 25% were not appropriate. While the width of the roads and the road material properties were appropriate, the sidewalk material properties were determined as not appropriate (Figure 5).

Figure 4. Pedestrian roads and sidewalk - guide track relationship in the example of education faculty and dormitories region (Hanik, 2019 – Original)

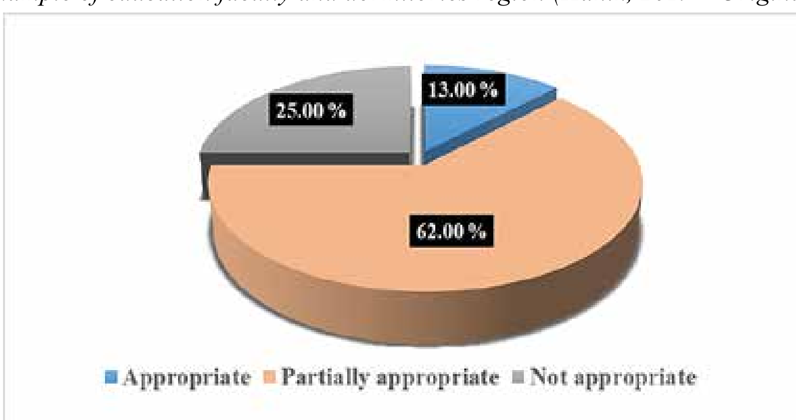


Figure 5. Distribution of pedestrian paths and sidewalks according to standards

Table 2. Comparison with the standards of pedestrian paths and sidewalks

Criteria	Standards			Size in the area	Evaluation
	International Standards	TSE 12576	ÖZİ		
Road Width	90 cm	150 cm	-	Shows Variability	Partially Suitable
Guide Trail	-	60cm	-	No Continuity	Not suitable
Materials of Roads	-	Non Slippery Material	It Must Be Routing And Reliable.	Mostly Paving Stone And Reinforced Concrete	Suitable
Pavement Width	-	At least 150cm	Minimum 150cm (Ideally: 200cm)	Between 60-195 Cm	Partially Suitable
Pavement Height	7-15 cm	3-15 cm	3-15 cm	No Standard	-
Pavement Surface Material Properties	-	It should be in a way that the visually impaired can watch comfortably with their walking sticks	It should have an anti-slip, non-glare and walkable texture.	The pavement surface does not meet the standards	Not suitable
Pavement Slope Condition	-	Transverse 2% Maximum Longitudinally 5% Maximum	2% max.	The slope varies	Partially Suitable
Road distance of Plants	100 cm	100 cm	-	Between 30-100 Cm	Partially Suitable
Minimum Bottom Span of Plants	200 cm	220 cm	-	114 Tcm	Partially suitable

Ramps

The ramps in the Görükle campus were evaluated according to 5 criteria in terms of compliance with the standards (Table 3). The evaluations exhibited that 20% of the criteria complied with the standards, while 40% were partially appropriate and 40% were not appropriate (Figure 6). In general, observations revealed that the road-ramp-building relationship was not ensured in a healthy way on the ramps. Although the width of the ramps was sufficient, characteristics such as the slope dimensions of the ramps, material choices, and handrails, etc. were determined not to be taken into consideration and the required standards were not complied with. While the ramp in the administrative building of the Faculty of Arts and Sciences was appropriate in terms of materials, observations revealed that there was no resting area. In the Faculty of Agriculture, on the other hand, the material quality was determined to be not appropriate (Figure 7).

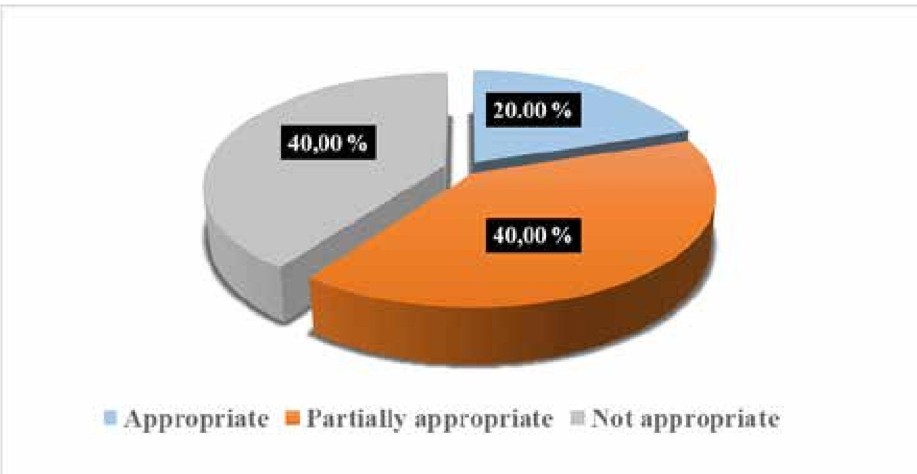


Figure 6. Distribution of ramps according to standards

Figure 7. The ramp-stair relationship in the example of the Faculty of Arts and Sciences (Hanik, 2019 – Original)

Table 3. Comparison with the standards of ramps

Criteria	Standards			Size in the area	Evaluation
	International Standards	TSE 12576	ÖZİ		
Ramp width	90 cm	180 cm	At least 90cm	Between 100-205 cm	Suitable
Ramps surface material property	Hard, stable, non-slip and slightly rough material should be used.	-	Hard, stable, non-slip and slightly rough material should be used.	Slippery material used in some ramps	Partially Suitable
Landing on ramps	120 cm	250 cm	250 cm	There is no landing	Not suitable
Railing size	90-140 cm	80-90 cm	-	85 cm	Partially Suitable
Warning signs at the beginning and end of the ramp	-	150 cm	-	No warning signs	Not suitable

Stairs

The stairs in the Görükle campus were evaluated according to 9 criteria (Table 4). The evaluations exhibited that the perceivable surface at the beginning and end of the stairs, which is one of the nine criteria and is especially important for the visually impaired, was in no area on the campus. While 22% of the criteria were complied with the standards, 56% were partially appropriate and 22% were not appropriate (Figure 8). The material properties of the stairs were determined not to be appropriate, and the step width, stair landing depth, and riser heights were found to be partially appropriate for the stairs. Observations showed that stairs-structure and stairs-road relationships were not appropriate in terms of accessibility (Figure 9)

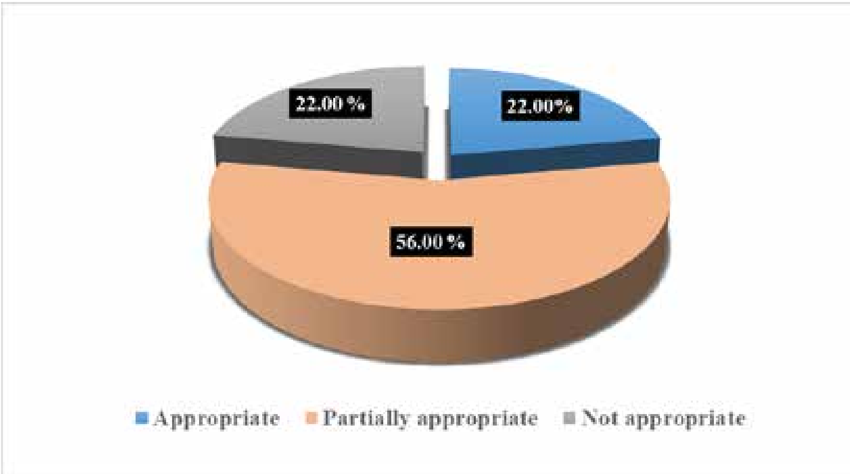


Figure 8. Distribution of stairs according to standards

Figure 9. Bursa Uludag University, in front of the central library and dormitories area building-stairs relationship (HANİK, 2019 - Original)

Table 4. Comparison with the standards of stairs

Criteria	Standards			Size in the area	Evaluation
	International Standards	TSE 12576	ÖZİ		
Stair Step Width	10 cm	33 cm	Max Dock Height 15 cm Include 2 × R.Y + 1 × Step Width = 63cm	33-36 cm	Suitable
Dock height on stairs	15 cm	15 cm	15 cm	Some Docks Do Not Meet The Standards	Partially Suitable
Landing height	250 cm	180 cm	-	Not meeting standards in some places	Partially Suitable
Landing Depth	120 cm	200 cm	200 cm	200 cm	Suitable

Width of Railing in the Middle of the Stair	300 cm	180 cm	-	Not meeting standards in some places	Partially Suitable
Handrail Height in the Middle of the Stairs	250 cm	180 cm	-	Not meeting standards in some places	Partially Suitable
Stair Walking Surface	Rough Anti-Slip Coating	Rough Anti-Slip Coating	Rough Anti-Slip Coating. Steps And Docks Should Be Displayed In Different Color.	Slippery Material Used In Most Places	Not Suitable
Tactile Surface On The Landings And Finish Before Steps	-	Width 60 cm	At least 60cm	no perceptible surface	Not Suitable
Landing Surface	Rough Anti-Slip Coating	Rough Anti-Slip Coating	Rough Anti-Slip Coating	Located in some places	Partially Suitable

Vehicle Parking Spaces

Vehicle parking spaces in Görükle Campus were evaluated according to 8 criteria (Table 5). The evaluations revealed that there was no space reserved for orthopedically disabled people in the vehicle parking spaces. 25% of the criteria were determined to be partially appropriate and 75% not appropriate (Figure 10). There were no criteria that complied with the standards. In particular, the numbers of vehicle parks, disabled signs, and the disabled ramp were not appropriate, while the distance of the vehicle parks to public transportation stops and the height of the parking lot sidewalk level were determined to be partially appropriate. While vehicle parking spaces were usually concentrated in front of medical faculty polyclinics, emergency polyclinics, and around social areas, observations exhibited that there were almost no vehicle parking spaces around the faculty buildings. On the other hand, in the existing disabled vehicle parking areas, no parking lot access corridors, parking areas, and sidewalk connection ramps, etc. were left (Figure 11).

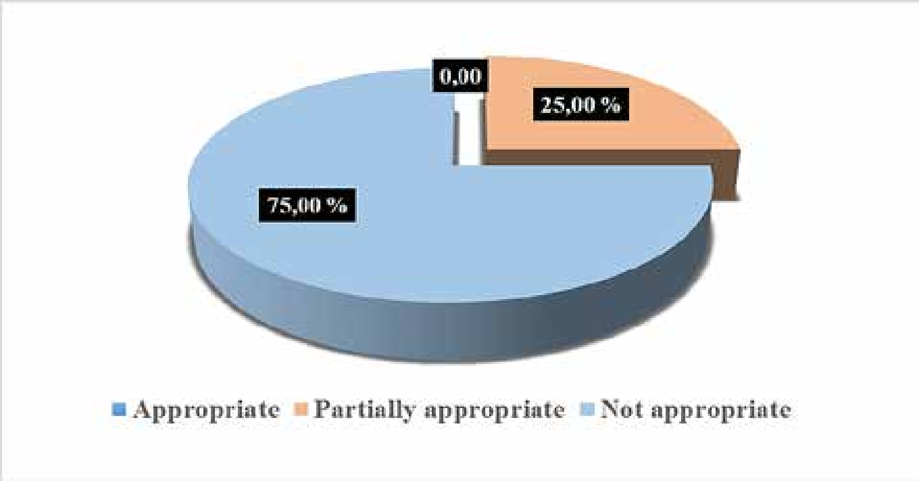


Figure 10. Distribution of vehicle parking spaces according to standards

Figure 11. Vehicle parking spaces sample (Hanik, 2019-Original)

Table 6. Comparison with the standards of vehicle parking spaces

Criteria	Standards			Size in the area	Evaluation
	International Standards	TSE 12576	ÖZİ		
Number of Disabled Parking Lots	-	There must be 1 disabled car parking space for every 50 vehicles	5% of the total number of parking spaces should be reserved.	50 pieces	Not Suitable
Bus and Metro stops entrance to the max. distance	3000 cm	2500 cm	-	Provides Only One Place	Partially Suitable
Pavement level of the parking lot	-	0.00, + 3.00 cm and ramp	3 cm	Differs everywhere	Partially Suitable
Vehicle Parking Space Width	-	At least 360 cm	At least 360 cm	250 cm	Not Suitable
Direction signs inside the parking lot	-	There must be a directional disability sign	Disabled parking sign should be placed on the ground with a direction indicating disability sign.	Not Available	Not Suitable
Distance Between Two Parking Spots for Orthopedically Disabled People	-	Parking is 250 cm when it is 140 cm	-	No distance to standards	Not Suitable
Disabled sign in the parking lot area	-	There should be at least 1 disabled sign on the side of the vehicle road.	Disabled parking signs must be visible, legible and lighted.	not in the area	Not Suitable
Sidewalk Ramp in Parking Area	9%	Curb ramp inclined in 3 directions (Middle ramp max 8%, Side ramps max 10%)	There should be a curb ramp and curbstone should be 3 cm.	not in the area	Not Suitable

Urban Facilities

The evaluations made in terms of accessibility of the urban facilities in the campus area showed that the required width for the disabled with wheelchair did not exist in the area (Table 7). While 33% of the criteria complied with the standards, 20% were partially appropriate and 47% were not appropriate (Figure 12). The criteria of the required maximum distance between the seating units, the distance of the benches to the road, the depth of the table benches, etc. were determined not to be appropriate. Observations revealed that the seating units in the campus were not continuous throughout the road circulation, and the ground-direction signs were determined to vary in terms of height and typeface.

On the other hand, only one disabled elevator in the area was located in the area of the light rail system, and it was determined to be sufficient in terms of accessibility (Figure 13).

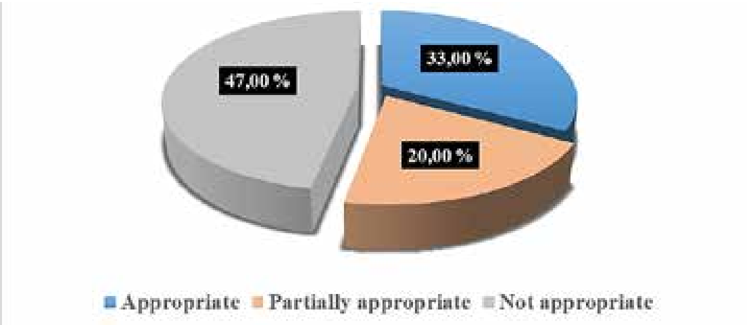


Figure 12. Distribution of urban facilities according to standards

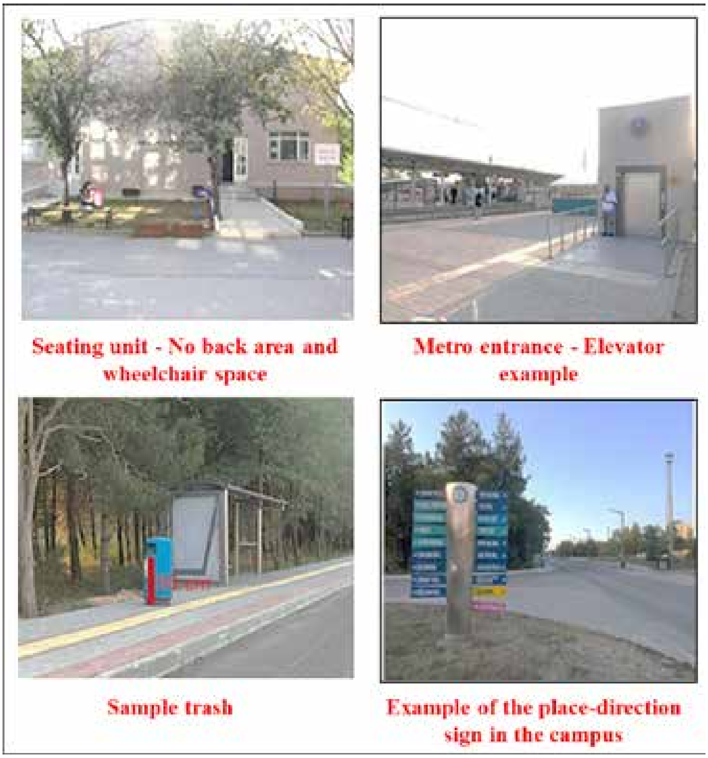


Figure 13. Urban facilities (Hanik, 2019 – Original)

Table 7. Comparison with the standards of urban facilities

Criteria	Standards			Size in the area	Evaluation
	International Standards	TSE 12576	ÖZİ		
The height of the bench seats from the ground	45 cm	45 cm	45 cm	45 cm	Suitable
The height of the backs of the benches	70 cm	70 cm	70 cm	Not available in some places	Partially Suitable
The height of the backs of the benches	45-50 cm	45-50 cm	45-50 cm	45 cm	Suitable
Necessary width for the disabled with wheelchair beside the seating elements	90*90 cm	90*90 cm	120 cm	Not available in the area	Not Suitable
The distance of the seating elements from the road	150*150 cm	150*150 cm	-	Distance Required Not Observed	Not Suitable
The distance of the seating elements from the road	100 cm	100 cm	100-200 cm	Varies in area	Not Suitable
Top material of seating element	-	Color-texture difference for perceptible surface	The positions of the reinforcements should be defined by creating texture differentiation.	Metal and Wood surface	Partially Suitable
The height of the table benches	-	75-90 cm	75-90 cm	76 cm	Suitable
Table Benches Minimum Depth Required For Disabled With Wheel Chair	-	60 cm	60 cm	30 cm	Not Suitable
The height of the trash cans from the ground	-	90-120 cm	90-120 cm	95 cm	Suitable
Trash can road distance	-	At least 40cm	At least 40cm	It is usually located on the road. In some places it is 40-50 cm.	Partially Suitable
Maximum height of direction and sign indicating signs on the route	250 cm	-	-	Different in some places	Partially Suitable

DISCUSSION AND CONCLUSION

University campuses, which are indicators of the development of cities, should provide a suitable life for all individuals they host as well as education and training activities. Especially, campus areas with a young population should be accessible to all and meet the needs of all individuals equally. Campuses should not create restrictions for people with disabilities and should provide all kinds of opportunities. It is an important issue to take the necessary precautions by making designs under the standards to create environments where disabled individuals can live comfortably.

In this context, this study examined the accessibility of Bursa Uludağ University Görükle Campus in six parts: campus entrances, stairs, ramps, pedestrian roads and sidewalks, vehicle parking lot, and urban facilities. The campus has three existing entrances, and the study determined that the light rail system and Görükle entrances were suitable. When disabled users reach the campus with the rail system, they can easily enter the campus with elevators and escalators. The Görükle entrance is located in the northwest of the campus and is provided by a straight road. The pedestrian roads and sidewalks of the campus were determined to be partially appropriate and there were deficiencies. The building's pedestrian road and sidewalk connections were observed to be generally not appropriate for disabled users, while the Medical Faculty Hospital was accessible in this sense, and there were restrictions of accessibility in units such as the Faculty of Agriculture, Faculty of Education, Faculty of Veterinary Medicine. These findings are similar to those of other studies. While Çelik et al. (2015) stated in their study that the parking spaces for disabled users should be built under the standards, and Çınar (2010) studied some universities in Ankara and stated that the campuses were not suitable for pedestrian circulation and the sidewalk height was an obstacle to access. Taş (2015), on the other hand, stated in her study on the campus of Namık Kemal University that the materials on the pedestrian roads and sidewalks were not suitable and the mobility of the disabled was restricted due to the elevation differences.

While the ramps in the entire campus were found to be generally inadequate, the slopes of the existing ramps, their surface materials, and handrails were determined not to comply with the standards. Therefore, people with disabilities experience difficulties in the use of ramps, and accessibility is restricted. The stairs were determined to be partially appropriate in terms of accessibility. In other words, the step widths and riser heights were determined to be under the standards, but there were no arrangements for disabled individuals at the starting and ending points of the stairs. The use of stairs and ramps together is insufficient and at a very low level. While a way out for the stairs and ramps in the Faculty of Arts and Sciences and Faculty of Sport Sciences was found, no solutions in this sense were observed in many units such as other buildings and especially the common use areas such as dining halls, libraries, etc. Especially in the Faculty of Agriculture, there is only a steep staircase at the entrance of the cafeteria and there seems no access for the disabled. These findings are similar to other studies. While Taş (2015) emphasized in her study on the campus of Tekirdağ Namık Kemal University that there are no perceptible areas at the beginning and end of the stairs, which are especially important for visually impaired individuals, Şenkaya et al. (2019) stated in their study in Istanbul Fındıkzade Çukurbostan life park that while the width and height of the stairs were appropriate, there were no handrails and perceptible areas.

The number of vehicle parking spaces reserved for disabled users on the campus is almost nonexistent. Observations exhibited that attention had been paid to this especially around the Faculty of Medicine Hospital and the Rectorate, and these areas were used extensively by both the city people and the students. There are few disabled parking spaces in the vehicle parks reserved for academic staff and students of the faculties scattered throughout the campus. However, observations revealed that the disabled parking spaces were not in compliance with the standards, there was no access corridor, the existing markings were not sufficient, and the size of the parking space was not appropriate. While garbage bins and stops comply with the standards in terms of urban facilities, information signs are partially appropriate, especially character and pole thicknesses are not appropriate. The texts of the information signs are small in terms of readability. No space was left especially for orthopedically disabled people at the edge of the sitting units. Also, the distance of the sitting units from one another is not appropriate and they are partially appropriate in terms of size. Besides, there are no telephone booths suitable for the disabled on the entire campus. There is a guide track, which is especially important for the visually impaired, but it does not enable circulation in the area and there are interruptions. This situation causes accessibility limitations. These findings are similar to other studies. While Bahadır (2014) stated in her study on accessibility in Istanbul Göztepe 60th year park that the guide track was not sufficient and did not provide continuity in the parks and not enough space was left for disabled people using wheelchairs in the sitting units with tables, while in her study which she conducted on the campus of Tekirdağ Namık Kemal University, Taş (2015) emphasized that the number of disabled parking spaces was not sufficient. Similarly, Çınar (2010), in her studies at some universities in Ankara, stated that the number of disabled car parking spaces in the campuses were not sufficient and did not comply with the standards, and found that the seating units and ground-direction signs in the campus were not appropriate in terms of standards for disabled individuals.

As a result, it is observed that the current situation of Bursa Uludağ University Görükle Campus is partially appropriate for disabled access, but some factors limit access. Considering that there are 245 disabled individuals on the campus where approximately 50,000 students, academic and administrative individuals live, it is necessary to re-evaluate the arrangements and designs under the disability standards to improve the current situation. From this point of view, the following suggestions have been made for the Bursa Uludağ University Görükle Campus to have an important mission by being referred to as the "unimpeded university", to eliminate the existing deficiencies for the disabled users and to enable disabled individuals to participate in social life by providing access to all areas of the campus;

- It is necessary to leave openings at the Görükle gate of the campus entrance to allow passage for disabled people using wheelchairs.

- The number of disabled vehicle parking spaces should be increased and arrangements should be made in the parking lots under the disabled standards.

- It is necessary to pay attention to the sidewalk heights, make appropriate material choices, and bring ramp solutions that will ensure the sidewalk-road relationship.

- Stairs should be made suitable for the standards. Stair surface materials should be selected correctly and rearranged so that there are handrails and landings.

- The solution of stairs and ramps throughout the campus should be designed together under the standards and attention should be paid to the surface coatings at the beginning and end.

- The guide tracks, which are especially important for the visually impaired, should be arranged in a way to ensure continuity throughout the campus, and the signs should be legible. Also, it would be appropriate to include devices that make sound warnings in areas with intense use.

- Situations of existing sitting units should be reviewed and necessary arrangements should be made for disabled users under the standards. The distances of the seating units from each other should be arranged considering their distances to the road and the openings to be left at the edges of the seating units.

- Although it is necessary to adjust the distance of the garbage bins to the road, it is necessary to ensure that the number of telephone booths is sufficient.

ACKNOWLEDGEMENT

This study was produced from the Master's Thesis titled " The Study On The Accessıbılıty in Uludag Unıversıty Görükle Campus Sample", which was completed in Uludag University, Institute of Science, Department of Landscape Architecture.

REFERENCES

Aykal, F.D., Yılmaz, A., Çelik, S. (2017). A Research On The Accessıbılıty Of The Cıty Parks: A Case Study On Van Dilek Dogan Cıty Park. *Journal of Engineering Sciences and Design (*22): 29-40.

Bolay, S. H, (2011) What Becomes Important in the Contemporary University? *Journal of Higher Education and Science* 1 (3):105-112.

Çelik, A., Ender, E., Akdeniz, N.S. (2015). Engelsiz Parklarda Peyzaj Tasarımı. *Tarım Bilimleri Araştırma Dergisi,8 (2): 05-11.*

Çınar, N. (2010). The Study On Landscape Accessıbılıty Of Dısabled People At Unıversıty Campuses. Ankara University, Graduate School of Natural and Applied Sciences, Department of Landscape Design. Master Thesis. Ankara. 134 p.

Çınarlı, S. (2008). Kamu hizmetlerinin yürütülmesinde engelli hakları. Doktora Tezi, DEÜ Sosyal Bilimler Enstitüsü, Kamu Hukuku Anabilim Dalı, İzmir

Ergun, E. (2014). Üniversite ve Kent İlişkisi Üzerine Görüşler: Mehmet Akif Ersoy Üniversitesi Örneği. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*. 31, 216- 237.

Evliyaoğlu, D. (2015). Havalimanlarının görme ve bedensel engellilerin erişebilirliği üzerinden değerlendirilmesi; İstanbul Atatürk havalimanı örneği. *Yüksek Lisans Tezi*, Bahçeşehir Üni. Fen Bilimleri Enstitüsü, İç Mekân Tasarımı Yüksek Lisans Programı, İstanbul

Feyzioğlu, G. (2013). Bedensel engellilere yönelik kentsel peyzaj tasarım kriterlerinin Ankara ili Kızılay Meydanı ve ilişkili caddelerinde irdelenmesi. *Yüksek Lisans Tezi*, Ege Üni. Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, İzmir

Gökçe, D. (2012). Antalya Atatürk kültür parkı örneğinde parkların engelli bireyler tarafından kullanım olanakları. *Yüksek Lisans Tezi*, Akdeniz Üni. Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Antalya

Kurşun, S. (2014). Tekerlekli sandalye kullanan engellilerin kentsel mekânları kullanım olanaklarının irdelenmesi; Özgürlük Parkı örneği, Kadıköy-İstanbul. *Yüksek Lisans Tezi*, Bartın Üni. Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Bartın.

Özdener, N. (2006). Mardin'de özürlüler görmezden gelinemez. Kent ve Sağlık Sempozyumu. *Bursa. Bildiri Özeti Kitabı*. s: 367-368.

Pouya, S. (2016). Ortopedik engelli çocukların iyileştirilmelerine yönelik planlama yaklaşımı: ODTÜ Eymir gölü örneği (Ankara). *Yüksek Lisans Tezi*, Karadeniz Teknik Üni. Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Trabzon

Şahin, N. (2012). Engellilere yönelik eğitim yapılarının tasarım prensipleri ve örnekler üzerinde incelenmesi. *Yüksek Lisans Tezi*, Haliç Üni. Fen Bilimleri Enstitüsü, Mimarlık Anabilim Dalı, İstanbul.

Şenkaya, Ü. Özdemir, Y. Özdemir, Ş. (2019). Parkların erişilebilirlikleri üzerine bir araştırma: fındıkzade çukurbostan yaşam parkı örneği. *İstanbul Sabahattin Zaim Üniversitesi Fen Bilimleri Enstitüsü Dergisi.* 1 (2): 53-57.

Tanfer, M., Yener, D. (2020). A Research about the Istanbul University - Cerrahpasa Faculty of Forestry Campus Flora. Journal of Bartin Faculty of Forestry. 22 (3): 726-737.

Taş, D. (2015). Namık Kemal Üniversitesi kampüsü örneğinde kampüslerin engelli bireyler tarafından kullanım olanakları. *Yüksek Lisans Tezi*, Namık Kemal Üni. Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Tekirdağ,

TSE (1999). *TS 12576 - Şehir İçi Yollar - Özürlü ve Yaşlılar İçin Sokak, Cadde, Meydan ve Yollarda Yapısal Önlemler ve İşaretlemelerin Tasarım Kuralları*. Türk Standartları Enstitüsü. 61 s.

URL-1. WHO. Word Health Organization. https://www.who.int/topics/disabilities/en/ - (Erişim tarihi:20.08.2019).

URL-2. Bursa Uludağ Üniversitesi. https://www.uludag.edu.tr. (Erişim tarihi: 22.08.2019).

Öter, B. (2018). Erişilebilirlik çalışmalarında mekân dizimi yönteminin Antalya kent merkezinde uygulanması üzerine bir araştırma. *Yüksek Lisans Tezi*, Akdeniz Üni. Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Antalya

ÖZİ (2011). *T.C. Başbakanlık Özürlüler İdaresi Başkanlığı. Yerel Yönetimler İçin Ulaşılabilirlik Temel Bilgiler Teknik El Kitabı.* T.C. Başbakanlık Özürlüler İdaresi Başkanlığı Yayınları. 124 s.

Yener, D., Akdeniz, N.S. (2020). Evaluation of the natural geophyte taxa of Sarıyer (Istanbul) and their use in urban landscape. Eurasian Journal of Forest Science. 8(1): 93-107

Yılmaz, S. (2015). Landscape Design of a Campus Outdoor Spaces: Süleyman Demirel University Faculty of Forestry. Building. *Kastamonu Univ., Journal of Forestry Faculty.* 15 (2) 297-307

Yılmaz, T. Gökçe, D. Şavklı, F. Çeşmeci, S. (2012). A Study On Young Disabled People's Use Of Common Areas in The University Campuses Example Of Olbia Culture Center in Akdeniz University. *Journal of Tekirdag Agricultural Faculty*. 9(3), 1-10.

Chapter 6

AN OVERVIEW OF LANDSCAPE PLANNING STUDIES INTEGRATED WITH PARTICIPATORY APPROACH IN TURKEY

***Pınar GÜLTEKİN*[1]**

***Kıymet UZUN YÜKSEL*[2]**

***Arzu AYDIN*[3]**

1 Associate Professor, Düzce University, Faculty of Forestry, Department of Landscape Architecture,pinargultekin@duzce.edu.tr

2 Research Assistant, Düzce University, Faculty of Forestry, Department of Landscape Architecture,kiymetuzun@duzce.edu.tr

3 Master Student, Düzce University, Institute of Science, Department of Landscape Architecture, aaydin3@gmail.com

1. INTRODUCTION

Community participation offers various opportunities to create strong societies. By including the community with various participation mechanisms in decision-making processes, the decision also helps to identify a common path for all those affected by the project. The participatory method is selected in accordance with the purpose, resources and time to be used (Aboleata et al, 2011). Unsuccessful participant practices create mistrust, waste people's time and money, and seriously undermine the future steps to be taken by the public in management. The positive background of participation is an important factor affecting the willingness to participate of people in the process (Involve, 2005).

According to Wulz (1986), participation is the decision-making process in different ways by the involved groups. Participation can be made either actively or passively, which is defined as participation in expert control and participation in user control (Wulz, 1986; Akyol, 2014).

The various social movements in the world have affected all sectors which concern people. The industrial revolution, the World War I, such as the breakdown of global impacts in the process of planning and design of cities has to be human-centered. The views on participation in planning and design decision making emerged in the 1960s as a result of social awareness processes (Sanoff, 2006).

The importance of the concepts such as development and locality together with the 21st century has necessitated the resolution of the problems that cannot be solved on a global scale. The phenomenon of participation, which is supported by strategic plans, has been applied for various purposes in almost every sector. Strategic spatial planning has been interpreted in various ways in different geographies due to different legal regulations and planning traditions. Therefore, there was no consensus on its definition (Akyol, 2014). As in management, region and urban planning, the subject of participation in landscape planning and design has an important role.

When the role of participation in landscape planning and design is examined, the European Landscape Convention defines the landscape as the main factor of the quality of life of all citizens and as the main component of their cultural, social, and economic development. The articles of the contract are prepared according to the convention on "Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters" (from Aarhus Convention). For this reason, by taking into consideration the social, and social dimensions of the concept of landscape in terms of quality of life and satisfaction, from the upper scale to the lower scale, planning and design as a whole should be integrated into planning and design at all stages from the national decisions to the street scale.

Planning is a process. In this process, by trying to minimize the negative effects caused by the environment, the quality of the spaces is improved and the quality of life of people is increased (Çetinkaya & Uzun, 2014).

In the study, Turkey's landscape planning at different scales and in different levels of participation projects involving scientific studies, postgraduate thesis are discussed. The aims and scope of the studies were briefly evaluated. Suggestions have been developed to highlight participation levels, stakeholder diversity and participation in landscape planning studies, to raise awareness, and to adapt participation to other studies in the public and private sector.

2. MATERIAL AND METHOD

Within the scope of the study, the literature was reviewed. Several landscape planning studies which are involved of participation concept until upper scale to subscales in Turkey was discussed. National, regional and local level participants made in landscape planning studies, projects and postgraduate thesis and publications examining the landscape planning in Turkey was made an evaluation of the participatory approach. The study is limited to the data that can be obtained in the literature review.

3. RESULTS

In this section, first of all, the importance of participatory studies, the historical process, stakeholder, stakeholder analysis, consept of participation, participatory planning, participation in landscape planning, participation levels and methods are explained. Subsequently, literature can be reached landscape planning studies in Turkey are evaluated and applied participatory approaches purpose.

3.1. Stakeholder, Stakeholder Analysis, Participation and Participation Levels, Participation Methods, Participation in Landscape Planning

Participation is the participation of all parties and stakeholder groups who reveal their demands and expectations in the decision-making, planning, execution, monitoring, evaluation, and supervision stages of any management process, sharing authority, responsibility, and difficulty (Yenilmez Arpa, 2011).

According to Coşgun (2009); Participation is defined as the communication process between the local population and development experts in which the local population guides in the analysis of the current situation and planning, implementation and evaluation of development activities. The purpose of participation is to create a sense of ownership, to raise awareness, to control political pressure and authority, to encourage the creation of a democratic environment, to ensure effective distribution of income, to support good governance, and to support sustainability (social-economic-environmental aspects) between the related parties (Yenilmez Arpa, 2011). Each participating group makes a collaborative effort in line with their interests, expertise and interests to meet the criteria for participation.

Therefore, the standards that determine the acquisition and validity of information will be different for each stakeholder group (Bluementhal and Jannink, 2000). The scientific way to reveal how the Project / Organization is perceived in the eyes of both internal and external stakeholders is through stakeholder analysis (Eroğlu, 2007).

The concept of "stakeholder analysis" includes all opinions, judgments, and opinions of other shareholders about the organization; it is defined as the totality of belief and trust in the organization.

To conduct a stakeholder analysis, it is necessary to identify stakeholders, to rank the priorities of stakeholders, to evaluate needs, and to collect opinions. The information obtained in this way will ensure integration in strategic management processes such as strategic goals, strategy formulation, and implementation. Planners can understand the needs and potential strengths of their stakeholders through stakeholder analysis (Garriga and Mele, 2004).

Analyzing the relationships with stakeholders will ensure the formation of the right strategies in stakeholder management, as well as increasing the positive effects of the stakeholders and reducing the negative effects (Bourne and Walker, 2006). The most meaningful participation is that the responsible institution ensures that other parties such as men and women, young and old, rich and poor, all parties and public institutions, non-governmental organizations from the local people take an active role in the processes (Yenilmez Arpa, 2011). Participation provides a multi-stakeholder analysis that helps to understand the problem comprehensively.

Including all stakeholders in the planning process is of great importance in terms of ensuring sustainability. It should be ensured that all groups and individuals own the work and agree on the common points that are right for all (Beşen, 2006). In addition, obtaining information through participation contributes to the development of trust among stakeholders (Ostrom 1992). When the methods used in participation-based studies are compared with each other, they are discussed in terms of the use and strengths and weaknesses of public participation (Bluementhal and Jannink, 2000).

Based on these methods; with the help of a mixed group of collaborative methods, the characteristics, potentials, and problems of the community are analyzed by themselves, helping the community to make and implement decisions for itself and in this way strengthen the community. The most frequently used methods in participatory planning studies are Rapid Rural Assessment and Participatory Rural Assessment (Gülçubuk, 2000; Cengiz, 2003; Özen, 2004).

According to Açıksöz et al. (2019), with the increasing awareness of participation and increasing awareness on this issue, various methods that involve all stakeholders in the planning processes have been used. Interview, Questionnaire, Delphi Technique, Stakeholder Analysis, Rapid Rural Assessment (Rural Assessment), Participatory Rural Assessment (PRA), Analytical Hierarchy Process (AHP), Mind Map, and Visual Landscape Analysis techniques can be given as examples of these methods.

In Turkey, it is possible to benefit from the positive aspects of participation concept in the landscape planning studies which has gained importance with the European Landscape Convention. Participatory methods can be integrated into existing landscape planning methods. Business and thought partnership of the local people, which is an indispensable part of this process, is a facilitator for landscape planning studies.

In Turkey, the participatory planning approach is frequently used in "ecotourism" studies that are integrated with landscape planning studies (Gültekin et al.2014; Gültekin et al.2016; Gültekin and Gültekin, 2017; Gültekin et al. 2017; Gültekin et al.2018). Participation has taken its place in landscape protection and planning with the understanding of protected areas and sustainable development and is seen as the most appropriate way to help the development of rural societies. Taking advantage of its benefits will support the development process.

3.2. Participatory Landscape Planning Studies in Turkey

In this section, participants associated with landscape planning in Turkey, at the national level projects, scientific research and postgraduate thesis describes.

3.2.1. Konya Province (Bozkır-Seydişehir-Ahırlı-Yalıhüyük Districts) and Suğla Lake Area Landscape Management, Conservation and Planning Project (2010)

"Konya Province (Bozkır-Seydişehir-Ahırlı-Yalıhüyük Districts) and Suğla Lake Area Landscape Management, Conservation and Planning Project" was carried out in Konya Closed Basin and Province, Bozkır-Seydişehir Ahırlı-Yalıhüyük Districts and villages. The project was coordinated by the former Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks, and the Landscape Protection Branch of the abolished Nature Protection Department. The project was carried out by an interdisciplinary group of twenty-one people.

Uzun et al. (2010), regarding the ecosystems in the landscape of 74,152 hectares, forward-looking plan decisions and actions were defined for the integration of natural and social data, the development of the ecosystems forming the landscape after analysis and synthesis, and the restoration of the degraded ones. 1 / 25.000 scaled "landscape plan" including these was prepared. Three basic stages were followed in the creation of the landscape plan. The first stage is the section where the inventory, field studies-workshops, and landscape analyzes are made regarding the planning area. The second stage is the section where the landscape plan is developed, the factors that are effective in landscape change are examined, problems and solution suggestions related to some sectors in the planning area are determined, and the landscape plan is created by creating landscape development strategies and sectoral landscape guides. The third stage is the landscape management organization for the implementation of the landscape plan and the control and monitoring process of the landscape plan.

In the study, the creation of the first official landscaping plans in Turkey and aimed to reveal the Application benefits of this form of landscape management. The participation of the relevant stakeholders has been ensured at every stage of the project. Workshops were held with all stakeholders during the landscape planning phase, while determining the problems and creating landscape guides. Along with the project, the first official classification of landscape approach to Turkey's national, regional and local scale it prepared and mapped.

3.2.2. Landscape Character Analysis on Provincial Scale and Its Evaluation in Terms of Tourism / Recreation (PEYZAJ-44) (2014)

The TÜBİTAK KAMAG No. 109G074 "Landscape Character Analysis at Provincial Scale and Its Evaluation in Terms of Tourism / Recreation (PEYZAJ-44)" project prepared by Şahin et al. (2012) is another study handled within the scope of the study. It is aimed to determine the characteristics of the natural and cultural landscape by using information systems technologies and to produce development strategies in terms of recreation/tourism by performing landscape character analysis and evaluation accordingly in Malatya Province as a pilot area.

One of the success factors of the "Landscape Character Analysis and Evaluation" Method specified in the method of the study is as follows:With a well-planned and repeated landscape survey, interest groups (local, regional, national) are identified as cultural landscape factors involved in the method process on the basis of information-coordination.

During the PEYZAJ-44 project (2010-2013), in the National Applicability and Coordination Workshops, the first and second of which were held, the possibilities, problems, and strategies regarding the integration of LCAA into the country spatial planning process were determined. Officials from many public institutions participated in the workshops and made invaluable contributions.

3.2.3. Yeşilırmak Basin Landscape Atlas (2015)

Yeşilırmak Basin Landscape Atlas is a project prepared by Uzun et al. (2015) and is another planning study evaluated within the scope of the study. According to the Turkish Linguistic Society (TDK), the atlas: "The compilation of geographic maps of the world, a country, a region, to give collective information on physical, political geography, economy, history, etc". The second definition is "a book made up of pictures or plates prepared to explain a subject". The map is defined as "the draft of the earth or a part of it, which is related to geography, history, language, population, etc., which is drawn on a plane by shrinking it according to a certain ratio".

According to the European Landscape Convention, landscape, as perceived by people, refers to an area whose features are formed as a result of natural and/or human activities and interactions. The European Landscape Convention has placed human at the center of the definition of landscape.

The concept of landscape atlas could be defined as the whole of pictures, maps and reports prepared to explain the landscape when these two definitions are combined. The content of the landscape atlas is not limited to the physical description of the landscape. In addition to this physical structure, the interactions between different ecosystems and people in the landscape should be revealed. Within these interactions, while determining the current situation arising from the natural structure of the landscape, the processes in the landscape or the results are expressed in the maps, graphics and reports; On the other hand, the positive aspects of the human element, which is the main component in the definition of the landscape, and the values created by the cultural structure (archeological wealth and historical traces in the historical process) should be included. In addition, the reflections of the problematic areas on the landscape, which are the product of the interaction between man and nature, should be evaluated within this scope.

The issue of creating landscape atlases has gained a concrete meaning in Europe through the European Landscape Convention.

With the Yeşilırmak Landscape Atlas Project was prepared by Uzun et al (2015);

- Number of 11 landscape character types and landscape character areas have been defined in the basin, number of 47 landscape analyzes have been made and the "Landscape Quality Targets" of the basin have been determined,

- Evaluations were made on the integration of the atlas with other upper scale plans in order to ensure the protection-use balance in the basin and to establish a sustainable planning and management structure,

- Ecological foundations were produced in order to be used in Strategic Environmental Impact Assessment studies. Within the scope of the adaptation of the European Union Water Framework Directive, ecologically based decisions that could be easily linked with the "Integrated Basin Management Plans" were produced.

- The tools have been produced to guide for the studies of landscape conservation and restoration,

- Approaches regarding how, where and according to which priorities social, cultural and environmental development projects that can be carried out on the basis of micro-basins have been developed,

- Relationships and approaches between urbanization, agriculture, conservation and forestry sectors are defined through landscape guides,

- An ecological basis has been created for the first environmental assessment of energy projects routes (oil, natural gas, etc.),

- Bases that will support the development and monitoring of the biodiversity action plan have been created and presented to the attention of relevant parties as a decision support tool.

The goal of the project; Landscape character assessment (landscape character analysis, landscape function analysis, landscape change and landscape pattern analysis, visual landscape analysis) on the basis of natural and cultural landscape inventory in Yeşilırmak Basin, and landscape character types and landscape character areas, landscape diversity and biodiversity are determined and landscape quality the preparation of the "Yeşilırmak Basin Landscape Atlas" and the determination of landscape protection/development strategies and the creation of sectoral landscape guidelines.

Within the scope of participatory landscape approach in the project, meetings, trainings and various studies were carried out with public institutions, local people and non-governmental organizations in Amasya, Samsun, Tokat and Çorum provinces. Landscape quality targets were determined in terms of planning decisions, management, conservation and sustainability, maps were created and new targets were determined spatially.

Following the preparation of the landscape atlas, the most important result is that the landscape plan and landscape planning approaches should be officially integrated with legal and administrative aspects in the plans prepared for sectors such as forestry, agriculture, urban areas, industry, and especially in spatial planning studies. In addition, with the participation in decision-making processes, it is necessary to reveal the deficiencies and make them applicable.

In all the meetings held within the scope of the project, the landscape atlas, which was advanced in 3 stages, and the views, suggestions and opinions of all participants, which can be reached at the center and locally with a participatory planning and management approach, were taken into consideration and included in the project. Still, in this context, conducted surveys in Tokat, Amasya, Çorum and Samsun provinces, through the participation of the public, their opinions and attitudes towards the project were examined.

3.2.4. Landscape Planning and Ecotourism Focused Rural Development in Uğursuyu and Aksu Basins (2014)

The doctoral thesis prepared by Gültekin (2014); it is aimed to integrate natural, cultural and social data in the ecosystems within the Uğursuyu and Aksu basins of Düzce province, to develop ecotourism-oriented rural development strategies after analysis and synthesis, to make landscape plan decisions and to develop an ecotourism management model. A three-step method was followed in the study.

In the first stage, an inventory and database related to the field were created. In the second stage, the ecotourism potential of the area was revealed by combining the environmental corridor method, ecotourism possibilities spectrum method, and cultural landscape analysis within the scope of suitability analysis and the evaluation of the residential areas. In this context, a visual landscape analysis based on expert and user evaluation was made

In order to determine the landscape pattern change, a controlled classification process was applied to the satellite images of both basins in 1999 and 2008. Within the framework of the patch-corridor-matrix theory, the changes in the study area are interpreted under the title of landscape functions. Stakeholder analysis has been made and interpreted in order to carry out participatory ecotourism planning.

In the last stage, as a result of the relevant analysis and evaluations, a landscape plan was prepared for the project area, strategies were developed and a rural development management model was proposed. It has been determined that settlements with high ecotourism opportunities and cultural landscape values in Uğursuyu and Aksu basins are located on ecotourism corridors determined according to the environmental corridors method, and these areas are also areas with high visual landscape quality.

When hydroelectric power plants, landslide areas, hazelnuts, etc. were evaluated visually by tourists, it was concluded that the areas caused a decrease in tourist appreciation and the presence of superstructure increased the tourist appreciation. The temporal changes in the land cover/ landscape pattern were evaluated and the ecological assessment of the area was made within the scope of habitat function analysis. Landscape plans and strategies were created by evaluating all applied methods together. Based on these syntheses, in the Uğursuyu and Aksu Basins ecotourism management plan, strategies for ecotourism were developed, and the ecotourism executive and advisory board and its duties were defined.

As a result, it was revealed that rural development projects focused on ecotourism, shaped, and defined by landscape planning approaches, are important in ensuring sustainability in natural resource management. Particular attention was drawn to the "participatory ecotourism planning approach" within the study, stakeholder analysis was conducted, stakeholder views were determined and evaluated, and participatory planning approaches were examined through literature reviews. There are suggestions and evaluations on the development and evaluation of participation, especially in terms of management, local capacity and governance, and being a part of the process.

In the study, the social dimension of participation was discussed by including the local people in the process. Stakeholders, stakeholders' interests, priorities and behaviors, values, common goals and objectives have been revealed. Questionnaire, face to face interviews and workshop organization methods were used as participation tools in the study.

3.2.5. A New Approach to Managing Protected Areas: Participatory Management Plans (2011)

Güneş (2011) emphasizes the importance of participatory management of protected areas and how the participatory management planning process should be handled in this study titled "A New Approach in the Management of Protected Areas: Participatory Management Plans". It includes case studies conducted in our country and abroad on this subject and offers suggestions specific to our country.

In the study, it is emphasized that the decisions taken while creating the actions to be put forward in line with the goals and objectives for the management plan should have 3 important principles: sustainability, partnership-participation, and scientificity. The preparation of the management plan with the participation of all stakeholders, including the local people, is stated as the basic conditions of the process in terms of supporting the negotiations of the planning team, correction of mistakes, and reconciliation.

3.2.6. Development of Kovada Lake Sub-Basin Management Plan (2012)

In the study titled "Development of Kovada Lake Sub-Basin Management Plan" conducted by Karadağ and Barış (2012), it is aimed to reveal the current situation regarding water resources management in Kovada Lake Sub-Basin and to develop a basin management plan.

The Basin Management structure has been developed on the basis of a "watershed committee" in which all participants in the basin take part and have responsibility. When practicability in Turkey Sub-Basin Management Plan valued, the existing water resources management in Turkey is insufficient for such an application, or even been shown to be causing new problems for management (Karadağ, 2007). Therefore the watershed management plan research in Turkey Suggestions for applicability have been developed

It is mentioned that participatory management is required for the realization of the basin management plan developed in the research and the implementation of the "activities". In this regard, it is emphasized that for inter-agency participation, first of all, a legal framework should be established for participation in basin management and power-sharing. Possible participants mentioned in the study are defined as basin residents, landowners, employees, industrialists, NGOs, media, politicians.

3.2.7. Development of the Participatory Ecotourism Perception Scale in Düzce Uğursuyu and Aksu Basins (2013)

In the study, a participatory approach was adopted within the scope of the "Ecotourism Focused Landscape Planning Research" conducted in Uğursuyu and Aksu basins. Possible stakeholders in ecotourism planning in the research area are defined as public institutions, local administrations, village headmen, non-governmental organizations, universities, and private enterprises. When the literature is examined, to learn the views of stakeholders in participatory ecotourism planning, the validity, and reliability of the previously tested ecotourism perception scale could not be reached.

The study aims to develop a "participatory ecotourism perception scale" that can be used reliably. In this context, 45 questionnaires were applied to the academic staff of Düzce University Faculty of Forestry. The participants of the survey were presented with 84 propositions in a five-point Likert scale with the titles of effects of ecotourism, obstacles to ecotourism activities, the degree of attractiveness of ecotourism resources and resource development, and management strategies. The results obtained were evaluated with the SPSS 19.0 program.

As a result of the evaluations made, the number of propositions, which was 84, was reduced to 77 propositions. In this context, as a result of the reliability analysis of the scale of evaluating the perceptions and attitudes of stakeholders about ecotourism in participatory ecotourism planning, the Cronbach Alpha Coefficient is 0.94. This coefficient increased to 0.95 with the reduction of the number of suggestions. Statistically, this value reveals that the scale has a high degree of reliability.

3.2.8. Assessment of Participatory Ecotourism Planning and Management Using by Different Stages of Basin Scale (2015)

Another scientific study is the study titled "Assessment of Participatory Ecotourism Planning and Management Using by Different Stages of Basin Scale" prepared by Gültekin et al. (2015). Although Turkey has a wealth of natural and cultural potential for ecotourism, the development in this area is not at the desired level. The aim of the study is to be provided participation in multi-dimensional and different scales in the ecotourism planning process in Düzce Province Uğursuyu and Aksu basins and contribute to the development of ecotourism.

Accordingly, following the stakeholder analysis conducted in the basins, questionnaires that will ensure the participation of stakeholders at three levels were developed and applied to the stakeholders. In the first level, the public, local administrations, private sector, scientists, in the second level, the village headmen and elders of the villages in the working area, and in the third level, the village people were determined as target groups. An approach based on ensuring the participation of stakeholder groups at all three levels and integrating the evaluation results with the spatial plans obtained through landscape planning approaches was followed.

3.2.9. Investigation of Conflict Management in Ecotourism A Case Study of Duzce Ugursuyu and Aksu Watersheds (2015)

In this study, to determine the stakeholders of ecotourism, a stakeholder analysis was conducted and the ecotourism management proposal model was developed in Düzce Uğursuyu and Aksu Basins where an area is rich in natural and cultural resource diversity, within daily transportation distance to the metropolises of Istanbul-Ankara. As a result of the evaluation of the surveys applied to determine the perceptions of all stakeholders towards ecotourism and the interpretation of the oral interviews, among the stakeholders, on the issues of ecotourism impacts, management strategies, development of resource attraction; differences in purpose, expectation, authority, responsibility, ecotourism perception, and professional and institutional perspectives were found. By evaluating the differences and reasons of opinion, a conflict management model was proposed and strategies were developed in order to ensure the continuity of the ecotourism organization.

3.2.10. Resilience through Participatory Planning for the Integrated Ecological Risks in Düzce (2018)

Aydın et al. (2018) 's study which is titled "Resilience Through Participatory Planning for the Integrated Ecological Risks in Düzce" aimed to develop an integrated ecological planning methodology with a participatory planning approach in order to create resilient settlements against complex ecological risk factors for the province of Düzce.

The methodology consists of four stages. In the first phase of the methodology, conceptually ecological planning objectives are combined. In the second phase, the risks arising from natural hazards and landscape sensitivities were combined with the deterioration risks of valuable ecosystem services (ES), and settlement suitability maps were created integrated with ES. Participatory risk governance approach, which is the third stage, consists of three components: risk communication, risk assessment and risk management. In the fourth stage, comprehensive outputs were obtained to ensure resilience by integrating ecological risk analysis and participatory planning findings according to the multiple spatial and temporal scale approach. According to the results of the risk assessment, while the participants evaluated the earthquake, landslide and flood risks in the first three places among natural hazards, they prioritized erosion, habitat fragility and water permeability risks among landscape sensitivities.

In the study, Participatory risk governance process was conducted through one pre-meeting plus two focus group workshops. The first pre-meeting within the framework of risk communication was conducted with the key stakeholders from Düzce Provincial Directorate of Environment and Urbanization, and Düzce Provincial Directorate of Disaster and Emergency Management Authority (AFAD). The premeeting was enabled us to get in contact with relevant stakeholders who were already involved and working on issues related natural hazards and risks, ES, and spatial planning and it provided to get related information about the spatial characteristics of Düzce Province.

3.2.11. Stakeholder Analysis in Participatory Ecotourism Planning Using Structural Equation Modeling: A Case Study of Western Black Sea Region (2018)

Gültekin et al. (2018) conducted a stakeholder analysis in participatory ecotourism planning in the Western Black Sea Section, which is a very rich area in terms of natural and cultural resources, in the study titled "Stakeholder Analysis in Participatory Ecotourism Planning Using Structural Equation Modeling: A Case Study of Western Black Sea Region". In the study, it is aimed to determine the ecotourism perceptions and attitudes of the stakeholders and to contribute to the solution of existing problems by applying structural equation modeling as a new approach.

In the study, very valuable relationships that explain the views of all stakeholders who will take part in ecotourism activities have been revealed, and strategies have been developed by creating an "Ecotourism Management Model" for the Western Black Sea Region. The fact that the "Structural Equation Modeling (SEM)" method, which is a method not yet used in Turkey ecotourism planning, will serve to guide the policies to be implemented in participatory ecotourism planning, has filled the gap in the literature on this issue.

3.2.12. A Scale Development Study on the Basis of Determining the Effect of Open and Green Spaces on Housing Selection (2019)

Karadağ et al (2019) conducted by "A Scale Development Study on the Basis of Determining the Effect of Open and Green Spaces on Housing Selection" study aims to develop a scale for determining the factors that influence the choice of housing in Turkey.

This study was carried out in some neighborhoods of Ankara (Capital city of Turkey) Dikmen Valley's vicinity. In the study, a survey was conducted to collect data. The questionnaire form consisted of 21 questions in three parts: variables that are effective in choosing the house (52 variables), demographic characteristics of the participants (11 questions) and characteristics of the house (9 questions). Considering the survey study 95% confidence level and 5% margin of error; In order to increase the ability to represent, random and face to face interviews were conducted with 415 people. Scale development of these studies to determine the factors affecting the Housing election will be held in different regions of Turkey and validity can be used in research it can be said to be a tool with reliability values.

4. CONCLUSION AND RECOMMENDATIONS

Within the scope of the study, the importance of stakeholders, stakeholder analysis, participation, participatory planning, participatory planning methods and landscape planning studies was emphasized. In Turkey, national, regional and local level participants made in landscape planning studies, projects, graduate theses and publications were examined and ensuring participation in planning and decision-making to take place in the process requirements discussed. In all processes of planning and landscape planning, decision-makers and participants should not be indifferent to their requests and demands.

In evaluations of participatory planning studies, it should be determined of relevant stakeholders within the scope of planning at first, and to be taken the opinions and suggestions of stakeholders in the next stage. When taking stakeholder opinions, participation method is decided by considering the factors which are the size of the field of study, the level of volunteering of the stakeholders, the work plan and work schedule of the researcher, etc. These participatory methods can be listed as surveys, interviews, meetings / workshops with interest groups. In planning and landscape planning studies, stakeholders who are included in participatory studies could be considered as "users", "visitors", "local people", "authorized institutions" and "subject matter experts". Training and informative studies will increase the formation of trust and voluntary participation among stakeholders in breaking the existing perceptions and prejudices of the stakeholders against the planning issue in participatory approaches.

The landscape architecture profession in Turkey where takes place particularly participatory study, which began in the year 2000, after that it intensified in the years 2010-2015; it can be stated that participation in practice has decreased after 2015. It is seen as an important result that after 2015, scientific research emphasizing especially landscape planning and participation has increased, but has not yet turned into action.

When the participatory approach is evaluated in landscape planning studies, it is seen that participation is used more effectively in landscape planning at the upper scale, national, regional or provincial level. It can be said that participation in projects with a scale of 1/1000 and below remains at the level of determining user satisfaction only after the project is implemented. The participatory approach plans developed not only in landscape planning studies but also by different professional disciplines were realized by ministries, public institutions, municipalities, universities and research institutes. These multidisciplinary studies, apart from landscape architects; It has been produced in collaboration with architects, engineers, urban regional planners, historians, geographers, archaeologists, sociologists, lawyers, agriculture and forestry experts.

Increasing participation in landscape planning studies, involving citizens in all phases of plan and project work and including preimplementation and utilization, and widespread participation; while enabling the formation of a solution-oriented, voluntary, participatory and visionary society with the ability to use decision mechanisms effectively, it will help the spaces produced in a participatory way to become sustainable and healthy spaces. Therefore, participatory implementations in landscape planning studies in Turkey should be expanded by increasing participation levels. In landscape planning studies to be carried out by public institutions and local administrations, informing the public should be implemented by using all stages of joint decision making and authorization.

REFERENCES

Aboelata, M. J., Ersoylu, L., & Cohen, L. (2011). Community engagement in design and planning. In *Making Healthy Places* (pp. 287-302). Island Press, Washington, DC

Açıksöz, S., Bollukçu, P., & Cengiz, G. (2019). *Peyzaj Planlama ve Tasarımında Katılımcı Yöntemler. Mimarlıkta Peyzaj Tasarımı*. Ankara: Nobel Akademik Yayıncılık.

Akyol, İ. (2014). *Açık kamusal mekanda katılımcılık etkinlik düzeyi*. Yüksek lisans tezi, İstanbul Teknik Üniverstesi Fen Bilimleri Enstitüsü, İstanbul.

Aydın, B., Tezer, A., Türkay, Z., Yılmaz Kaya, M.,Karaçor, E. K., Güler, İ., Uzun, O.,Okay, N.,Terzi, F., Satılmış, E. & Kara, D. (2018). Resilience through Participatory Planning for the Integrated Ecological Risks in Düzce. *Resilience, 2(2),* 105-121.

Beşen, T. (2006). *Katılımcı havza planlaması yaklaşımı ile kırsal kalkınma potansiyelinin belirlenmesi üzerine bir araştırma Düzce ili Cumayeri ilçesi Avlıyan havzası örneği*. Yüksek lisans tezi, A.Ü. Fen Bilimleri Enstitsü, Ankara.

Blumenthal, D., & Jannink, J. L. (2000). A classification of collaborative management methods. *Conservation Ecology*, *4*(2).

Bourne L., & Walker D. (2006). Visualising Stakeholder Influence: Two Australian Examples, *Project Management Journal, 37 (1),* 5-21.

Cengiz, T. (2003*). Peyzaj değerlerinin korunmasına yönelik kırsal kalkınma modeli üzerine bir araştırma: Seben İlçesi Alpağut Köyü Örneği*. Doktora tezi, A.Ü. Fen Bilimleri Enstitüsü, Ankara.

Coşgun, U. (2009). Ormancılıkta katılımcı kırsal değerlendirme ve kırsal kalkınma: Köprülü Kanyon milli parkı örneği. *II. Ormancılıkta sosyo-ekonomik sorunlar kongresi 19-21 Şubat 2009*, SDÜ, Isparta.

Çetinkaya, G., & Uzun, O. (2014). *Peyzaj Planlama* (1.Baskı). İstanbul: Birsen Yayınevi.

Eroğlu, E. (2007). Orman Genel Müdürlüğü stratejik paydaş analizi araştırması. *Araştırma Projesi*, Ankara.

Garriga E., Melé D. (2004). Corporate Social Responsibility Theories: Mapping The Territory, *Journal of Business Ethics,* Vol. 53, 51–71.

Gülçubuk, B. (2000). Hızlı kırsal değerlendirme Ders Notları, Ankara Üniversitesi Ziraat Fakültesi, Ankara.

Gültekin, P. (2014). *Uğursuyu ve Aksu Havzalarında Peyzaj Planlama ve Ekoturizm Odaklı Kırsal Kalkınma*. Doktora Tezi, Düzce Üniversitesi, Fen Bilimleri Enstitüsü, Düzce.

Gültekin, P., Gültekin, Y. S., Uzun, O. & Gök, H. (2018). Katılımcı ekoturizm planlamasında yapısal eşitlik modellemesi ile paydaş analizi: Batı Karadeniz Bölgesi örneği. *Journal of Forestry, 14 (2)*, 33-56.

Involve, U. K. (2005). People and Participation: How to Put Citizens at the Heart of Decision Making. London, http://www.involve.org.uk.

Gültekin, Y.S., & Gültekin, P. (2017). The Effects of Ecotourism Activities on Forest Villagers in Duzce. *Current Trends in Science and Landscape Management.. ST. Kliment Ohridski University Press Sofia*, p 685-700. ISBN 978-954-07-4338-7

Gültekin, Y.S., Gültekin, P., Uzun, O., & Gök, H. (2017). Use of Structural Equation Modeling in Ecotourism: A Model Proposal. *Periodicals of Engineering and Natural Sciences, 5(2).*

Gültekin P., Gültekin Y.S., & Uzun O. (2016).Stakeholder Analysis and Stakeholder Governance in Participatory Ecotourism Planning for Turkey. *1. International OsmaneliSocial Science Congress*, Bilecik.

Gültekin P., Gültekin Y.S., & Uzun, O. (2014). The Relationship between local people and ecotourism in Participatory Planning: Example of Düzce Aydınpınar Village. *Uluslararası Odundışı Orman Ürünleri Sempozyumu*, Kahramanmaraş.

Gültekin, P. Uzun, O., Gültekin Y.S., Özdede, S., & Kaya, S. (2018). Regional Identity and Cultural Landscapes for Sustainability of Ecotourism from Tourist Perspectivesin Düzce Uğursuyu and Aksu Watersheds. *5th International Conference on Civil Engineering, Architecture and Urban Planning Elites Paris November 2-4*, France.

Gültekin, P., Gültekin, Y.S., Uzun, O. (2015). Ekoturizmde Çatışma Yönetiminin Düzce Uğursuyu ve Aksu Havzaları Örneğinde İrdelenmesi. *IV. Ormancılıkta Sosyo-Ekonomik Sorunlar Kongresi, 15-17 Ekim 2015*, Trabzon.

Gültekin, P., Gültekin, Y.S., & Uzun, O. (2013). Düzce Uğursuyu ve Aksu Havzalarında Katılımcı Ekoturizm Algı Ölçeğinin Geliştirilmesi. *Peyzaj Mimarlığı V. Kongresi, 14-17 Kasım, 904-921*, Adana.

Güneş, G. (2011). Korunan alanların yönetiminde yeni bir yaklaşım: katılımcı yönetim planları. *Ekonomi Bilimleri Dergisi, 3(1)*, ISSN: 1309-8020.

Karadağ A. A. (2007*). Katılımcı havza yönetim modelinin oluşturulması: Kovada Gölü örneği*, Doktora Tezi, A.Ü Fen Bilimleri Enstitüsü, Ankara.

Karadağ, A. A., & Barış, M. E. (2012). Kovada Gölü alt havza yönetim planının geliştirilmesi. *Düzce Üniversitesi Ormancılık Dergisi, 8(1)*, 118-136.

Karadağ, A., A., Gültekin, Y. S., & Mutlu, S. (2019). Yapısal eşitlik modellemesi ile konut seçimi ölçeğinin geliştirilmesi. *Düzce Üniversitesi Orman Fakültesi Ormancilik Dergisi*, *15 (2)*, 78-95.

Ostrom, E. (1992). The rudiments of a theory of the origins, survival, and performance of common-property institutions. *Making the commons work: theory, practice, and policy*, 293-318.

Özer, D. (2004). Kırsal kalkınmada katılımcılık ve katılımcı yayım. *Harran Üniversitesi Ziraat Fakültesi Dergisi*, *8*(2), 17-27.

Sanoff, H. (2011). Multiple views of participatory design. *Focus*, *8*(1), 7.

Şahin, Ş., Perçin, H., Kurum, E., Uzun, O., Bilgili, B.C., Tezcan, L., Çiçek, İ., Müftüoğlu, V., Çorbacı, Ö.L., Sütünç, S., Doğan, D., Koç, Ö., Ateş, E., Tarım, B., Kurdoğlu, G. & Kaşko, Y. (2013). PEYZAJ-44: İl Ölçeğinde Peyzaj Karakter Analizi ve Turizm/Rekreasyon Açısından Değerlendirilmesi. *109G074 Nolu TÜBİTAK KAMAG Projesi Raporu*.

Uzun, O., Dilek, F., Çetinkaya, G., Erduran, F., & Açıksöz S. (2010). Konya İli, Bozkır-Seydişehir- Ahırlı-Yalıhüyük İlçeleri ve Suğla Gölü Mevkii Peyzaj Yönetimi, Koruma ve Planlama Projesi. *Proje Raporları, Mülga T.C. Çevre ve Orman Bakanlığı (Yeni T.C. Orman ve Su İşleri Bakanlığı),Doğa Koruma ve Milli Parklar Genel Müdürlüğü Doğa Koruma Dairesi Başkanlığı*, Ankara.

Uzun, O., Müderrisoğlu, H., Demir, Z., Kaya, L. G., Gültekin, P., & Gündüz, S. (2015). Yeşilırmak Havzası Peyzaj Atlası. *TC Orman ve Su İşleri Bakanlığı, Doğa Koruma ve Milli Parklar Genel Müdürlüğü adına AKS Planlama ve Mühendislik Limited Şirketi*, *259*.

Uzun, O., Gültekin, P., & Gültekin, Y. S. (2015). Assessment of participatory ecotourism planning and management using by different stages of basin scale. MACODESU 2015 Trabzon.

Wulz, F. (1986). The concept of participation. *Design studies*, *7*(3), 153-162.

Yenilmez-Arpa, N. Y., & Karadeniz, N. T. D. (2011). *Türkiye'de korunan alanların belirlenmesi, planlanması ve yönetimi sürecinde katılımcılığın değerlendirilmesi: Sultan Sazlığı Milli Parkı* (Doctoral dissertation, Ankara Üniversitesi Fen Bilimleri Enstitüsü Peyzaj Mimarlığı Anabilim Dalı).

Chapter 7

CONTRIBUTION OF ACCOMMODATION FACILITY HOSPITAL PROJECTS TO URBAN SUSTAINABILITY; FIRAT UNIVERSITY CHAPERONE HOUSE PROJECT

Hasan POLAT[1]

1 Firat University, Department of Architecture, ELAZIG, TURKEY

1. Introduction

For all countries, health has been an important concept that also plays an important role in economic development, which shows the level of development. The provision of health services based on this concept has been very important for the individuals of the society. Health services aim to protect the physical and mental health of individuals, improve their quality of life and protect the existing health status of the society with the preventive services it provides, as well as the continuation of sustainable services necessary for social life.

Hospitals, which are one of the health institutions where health services are carried out, are important spatial arrangements in social life. Hospitals are one of the health service organizations designed to meet the care and treatment of sick people as soon as possible [1]. Today, hospitals are not only spaces that try to continue their existence by filling their bed capacities, but also places that research solutions and develop new understandings in order to provide better quality health care services [2].

Scientific research has found that the physical and environmental conditions applicable to hospitals significantly affect patient satisfaction in the short term, public health and social sustainability in the long term. Internal and external spatial arrangements and physical conditions of hospitals are effective criteria in the satisfaction assessments of individuals who benefit from the service. Inadequate room conditions, sloppy planned poorly maintained hospitals were the subject of complaint and dissatisfaction assessments of patients [3,4,5].

2. Change of Understanding in Health Care

Today, the quality health service presentation approach, which has gained such importance, was supported by the Ministry of Health with the 'Health Transformation Program' which came into force in 2003 and the service presentation parameters were revised [6] and a new configuration was made in the country's health system with this transformation program. The new regulations made with the understanding of the Health Transformation Program are aimed at more effective and efficient delivery of health services carried out in the country [7]. For this purpose; a number of basic reference principles such as sustainability, continuous quality development, human centering, participation, conciliation, volunteering, separation of powers, desantralization (localization) and competition in service have been adopted [8-9].

In this study, in the light of new principles in health care; The principle of 'sustainability' has been one of the issues focused on in terms of its contributions to social life and urban design development. Likewise, another basic reference policy is; The principle of ‘human centeredness’ has been one of the points emphasized by the value it adds to the social structure and ‘continuous quality development’ by including the patient’s relatives in the planning process as much as the patient in the service delivery.

Quality of health care presentation; diagnosis, treatment and care services provided in accordance with the standards in internationally valid indicators are defined as fully meeting patient expectations and needs [10-11]. All hospitals that support the principle of providing quality services in health services with the necessary accreditation certificates in accordance with the international level have parameters that contribute to social and economic sustainability. One of the important improvements made in the development of these contributions was the production of projects in which the patient’s relatives who were in a state of accompanying him as much as the patient were provided with accommodation opportunities in spatial planning related to hospitals.

Today, businesses do not only associate sustainability and profitability with product or service quality; social responsibility also relates to variables such as education and environment. They feel obliged to carry out social responsibility practices not only for economic profit purposes, but also for the purpose of obtaining ‘social profits’ [12]. It is inevitable that developments will be observed in health institutions that need social structure for environmental, economic and social sustainability. Sustainability concept; it is used in the sense that a society maintains the existence of any system with continuity without overloading its main resources [13]. Sustainable development can be achieved when environmental, economic and social sustainability is achieved. The creation of a sustainable urban environment also creates a sustainable social life. Sustainable urban development covers all aspects of social justice, sustainable economies and environmental sustainability [14]. In that sense, TC. According to the ‘Turkish Health Structures Minimum Design Standards 2010 Guide [15] prepared by the Ministry of Health, patient room qualifications were determined and the design was carried out with these references. In addition to the Elazig Fırat University Hospital Building designed according to these criteria, the Companion House will be evaluated within the scope of this study in terms of project criteria.

3. In terms of Health Service given to Elazig and Surrounding Provinces; Importance of Fırat University Faculty of Medicine

Fırat University Faculty of Medicine has a history of 35 years in Elazig and has trained nearly 2500 physicians since its establishment. There are 37 branches of 45 departments affiliated to 3 departments and departments in the faculty, but it also has 79 Professors, 37 Associate Professors, 70 Dr. Faculty Members, 8 Experts and 314 Research Assistants and a total of 508 faculty members.

Fırat University Hospital also offers third-line service in its on-campus building. The hospital provides 55 units of outpatient services, including emergency and children's emergency units, 40 of which also offer inpatient treatment. The bed capacity of Fırat Medical Center is 962. The number of people receiving diagnosis and treatment is around 300,000 per year.

Fırat University Hospital is receiving intensive patient and treatment requests from the surrounding provinces as as it is in Elazig province due to both the geopolitical location of the city and the quality of service. Therefore, due to its position as a regional hospital, there are intensive patient applications from the surrounding provinces (Bingöl, Tunceli, Mus, Bitlis, etc.).

However, after the hospitalization procedures, a significant number of the patient's relatives stay in the hospital garden, corridors, waiting units, emergency cafeteria due to their economic impotence, and this situation sometimes lasts for weeks.

Fırat University planned to make a companion house in order to solve this problem and implemented it to contribute to the city. In order to meet the expenses and needs of the structure in question; commercial areas (such as pharmacies, restaurants, cafeterias) are planned on the ground floor and paid indoor parking is planned at the back of the building. In this way, it is planned to transfer the rental income of commercial areas together with the rental income to the chaperone house and to ensure the accommodation of relatives of patients who do not have financial facilities. It is planned with the thought that it will make significant contributions to the city both in terms of the execution of health services and sustainability.

4. Companion House (Annex) Project Analysis in the Heat of Project Criteria

The building is in the form of a single mass due to the lack of available land; it consists of three basic functions as commercial workplaces (pharmacy, restaurant, cafeteria), accommodation (for companions) and indoor parking. The building was built just south of the existing hospital building; The basement with 2680 m2 sessions is made up of ground floor and 3 normal floors and is designed as 13.400 m² in total.

The sections overlooking the main street (east direction) and the existing hospital building (north direction) are planned as companion houses on the ground floor and commercial areas on the upper floors. The sections facing the back façade (west direction) are arranged as covered and storey car parks with the driving entrance and exit of the existing hospital building and from the medical school located at the back. The entrance and exit of the car park on the back front are given from the basement using the jeans.

3 buildings located on the backline in the situation plan belong to the medical school. The indoor car park on this floor, which is located in the same jeans as the medical school, is reserved for the use of faculty members and staff. The direction in which the building mainly fronts is the eastern façade. The main reason for this is the street on the north-south axe in the east view, where the pedestrian and traffic axly facing the building.

Figure 1. *Situation Plan*

Figure 2. *Basement Plan*

The basement car park reserved for faculty members can accommodate up to 68 vehicles. There are also technical neighborhoods belonging to the chaperone house in the basement. At the beginning of these units is the laundry where the beds and sheets and companion dresses in the companion house can be washed. In addition, warehouses, boiler room, electrical and transformer room, hydrophore water tank are also arranged in this area. Vertical circulations from technical volumes to the companion house and to the upper floors in the parking lot were provided by stairs and elevators.

On the ground floor, there is a parking lot for 58 cars serving the hospital and a ramp for exiting and landing on the upper floors. On the façade overlooking the main façade and the hospital, there are 3 commercial areas and the entrance of the companion house. Commercially planned spaces are 156 m², 135 m², 130 m². At the entrance of the companion house there is an 80 m² lobby, a 15 m² reception area, a 20 m² executive room and an on-call officer's room within 18 m² with wc-shower facilities.

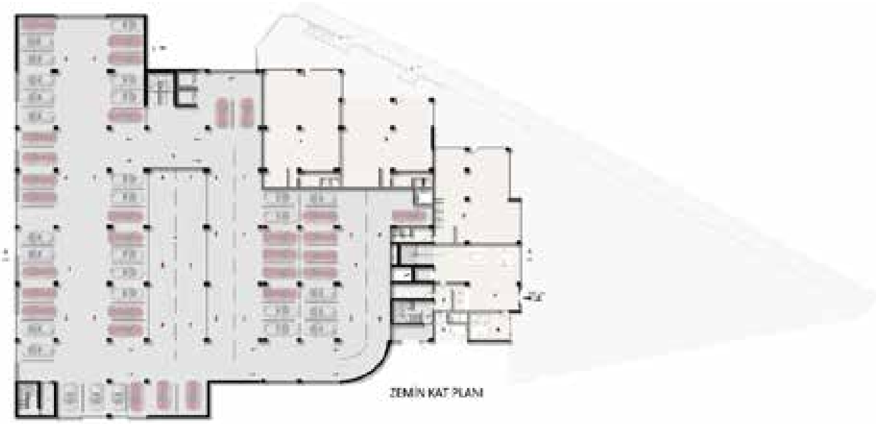


Figure 3. *Ground Floor Plan (with its immediate surroundings)*

On the 1st, 2nd and 3rd normal floors, there is a parking lot for 195 cars serving the hospital -65 vehicles on each floor- and a ramp for exiting and landing on the upper floors. There are 24 bedrooms, 8 rooms on each floor, on the façade overlooking the main façade and hospital. The bedrooms have 1 person for 2 people, 2 for 3 people, 4 for 4 people and 1 for 6 people on each floor. Each floor has a total capacity of 90 beds with a capacity of 30 beds. Alhowever, there is a wc-shower in all rooms, but there is 1 shared kitchen on the floor where the companions can prepare their food drinks, as well as 2 common sink-wc (sir-female).

Figure 4. *1st, 2nd, 3rd Normal Floor Plans*

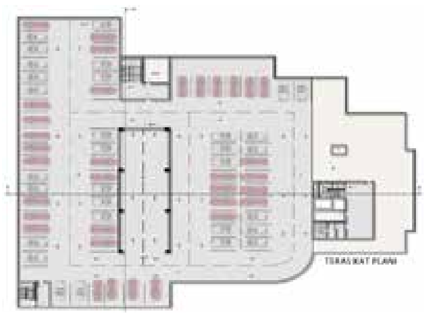


Figure 5. *Terrace Floor Plan*

The penthouse is planned as a terrace. The main reason for this is that the terrace area is also considered as a car park. This terrace, which has a capacity of 65 vehicles, is also the floor where the entire building is 30. When designing building facades, it is basically based on providing integrity with the existing hospital building, which is functionally and organically related. The existing hospital building consists of densely glass surfaces and solid surfaces consist of clinker coatings. However, horizontal chrome profiles that connect these elements with low density andesite elements were used in order to emphasize the differentiation of the design and construction period when the façade was edited.

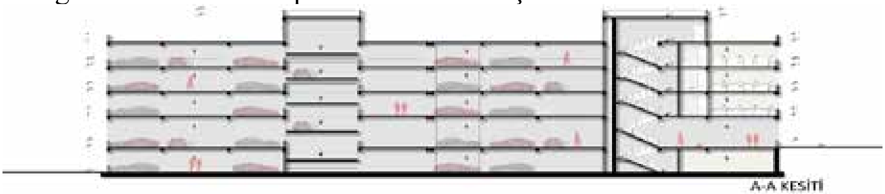


Figure 6. *Section A-A*

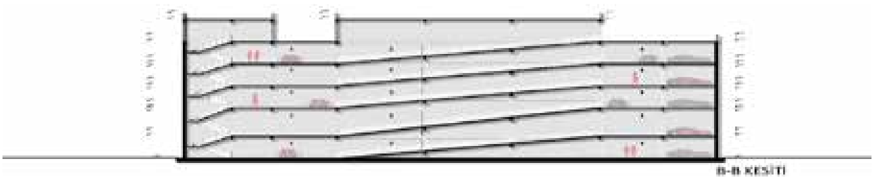


Figure 7. *Section B-B*

On the facades where there is a covered car park, it was tried to get out of the line using partial parapet walls and metal railings. This situation has always revealed a partial perception of the car park from the outside, but also an aesthetic image with simple movements that will disrupt the n quite ordinaryness on the front with simple touches.

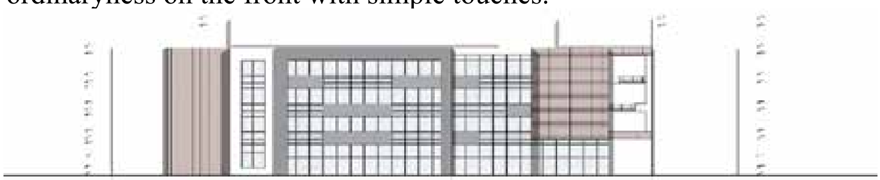


Figure 8. *Front (East View)*

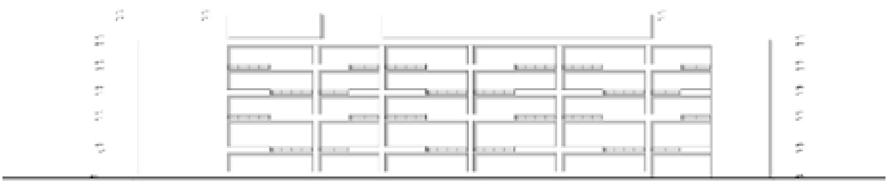


Figure 9. *Rear View (West View)*

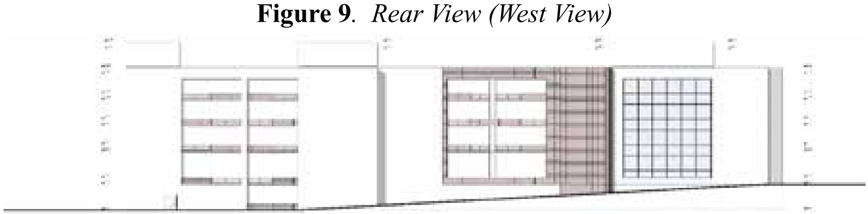


Figure 10. *Left Side Facade (South View)*

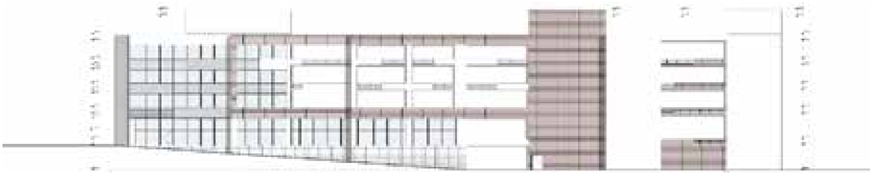


Figure 11. *Right Side Facade (Northern View)*

Figure 12. *Perspective from the Southeast*

Figure 15. *Perspective from the Southwest*

Figure 13. *Perspective from the Northeast*

Figure 16. *East Side Perspective (Building Main Entrance and Commercial Areas)*

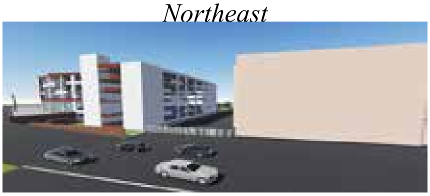


Figure 14. *Perspective from the Northwest*

Figure 17. *Image from the Finished Building*

5.Project Tag

Architectural Design	: Hasan POLAT, Dr. Architect
Application Project	: Hasan POLAT, Dr. Architect - Çetin IRMAK, Architect
Static Project	: Miraç GÖKDOĞAN, Civil Engineer
Mechanical Project	Çiğdem BOZDAĞ, Mechanical Engineer
Electrical Project	: Erhan AZTEKİN, Electrical Engineer
Employer	: Rectorate of Fırat University

Control : Fırat University Directorate of Construction and Technical Works

Contractor : Han Engineering Company

Contract Date : 07.06.2017

End Date : 25.10.2018

Contract Price : 8.638.000,00 TL

6.Conclusion and Evaluation

In hospital projects, it is one of the most common practices to include units that provide accommodation services to patient relatives. Especially in hospitals planned with the comfort of 5-star hotels to increase the preference environment of the hospital in developed countries, luxury hotels planned for the accommodation of patient relatives are also included in the planning. Sometimes as a service delivery carried out by the state by the public and local government with the mission of becoming a social state in hospital projects in developing countries; Due to the lack of transportation and facilities of poor and disadvantaged patient relatives, accommodation units will be added to the projects and plans are made. To cover this cost of service; some income-bringing functions have also been added to the project so that the hospital can meet the accompanying service on its own budget. The companion house, which is designed with the annex function examined because it is an example of hospital projects designed with this understanding, is an important example in that it contributes to the spatial and social sustainability of the city and responds to the need demanded by feeding the city on a regional basis.

The desire of the Ministry of Health to improve the quality of service of hospitals within the scope of the 'Health Transformation Program' in our country has contributed to the consideration of different demands in the projects. Thus, health services that contribute to spatial and social sustainability, which is an important issue in urban life; it provides great advantages to the city with its service services that feed not only that city, but also the surrounding provinces. Such additional service projects, which are important such as providing free accommodation opportunities for companions in a location close to their patients, have been one of the issues that are taken care to be implemented in the design, implementation and operation processes of hospital projects today.

Resources

1. Karahan, A., (2008), Hastanelerde Kat Hizmetleri ve Memnuniyet Analizi, Uşak Üniversitesi Sosyal Bilimler Dergisi, 1 (2), 155-171, Uşak.
2. Aslantekin, F., Göktaş B., Uluşen, M. & Erdem, R., (2007), *Sağlık Hizmetlerinde Kalite Deneyimi: Dr. Ekrem Hayri Üstündağ Kadın Hastalıkları ve Doğum Hastanesi Örneği*, Fırat Üniversitesi Sağlık Hizmetleri Dergisi, 2 (6), 55-71, Elazığ.
3. Büber, R. & Başer H., (2012), *Sağlık İşletmelerinde Müşteri Memnuniyeti: Vakıf Üniversitesi Hastanesinde Bir Uygulama,* Sosyal ve Beşeri Bilimler Dergisi, 4 (1), 265-274.
4. Çinal, A., (2009), *Özel Hastanelerin Sınıflandırılması, Hasta Güvenliği ve Yeni Roller*, T.C. Sağlık Bakanlığı Yayınları, Performans Yönetimi ve Kalite Geliştirme Daire Başkanlığı, Ankara.
5. Kıdak, B. L. & Aksaraylı, M., (2008), Yatan Hasta Memnuniyetinin Değerlendirilmesi ve İzlenmesi: Eğitim *ve Araştırma Hastanesi Uygulaması*, Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 10 (3), 87-122, İzmir.
6. SHGM (Sağlık Hizmetleri Genel Müdürlüğü), Sağlıkta Kalite ve Akreditasyon Daire Başkanlığı, (2012), *Sks Işığında Sağlıkta Kalite*, Sağlık Bakanlığı Yayını, Ankara.
7. Tükel, B., Acuner, A., Önder, R. Ö. & Üzgül, A., (2004), *Ankara Üniversitesi İbn–İ Sina Hastanesi'nde Yatan Hasta Memnuniyeti; Genel Cerrahi Anabilim Dalı Örneği*, Ankara Üniversitesi Tıp Fakültesi Dergisi, 57 (4), 205-214, Ankara.
8. Tatar, M. (2012), *Sağlık Kurumları Yönetimi-I* (Editör), T.C. Anadolu Üniversitesi Yayını, No: 2631, Eskişehir.
9. T.C. Sağlık Bakanlığı, (2008), *Türkiye Sağlıkta Dönüşüm Programı İlerleme Raporu,* Sağlık Bakanlığı Yayınları, 20-21, Ankara.
10. Andaleeb, S. S., (2001), *Service Quality Perceptions And Patient Satisfaction: A Study of Hospitals in A Developing Country*, Social Science & Medicine, 52 (9), 1359-1370.
11. Bostan, S., Kılıç T. & Acuner, T., (2012), *Sağlıkta Dönüşüm Programının Hastaneler Üzerindeki Değişim Etkisi: Hastane Yöneticilerinin Görüşleri*, Türkiye İstatistik Kurumu Akademik Yayını, 108-123, Ankara.
12. Güzel, T., (2010), *Kurumsal Sosyal Sorumluluk Yönelimli Otel İşletmeleri Uygulamaları*, Trakya Üniversitesi Sosyal Bilimler Dergisi, 12 (1), 285-304, Edirne.
13. Yaş, Z. S., (2009), *Toplam Kalite Yönetimi Anlayışının Sağlık Sektöründe Uygulanması: Trakya Üniversitesi Sağlık Araştırma ve Uygulama Merkezi*

İle Edirne Devlet Hastanesi'nin Karşılaştırılması, Trakya Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi, Edirne.

14. Yazar, K. H. (2006), *Sürdürülebilir Kentsel Gelişme Çerçevesinde Orta Ölçekli Kentlere Dönük Kent Planlama Yöntem Önerisi*, Doktora Tezi. Ankara.

15. T.C. Sağlık Bakanlığı, (2010), *Türkiye Sağlık Yapıları Asgari Tasarım Standartları,* 2010 Yılı Kılavuzu, T.C. Sağlık Bakanlığı Yayınları, Yayın No: 800, Ankara.

Chapter 8

GEOPHYTES OF ISTANBUL AND THEIR ORNAMENTAL CHARACTERISTICS[1]

Ş. Doğanay YENER

1 Assist. Prof. Dr. Ş. Doğanay YENER, Istanbul University - Cerrahpaşa, Faculty of Forestry, Department of Landscape Architecture, Bahcekoy-Istanbul, Turkey.

INTRODUCTION

'Geophyte' is a Latin word which means 'ground plants, hidden plants' and it is formed by the combination of the words "geo" meaning 'place' and 'phyta' meaning plant. The stems of these plants are metamorphosed in the form of bulb, tuber, corm or rhizome and are located below the soil level (Anonymous, 2020). The geophytes, plants with underground perennating organs like bulbs, corms, tubers or rhizomes that lose their aerial parts annually. Perennial belowground elements allow plants to survive periods of severe climate conditions (Dafni et al., 1981; Hamrick and Godt, 1996; Parsons, 2000; Procheş et al., 2005; Procheş et al., 2006; Kamenetsky, 2013). According to Zencirkıran (2002), although the above-ground organs dry out after completing their development in the growing season, geophytes; are biannual or perennial plants that have organs that can survive under the ground. In geophytes, budding occurs under the ground, while other plants are at or above the ground level. Furthermore, it is known that species of geophytes in different lineages of angiosperms have increased their genome size, facilitating the production of larger cells in the underground perennating organs, which is advantageous for fast growth in seasonal habitats (Vesely et al., 2012).

In general, geophytes spend most of the year under the ground, the above-ground parts turn yellow after the growth is complete, and eventually dry out and die. However, the storage organs under the soil continue to survive (Anonymous, 2020). Geophyt types include bulbs, corms, tubers, tuberous stems, tuberous roots, rhizomes and pseudobulbs (Kamenetsky and Hiroshi, 2013). They are blooming in almost all seasons but generally classified as "spring geophytes" which are planted in autumn and bloom in spring and "fall geophytes" which are planted in spring and bloom in summer (Kılıçaslan and Dönmez, 2016). Geophytes are often conspicuous components of vegetation after burning (Doussi and Thanos, 2002; Verboom et al., 2002; Tyler and Borchert, 2003; Koniak et al., 2009). This life form is more common in monocots, in families like Iridaceae, Orchidaceae, Hyacinthaceae, Amaryllidaceae and Anthericaceae and only occurs in very few dicot taxa (Meerow, 2013).

Geophytes has an economic value due to their use in the pharmaceutical industry and remarkable flowers (Güner et al., 1991). Due to their aesthetic properties, fragrances and usability as cut flowers, they are the most preferred plants among ornamental plants (Çığ and Başdoğan, 2015). Geophytes create a strong visual impact due to contribute to the enrichment of landscape both aesthetically and functionally. With the help of their year-round blooming feature, they avoid monotony in landscape designs. (Seyidoğlu et al., 2009). It provides relaxation, especially by offering beautiful looks with its colors, and is also effective in sensory stimulation. Designs made with blue, yellow and white flowering geophytes make people feel the feelings of eternity, joy and purity (Akdeniz, 2020). Geophytes are used in many areas such as.rock gardens, curbs, grass areas, building entrances, roadsides. In recent years, it has been given possibility of having the impressive design with the participation of Geophytes to planting works (Akdeniz and Zencirkıran, 2016).

These plants have always attracted the attention of people since history. Considering the history of our country, at the beginning of the 17th century, we can mention that *Tulipa* is a plant considered important enough to give its name to an era. During the Tulip Era, *Tulipa* sp. took their place not only in the palace gardens, but also in the recreation areas used extensively by the public. The widespread use of *Tulipa* sp., which is one of the most well-known geophyte species in urban green areas, is in the 19th century. Today, there has been great interest in plants with this life form because many geophyte monocot species in genera like *Allium, Iris* and *Tulipa* are widely cultivated as ornamentals and and also *Muscari* sp., *Narcissus* sp. and *Hyacinthus* sp. have been participated in the landscape designs (Kamenetsky, 2013; Yener and Akdeniz, 2020).

Turkey is very rich in native plant diversity. Within the studies about the natural flora in recent years, it is revealed that Turkey's flora consists of about 12500 plant taxa (Özhatay et al., 2003). Geophytes are an important part of this rich flora. According to Davis (1965-1985) geophytes are represented by nearly 600 plant taxa in Turkey and about 40% them is endemic. This number is 800 according to Güner (2006) and 900 according to Kandemir and Yakupoğlu (2016).

Istanbul, which is one of Turkey's most developed city is quite appropriate for geophytes with its geographic location, as well as climatic structure and different habitats. This is the main reason why the city is rich in geophytes. In this study, it is aimed to investigate the geophyte taxa in the flora of Istanbul. After that the design characteristics of these geophytes has been evaluated in detail, in order to use them in the urban landscape of the city.

RESULTS

2.1. Diversity of natural geophytes in Istanbul

In Istanbul, there has been native 61 genus and 226 geophyte taxa belonging to 14 families. In Table 1; geophyte taxa belonging to 14 families has been given (Tubives, 2020).

Table 1. *Geophyte taxa of Istanbul*

Family	Genus	Species/Subspecies/Variety
Amaryllidaceae	*Allium* L.	*Allium amethystinum* Tausch, *Allium ampeloprasum* L., *Allium atropurpureum* Waldst. et Kit., *Allium cepa* L., *Allium commutatum* Guss., *Allium cyrilli* Ten., *Allium flavum* L. subsp. *tauricum* (Besser ex Reichb.) Stearn *var. tauricum* L., *Allium guttatum* Steven subsp. *sardoum* (Moris) Stearn, *Allium istanbulenese* Özhatay, Koçyigit, Brullo&Salmeri, *Allium moschatum* L., *Allium myrianthum* Boiss. var. *floribus albidis* Regel, *Allium neapolitanum* Cyr., *Allium nigrum* L., *Allium pallens* L. subsp. *pallens, Allium paniculatum* L. subsp. *paniculatum, Allium paniculatum* L. subsp. *fuscum* (Waldst. et Kit.) Arc., *Allium peroninianum* Aznav., *Allium porrum* L., *Allium rhodopeum* Velen. subsp. *turcicum* Brullo, Guglielmo et Terrasi, *Allium roseum* L., *Allium rubellum* Bieb., *Allium scorodoprasum* L. subsp. *rotundum* (L.) Stearn, *Allium scorodoprassum* L. subsp. *scorodoprasum* L., *Allium siculum* Ucria, *Allium sphaerocephalon* L. subsp. *sphaerocephalon, Allium stamineum* Boiss., *Allium triquetrum* L., *Allium wiedemannianum* Regel
	Gagea Salisb.	*Gagea chrysantha* (Jan) Schultes et Schultes Fil*., Gagea villosa* (Bieb.) Duby var. *villosa*
	Galanthus L.	*Galanthus gracilis* Celak*, Galanthus nivalis* L. subsp. *nivalis, Galanthus plicatus* subsp. *byzantinus* (Baker) D. A. Webb, *Galanthus plicatus* Bieb. subsp. *plicatus* Baker., *Galanthus* x *valentinei* (J.Allen) Beck nothosubsp. *subplicatus* (N.Zeybek) P.Davis
	Leucojum L.	*Leucojum aestivum* L.
	Narcissus L.	*Narcissus assoanus* Dufour, *Narcissus jonquilla* L., *Narcissus poeticus* L., *Narcissus pseudonarcissus* L., *Narcissus tazetta* L. subsp. *tazetta*
	Nectaroscordum	*Nectaroscordum siculum* (Ucria) Lindl. subsp. *bulgaricum* (Janka) Stearn
	Pancratium L.	*Pancratium maritimum* L.
	Sternbergia Waldst. Et Kit.	*Sternbergia colchiciflora* Waldst. Et Kit.

Asparagaceae	*Asparagus* L.	*Asparagus acutifolius* L., *Asparagus aphyllus* L. subsp. *orientalis* (Baker.) P.H.Davis, *Asparagus officinalis* L.
	Bellevalia Lapeyr.	*Bellevalia clusiana* Griseb., *Bellevalia sarmatica* (Pallas ex Georgi) Woronow, *Bellevalia trifoliata* (Ten.) Kunth
	Convallaria L.	*Convallaria majalis* L. var. *majalis*
	Danae Medikus	*Danae racemosa* (L.) Moench
	Muscari Miller	*Muscari armeniacum* Leichtlin ex Baker, *Muscari comosum* (L.) Miller, *Muscari neglectum* Guss., *Muscari parviflorum* Desf.
	Ornithogalum L.	*Ornithogalum arabicum* L., *Ornithogalum comosum* L., *Ornithogalum fimbriatum* Willd., *Ornithogalum montanum* Cyr., *Ornithogalum narbonense* L., *Ornithogalum orthophyllum* Ten., *Ornithogalum refractum* Kit. ex Schlecht., *Ornithogalum sigmoideum* Freyn et Sint., *Ornithogalum sphaerocarpum* Kerner, *Ornithogalum umbellatum* L., *Ornithogalum wiedemannii* Boiss.
	Polianthes L.	*Polianthes tuberosa* L.
	Polygonatum Miller	*Polygonatum hirtum* (Bosc ex Poiret) Pursh.
	Ruscus L.	*Ruscus aculeatus* L. var. *aculeatus, Ruscus aculeatus* L. var. *angustifolius* Boiss., *Ruscus hypoglossum* L., *Ruscus hypophyllum* L.
	Scilla L.	*Scilla autumnalis* L., *Scilla bifolia* L., *Scilla bithynica* Boiss.
Araceae	*Arum* L.	*Arum byzantinum* Blume, *Arum elongatum* Steven subsp. *elongatum, Arum italicum* Miller, *Arum maculatum* L.
	Dracunculus Miller	*Dracunculus vulgaris* Schott
Butomaceae	*Butomus* L.	*Butomus umbellatus* L.
Colchicaceae	*Colchicum* L.	*Colchicum chalcedonicum* Azn. subsp. *chalcedonicum*, *Colchicum lingulatum* Boiss. et Spruner ex Boiss., *Colchicum lingulatum* Boiss. et Spruner subsp. *rigescens* K.M.Perss., *Colchicum micranthum* Boiss., *Colchicum troodii* Kotschy, *Colchicum turcicum* Janka
Geraniaceae	*Erodium* L'Herit.	*Erodium acaule* (L.) Becherer et Thell., *Erodium botrys* (Cav.) Bertol., *Erodium ciconium* (L.) L'herit., *Erodium cicutarium* (L.) L'herit., subsp. *cicutarium*, *Erodium gruinum* (L.) L'herit., *Erodium laciniatum* (Cav.) Willd., subsp. *laciniatum*, *Erodium malacoides* (L.) L'Herit., *Erodium moschatum* (L.) L'Herit.,
	Geranium L.	*Geranium asphodeloides* Burm. Fil. subsp. *asphodeloides, Geranium columbinum* L., *Geranium dissectum* L., *Geranium lanuginosum* Lam., *Geranium lucidum* L., *Geranium molle* L. subsp. *molle, Geranium molle* L. subsp. *brutium* (Gasp.) Davis, *Geranium purpureum* Vill., *Geranium pusillum* Burm. Fil., *Geranium pyrenaicum* Burm. Fil., *Geranium robertianum* L., *Geranium rotundifolium* L., *Geranium sanguineum* L., *Geranium tuberosum* L. subsp. *tuberosum*

Iridaceae	*Crocus* L.	*Crocus biflorus* Miller subsp. *biflorus, Crocus flavus* Weston subsp. *flavus, Crocus olivieri* Gay subsp. *olivieri, Crocus olivieri* Gay subsp. *istanbulensis* Mathew, *Crocus pestalozzae* Boiss., *Crocus pulchellus* Herbert, *Crocus sieheanus* Barr ex Burtt
	Gladiolus L.	*Gladiolus illyricus* W. Koch, *Gladiolus italicus* Miller
	Iris L.	*Iris pseudacorus* L., *Iris sintenisii* Janka, *Iris suaveolens* Boiss. et Reuter
	Moraea L.	*Moraea sisyrinchium* (L.) Ker Gawl.
	Romulea Maratti	*Romulea columnae* Seb. et Mauri subsp. *columnae, Romulea linaresii* Parl. subsp. *graeca* Beg., *Romulea ramiflora* Ten. Subsp. *ramiflora*
Liliaceae	*Erythronium* L.	*Erythronium dens-canis* L.
	Fritillaria L.	*Fritillaria pontica* Wahlenb.
	Lilium L.	*Lilium martagon* L.
	Tulipa L.	*Tulipa orphanidea* Boiss. ex Heldr.

Orchidaceae	*Anacamptis* L.C.M. Richard	*Anacamptis laxiflora* subsp. *laxiflora, Anacamptis pyramidalis* (L.) L.M.C. Richard
	Cephalanthera L.C.M. Richard	*Cephalanthera longifolia* (L.) Fritsch, *Cephalanthera rubra* (L.) L.M.C. Richard
	Dactylorhiza Necker ex Nevski	*Dactylorhiza iberica* (Bieb. ex Willd.) Soo*, Dactylorhiza romana* (Seb.) Soo subsp. *romana* (Seb.) Soo, *Dactylorhiza saccifera* (Brongn.) Soo
	Epipactis Zinn	*Epipactis helleborine* (L.) Crantz*, Epipactis microphylla* (Ehrh.) Swartz, *Epipactis palustris* (L.) Crantz
	Gymnadenia R. BR.	*Gymnadenia conopsea* (L.) R. BR.
	Himantoglossum Spreng.	*Himantoglossum caprinum* (Bieb.)Sprengel
	Limodorum Boehmer	*Limodorum abortivum* (L.) Swartz
	Neotinea Reichb. Fil.	*Neotinea maculata* (Desf.) Stearn
	Neottia Guettard	*Neottia nidus-avis* (L.) L.C.M. Richard
	Ophrys L.	*Ophrys apifera* Hudson, *Ophrys bombyliflora* Link, *Ophrys fusca* Link, *Ophrys iricolor* Desf., *Ophrys mammosa* Desf., *Ophrys oestrifera* Bieb. subsp. *oestrifera, Ophrys oestrifera* Bieb. subsp. *heldreichii* (Schlechter) Soo, *Ophrys speculum* subsp. *ferdinandii* (Acht. & Kellerer ex Renz) Butter, *Ophrys sphegodes* subsp. *catalcana* Kreutz, *Ophrys umbilicata* Desf. subsp. *umbilicata, Ophrys vernixia* Brot. subsp. *vernixia, Ophrys vernixia* Brot. subsp. *regis-ferdinandii* (Acht. et Kellerer ex Kuzmanov)
	Orchis L.	*Orchis collina* Banks et Sol., *Orchis coriophora* L., *Orchis lactea* Poiret, *Orchis laxiflora* Lam., *Orchis morio* L. subsp. *morio, Orchis morio* L. subsp. *picta* (Loisel.) K. Richter, *Orchis papilionacea* L. var. *rubra* (Jacq. Ex Murray) Brot., *Orchis papilionacea* L. var. *papilionacea, Orchis purpurea* Hudson, *Orchis tridentata* Scop.
	Platanthera L.C.M. Richard	*Platanthera bifolia* (L.) L.C.M. Richard, *Platanthera chlorantha* (Custer) Reichb.
	Serapias L.	*Serapias bergonii* E.G.Camus, *Serapias cordigeri* L., *Serapias vomeracea* (Burm. Fil.) Briq. subsp. *orientalis* Greuter, *Serapias vomeracea (*Burm. Fil.) Briq. subsp. *laxiflora* (Soo) Gölz et Reinhard
	Spiranthes L.C.M. Richard	*Spiranthes spiralis* (L.) Chevall.
Oxalidaceae	*Oxalis* L.	*Oxalis articulata* Savigny, *Oxalis corniculata* L.
Primulaceae	*Cyclamen* L.	*Cyclamen coum* Miller var. *coum, Cyclamen hederifolium* Aiton
	Lysimachia L.	*Lysimachia atropurpurea* L., *Lysimachia linum-stellatum* L., *Lysimachia nummularia* L., *Lysimachia punctata* L., *Lysimachia verticillaris* Sprengel, *Lysimachia vulgaris* L.
	Primula L.	*Primula vulgaris* Huds. subsp. *sibthorpii* (Hoffmanss.) W.W. SM. et Forrest

Ranunculaceae	*Adonis* L.	*Adonis annua* L., *Adonis flammea* Jacq.
	Anemone L.	*Anemone blanda* Schott & Kotschy, *Anemone coronaria* L., *Anemone nemorosa* L., *Anemone pavonina* Lam.
	Delphinium L.	*Delphinium peregrinum* L.
	Helloborus L.	*Helleborus orientalis* Lam.
	Ranunculus L.	*Ranunculus arvensis* L., *Ranunculus chius* DC., *Ranunculus constantinopolitanus* (DC.) D'urv., *Ranunculus cornutus* DC., *Ranunculus ficaria* L. subsp. *calthifolius* (Reichb.) Arc., *Ranunculus ficaria* L. subsp. *ficariiformis* Rouy et Fouc., *Ranunculus gracilis* Clarke, *Ranunculus lanuginosus* L., *Ranunculus lateriflorus* DC., *Ranunculus marginatus* D'urv. var. *marginatus, Ranunculus marginatus* D'urv. var. *trachycarpus* (Fisch. et Mey.) Azn., *Ranunculus millefoliatus* Vahl., *Ranunculus muricatus* L., *Ranunculus neapolitanus* Ten., *Ranunculus ophioglossifolius* Vill., *Ranunculus paludosus* Poiret, *Ranunculus psilostachys* Griseb., *Ranunculus repens* L., *Ranunculus rumelicus* Griseb., *Ranunculus saniculifolius* Viv., *Ranunculus sceleratus* L., *Ranunculus sphaerospermus* Boiss. et Balanche, *Ranunculus sprunerianus* Boiss., *Ranunculus thracicus* Azn., *Ranunculus velutinus* Ten.
	Thalictrum L.	*Thalictrum flavum* L., *Thalictrum lucidum* L.
Rosaceae	*Geum* L.	*Geum urbanum* L.
Xanthorrhoeaceae	*Asphodeline* Reichb.	*Asphodeline lutea* (L.) Reichb.
	Asphodelus L.	*Asphodelus aestivus* Brot., *Asphodelus fistulous* L., *Asphodelus ramosus* L.
	Kniphofia Moench	*Kniphofia uvaria* (L.) Hooker

When families are evaluated in terms of number of species, Orchidaceae and Amaryllidaceae families come first with 19.30%. Following them, Ranunculaceae comes in second with 15.35% and Asparagaceae comes in third with 14.04%. It was determined that Rosaceae and Butomacaea families were represented by only one species (0.44%) (Figure 1).

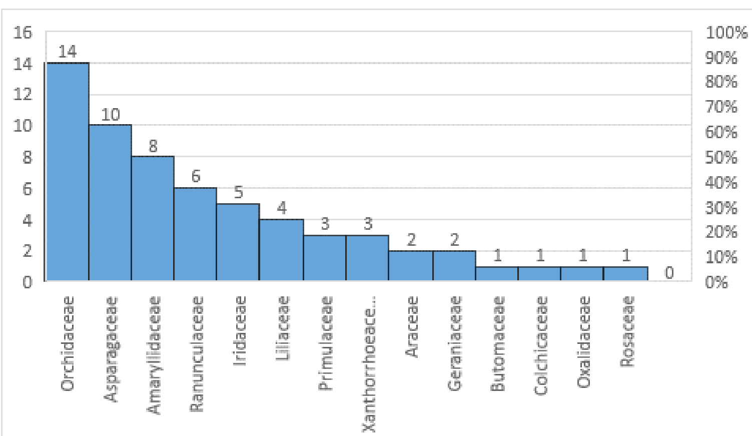


Figure 1. *Distribution of geophyte genus according to families*

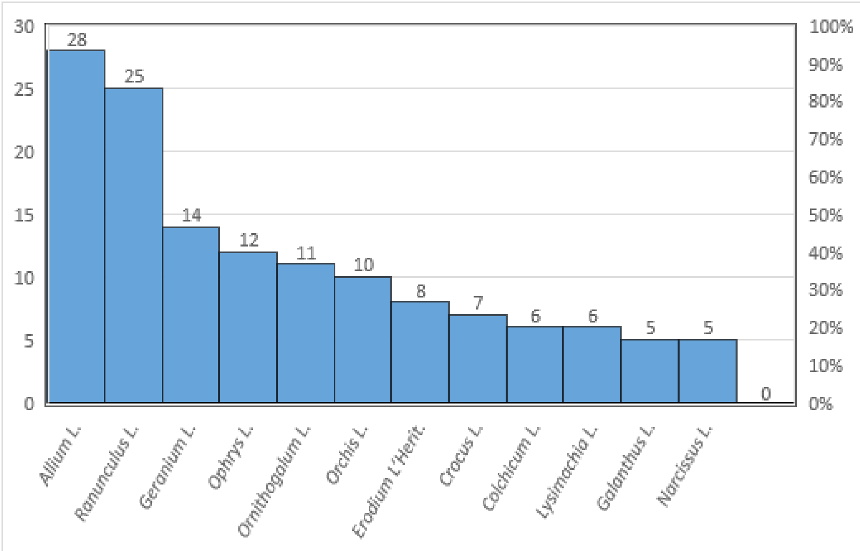


Figure 2. *Distribution of geophyte taxa according to genus*

The biggest genus of geophyte taxa in Istanbul is *Allium* with having 28 taxa. Following it, *Ranunculus* genus comes with 25 taxa and thirdly *Geranium* comes with 14 taxa (Figure 2).

There has been 11 endemic geophyte taxa in Istanbul. The endemic geophyte taxa of Istanbul has been given on Table 2.

Table 2. *Endemic geophyte taxa of Istanbul*

Allium istanbulenese Özhatay, Koçyigit, Brullo&Salmeri
Allium peroninianum Aznav.
Allium rhodopeum Velen. subsp. *turcicum* Brullo, Guglielmo et Terrasi
Bellevalia clusiana Griseb.
Colchicum lingulatum Boiss. et Spruner subsp. *rigescens* K.M.Perss.
Colchicum micranthum Boiss.
Crocus olivieri Gay subsp. *istanbulensis* Mathew
Crocus pestalozzae Boiss.
Crocus sieheanus Barr ex Burtt
Galanthus plicatus subsp. *byzantinus* (Baker) D. A. Webb
Ophrys sphegodes subsp. *catalcana* Kreutz

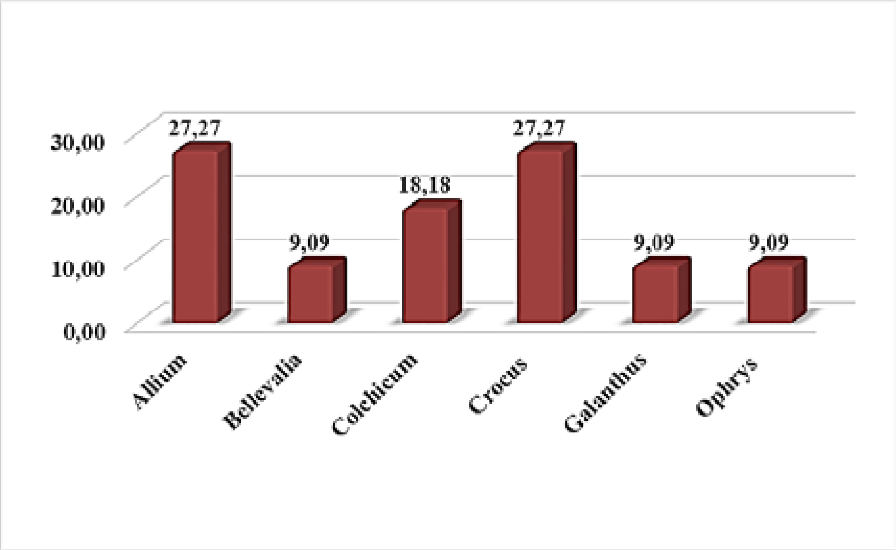


Figure 3. *Distribution of endemic geophyte taxa according to genus*

According to this data, 3 *Allium* and *Crocus*, 2 *Colchicum* and 1 *Bellevalia* species has been specified as endemic geophtes of Istanbul (Figure 3).

2.2. Design features of geophytes in Istanbul

Flower colors of geophyte taxa is one of the most important criteria for planting design. Evaluations about the flower colors of geophyte taxa in Istanbul, has been given in Table 3 and Figure 4.

Table 3. *Flower colors of geophyte taxa in Istanbul*

Yellow	*Allium flavum* subsp. *tauricum* var. *tauricum, Asphodeline lutea, Crocus sieheanus, Danae racemosa, Gagea chrysantha, Gagea villosa* var. *villosa, Geum urbanum, Iris pseudacorus, Lysimachia linum-stellatum, Lysimachia nummularia, Lysimachia punctata, Lysimachia verticillaris, Lysimachia vulgaris, Narcissus assoanus, Narcissus jonquilla, Narcissus pseudonarcissus, Neottia nidus-avis, Oxalis corniculata, Primula vulgaris* subsp. *sibthorpii, Ranunculus arvensis, Ranunculus chius, Ranunculus constantinopolitanus, Ranunculus cornutus, Ranunculus ficaria* subsp. *calthifolius, Ranunculus ficaria* subsp. *ficariiformis, Ranunculus gracilis, Ranunculus lanuginosus, Ranunculus lateriflorus, Ranunculus marginatus* var. *marginatus, Ranunculus marginatus* var. *trachycarpus, Ranunculus millefoliatus, Ranunculus muricatus, Ranunculus neapolitanus, Ranunculus ophioglossifolius, Ranunculus paludosus, Ranunculus psilostachys, Ranunculus repens, Ranunculus rumelicus, Ranunculus saniculifolius, Ranunculus sceleratus, Ranunculus sphaerospermus, Ranunculus sprunerianus, Ranunculus thracicus, Ranunculus velutinus, Sternbergia colchiciflora, Thalictrum flavum*

White	*Allium cepa, Allium cyrilli, Allium neapolitanum, Allium nigrum, Allium peroninianum, Allium triquetrum, Asphodelus fistulous, Cephalanthera longifolia, Colchicum troodii, Convallaria majalis* var. *majalis, Crocus pestalozzae, Dactylorhiza romana* subsp. *romana, Galanthus gracilis, Galanthus nivalis* subsp. *nivalis, Galanthus plicatus* subsp. *byzantinus, Galanthus plicatus* subsp. *plicatus*, *Galanthus* x *valentinei* nothosubsp. *subplicatus, Leucojum aestivum, Narcissus poeticus, Narcissus tazetta* subsp. *tazetta, Orchis lactea, Ornithogalum arabicum, Ornithogalum comosum, Ornithogalum fimbriatum, Ornithogalum montanum, Ornithogalum narbonense, Ornithogalum orthophyllum, Ornithogalum refractum, Ornithogalum sigmoideum, Ornithogalum umbellatum, Ornithogalum wiedemannii, Pancratium maritimum, Platanthera bifolia, Polianthes tuberosa, Spiranthes spiralis*
Purple	*Allium amethystinum, Allium ampeloprasum, Allium atropurpureum, Allium paniculatum* subsp. *fuscum, Allium scorodoprasum* subsp. *rotundum, Allium scorodoprassum* subsp. *scorodoprasum*, *Allium sphaerocephalon* subsp. *sphaerocephalon, Allium stamineum, Allium wiedemannianum, Anacamptis laxiflora* subsp. *laxiflora, Bellevalia clusiana, Bellevalia trifoliata, Colchicum chalcedonicum* subsp. *chalcedonicum, Colchicum turcium, Dracunculus vulgaris, Geranium dissectum, Geranium lanuginosum, Geranium sanguineum, Himantoglossum caprinum*, *Iris sintenisii, Iris suaveolens, Lysimachia atropurpurea, Moraea sisyrinchium, Muscari comosum, Muscari parviflorum, Orchis laxiflora, Orchis morio* subsp. *picta, Orchis purpurea, Romulea linaresii* subsp. *graeca, Scilla autumnalis, Serapias vomeracea* subsp. *laxiflora, Serapias vomeracea* subsp. *orientalis*
Lilac	*Allium guttatum* subsp. *sardoum, Arum elongatum* subsp. *elongatum, Cephalanthera rubra, Colchicum micranthum, Crocus biflorus* subsp. *biflorus, Crocus pulchellus, Dactylorhiza saccifera, Erodium acaule, Erodium botrys, Erodium ciconium, Erodium cicutarium* subsp. *cicutarium, Erodium laciniatum* subsp. *laciniatum, Erodium malacoides, Erodium moschatum, Geranium asphodeloides* subsp. *asphodeloides, Geranium columbinum, Geranium purpureum, Geranium pusillum, Geranium pyrenaicum, Geranium robertianum, Geranium rotundifolium, Geranium tuberosum* subsp. *tuberosum, Limodorum abortivum, Neotinea maculate, Romulea columnae* subsp. *columnae, Romulea ramiflora* subsp. *ramiflora*
Pink	*Allium paniculatum* subsp. *paniculatum, Allium porrum, Allium siculum, Allium roseum, Allium rubellum, Butomus umbellatus, Colchicum lingulatum, Colchicum lingulatum* subsp. *rigescens*, *Cyclamen coum* var. *coum, Cyclamen hederifolium, Dactylorhiza iberica, Epipactis palustris, Erythronium dens-canis, Geranium lucidum, Geranium molle* subsp. *brutium, Geranium molle* subsp. *molle, Gladiolus illyricus, Gladiolus italicus, Gymnadenia conopsea, Helleborus orientalis, Lilium martagon, Ophrys oestrifera* subsp. *heldreichii, Ophrys oestrifera* subsp. *oestrifera, Orchis coriophora, Oxalis articulata*
Greenish white	*Allium commutatum, Asparagus acutifolius, Asparagus aphyllus* subsp. *orientalis*, *Asparagus officinalis, Epipactis microphylla, Fritillaria pontica, Neottia ovate, Ophrys umbilicata* subsp. *umbilicata, Platanthera chlorantha, Polygonatum hirtum, Ruscus aculeatus* var. *aculeatus, Ruscus aculeatus* var. *angustifolius, Ruscus hypoglossum, Ruscus hypophyllum*
Blue	*Anemone blanda, Anemone nemorosa, Delphinium peregrinum, Erodium gruinum, Muscari armeniacum, Muscari neglectum, Ophrys bombyliflora, Ophrys speculum* subsp. *ferdinandii, Scilla bifolia, Scilla bithynica*
Red	*Adonis annua, Adonis flammea, Orchis collina, Orchis morio* subsp. *morio, Orchis papilionacea* var. *papilionacea, Orchis papilionacea* var. *rubra, Orchis tridentata*

Pembemsi Beyaz	*Allium istanbulenese*, *Allium moschatum, Allium rhodopeum* subsp. *turcicum*, *Asphodelus aestivus, Asphodelus ramosus*, *Nectaroscordum siculum* subsp. *bulgaricum, Ophrys apifera*
Cream	*Allium myrianthum* var. *floribus albidis, Allium pallens* subsp. *pallens, Arum italicum, Bellevalia sarmatica, Ornithogalum sphaerocarpum, Thalictrum lucidum*
Blackish purple	*Ophrys fusca, Ophrys iricolor, Ophrys mammosa, Ophrys vernixia* subsp. *regis-ferdinandii, Ophrys vernixia* subsp. *vernixia, Serapias cordigeri*
Multicolored	Anacamptis pyramidalis, Anemone coronaria, Anemone pavonia, Epipactis helleborine, Tulipa orphanidea
Purplish brown	*Arum byzantinum* subsp. *elongatum, Arum maculatum, Ophrys sphegodes* subsp. *catalcana*, *Serapias bergonii*
Orange	*Crocus flavus* subsp. *flavus, Crocus olivieri* subsp. *olivieri, Crocus olivieri* subsp. *istanbulensis, Kniphofia uvaria*

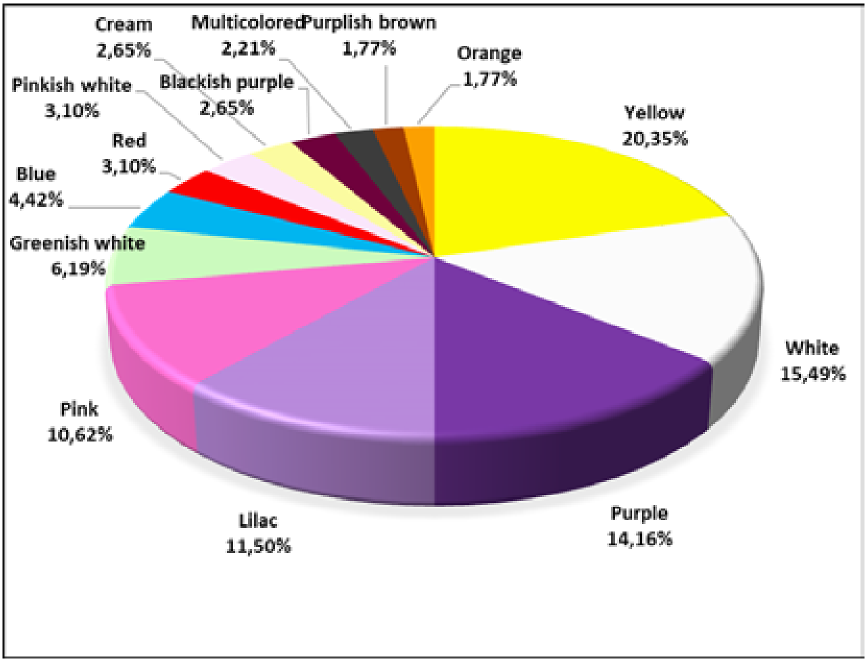


Figure 4. *The distribution of geophyte taxa of Istanbul according to flower colors*

As it is seen on Figure 4, in Istanbul yellow flowering geophytes are the most common (20.35 %). Secondly white flowering with 15.49 % and thirdly purple flowering geophytes with 14.16 %.

Flowering start times and flowering periods of th plants are very important issue in planting designs. These features are much more important for the geophytes while they are mostly used for their attractive flowers. Within the results of the assessments made for the flowering times of Istanbul's geophytes, it has been seen that 30.53% of them are flowering in March. 23.89% of them are flowering in April and 14.16% of them are in May. And also it has been evaluated that in October and December no geophyte taxa is starting to have flower in Istanbul (Table 4).

Table 4. *The distribution of geophyte taxa of Istanbul according to flowering start times*

Season	Months	Plants	%
Spring	March	69	30.53
	April	54	23.89
	May	32	14.16
Summer	June	21	9.29
	July	7	3.10
	August	12	5.31
Autumn	September	5	2.21
	October	-	-
	November	2	0.88
Winter	December	-	-
	January	7	3.10
	February	17	7.52

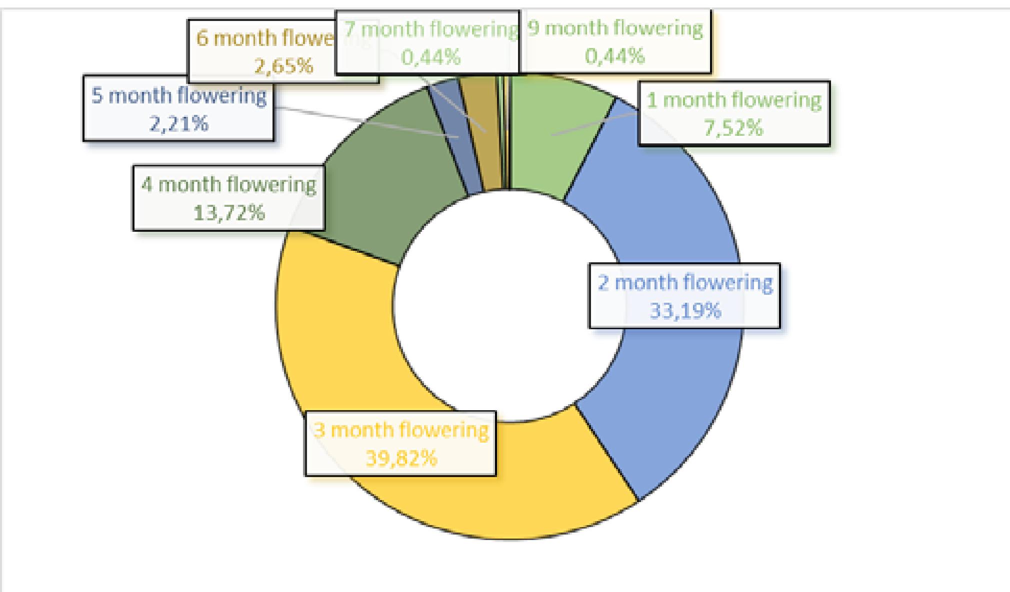
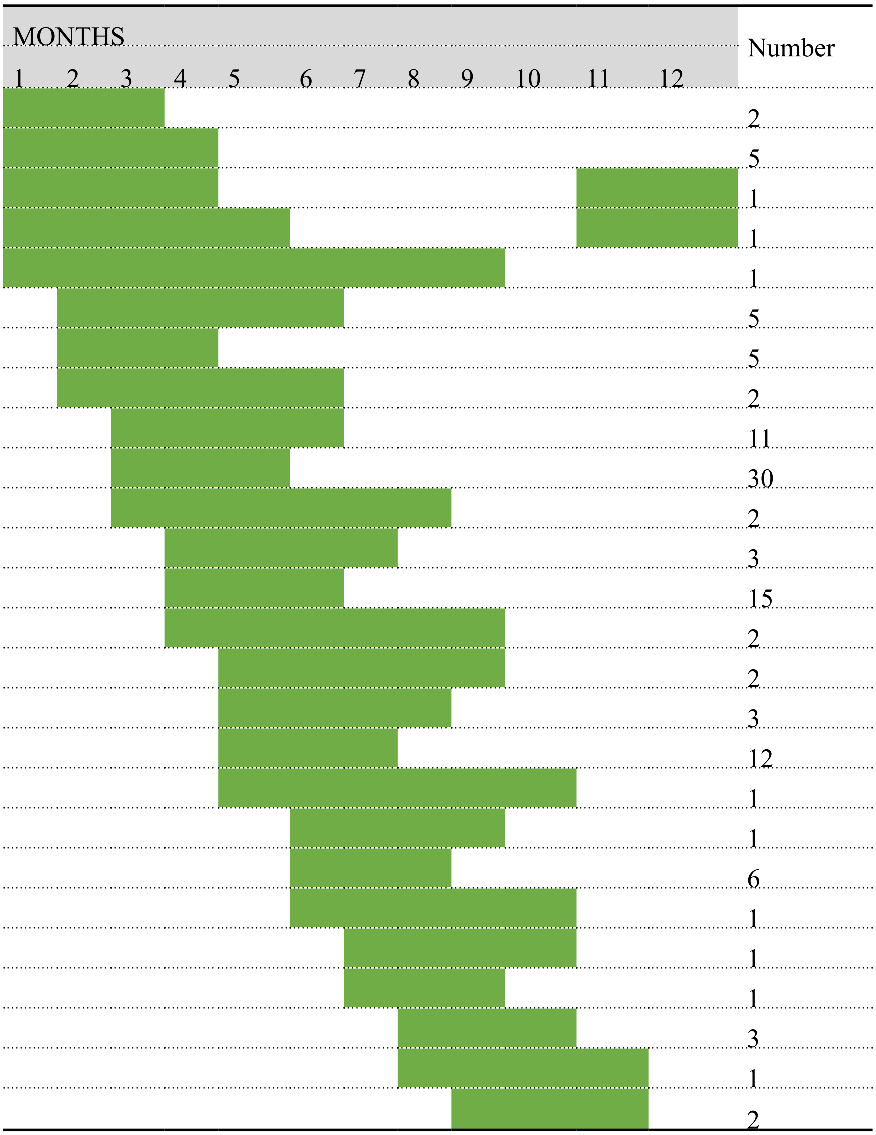


Figure 5. *The distribution of geophyte taxa of Istanbul according to flower periods*

When the flowering period of the taxa has been examined, it is determined that 39.82 % of the detected taxa are 3 months flowering 33.19

% of them are 2 months flowering and 13.72 % of them are 4 months flowering in the flora of Istanbul. Also it has been found that 8, 10, 11 and 12 months flowering geophytes are absent in the area (Figure 5).

Table 5. *Number of 3 months and more flowering geophyte taxa in Istanbul*



The geophyte taxa of Istanbul has been evaluated according to the flowering periods again. This time 3 months and more flowering taxa has been identified. According to this it is seen that 119 (52.65%) of the geophyte taxa of Istanbul are blooming 3 months and more througout the year. In Table 5 the number of taxa and their flowering periods according to the months has been given.

When the geophytes of Istanbul has been classified according to their underground organ structures; it has been seen that mostly tuberous taxa has been found with the rate of 32.89 %, bulbous of 30.67 %, rhizome of 29.78 % and the least is corm of 10.20 % (Figure 6).

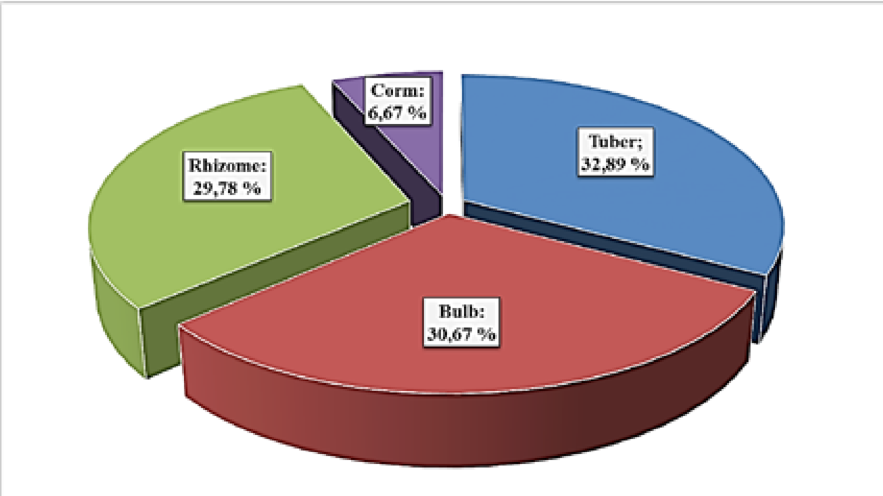


Figure 6. *The distribution of geophyte taxa of Istanbul according to underground organ structures*

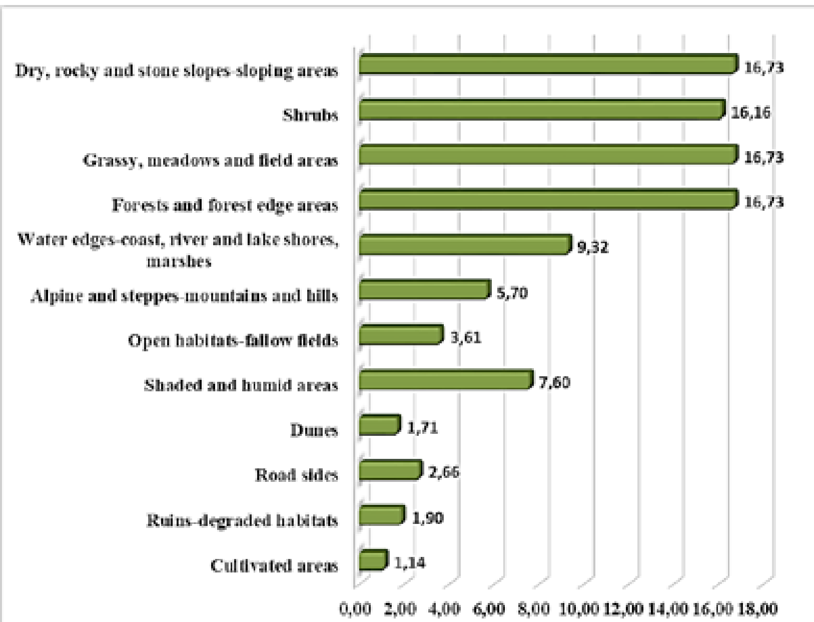


Figure 7. *Classification of geophyte taxa in Istanbul according to habitats*

In Figure 7, the habitats of the natural geophyte taxa of Istanbul has been given. According to this most of them (16,73%) are naturally found in the dry, rocky and stone-sloping areas; grassy, meadow and field areas and forest and forest edge areas. Also they are commonly found in the shrubs (16.16%).

CONCLUSION

Istanbul is one of Turkey's largest city; that has a very rich plant diversity because of it acts as a bridge between the Asian and European continents and is surrounded by seas. It is clearly seen that the city has more floristic richness than many countries in the world with approximately 2500 plant taxa. An important part of this rich plant diversity of the city is also composed of geophytes. It turns out that geophytes, which constitute a big amount of the flora of Istanbul, have an important role in the ecology of the city.

In this study, geophyte species of Istanbul have been investigated and has been intended to demonstrate the possibilities of usage of these taxa in urban landscape designs. As a result of the evaluation of floristic studies carried out in Istanbul, it was determined that 226 geophyte taxa, belonging to 61 geophyte genus and 14 families are naturally takes place in the city. It has been revealed that in terms of number of species, Orchidaceae and Amaryllidaceae families come first, Ranunculaceae comes in second and Asparagaceae comes in third. It was determined that Rosaceae and Butomacea families were represented by only one species. The biggest genus of geophyte taxa in Istanbul is *Allium* with having 28 taxa. Following it, *Ranunculus* genus comes with 25 taxa and thirdly *Geranium* comes with 14 taxa. Also it has been determined that there has been 11 endemic geophyte taxa in Istanbul.

Flower colors, flowering start times and flowering periods of the plants are very important issue in planting designs. These features are much more important for the geophytes while they are mostly used for their attractive flowers. When we evaluate the geophyte taxa of Istanbul in terms of their design features; it is seen that yellow flowering geophytes are the most common (20.35 %). Secondly white flowering with 15.49 % and thirdly purple flowering geophytes are common in Istanbul with 14.16 %. Within the results of the assessments made for the flowering times of Istanbul's geophytes, it has been seen that 30.53% of them are flowering in March, 23.89 % of them are flowering in April and 14.16 % of them are flowering in May. And also it has been evaluated that in October and December no geophyte taxa is starting to have flower in Istanbul. When the flowering period of the taxa has been examined, it is determined that 39.82 % of the detected taxa are 3 months flowering 33.19 % of them are 2 months flowering and 13.72 % of them are 4 months flowering in the flora of Istanbul. Also it has been found that 8, 10, 11 and 12 months flowering geophytes are absent in the area. 3 months and more flowering taxa has been identified. According to this it is seen that 119 (52.65 %) of the geophyte taxa of Istanbul are blooming 3 months and more througout the year. And mostly 30 of these taxa are flowering in the months of March, April and May. When the geophytes of Istanbul has been classified according to their underground organ structures; it has been seen that mostly tuberous taxa has been found with the rate of 32.89 %, bulbous of 30.67 %, rhizome of 29.78 % and the least is corm of 10.20 %. The habitats of the natural geophyte taxa of Istanbul has been given. According to this most of them (16,73 %) are naturally found in the dry, rocky and stone-sloping areas; grassy, meadow and field areas and forest and forest edge areas. Also they are commonly found in the shrubs (16.16 %).

In this study, it is clearly seen Istanbul is how rich in terms of geophytes. The remarkable flower structures of the geophytes allow these plants to be used in urban landscapes. In addition to their magnificent flower structures, their long flowering features makes these plants one of the indispensable plants in the landscape. Today, unfortunately, certain types of geophytes have been cultivated and used in landscape designs. Cultivation and breeding studies related to these plants should be accelerated. In a city like Istanbul, which has a very rich geophyte presence, it will be very beneficial in terms of sustainable designs if geofit taxa are used in the urban landscape by cultivating studies.

REFERENCES

Akdeniz, N.S. (2020). Woody Landscape Plants Used in The Design Of Hospital Gardens and Their Sensory Effects On Users. *Journal of Bartin Faculty of Forestry*. 22(1): 47-62.

Akdeniz, N.S., Zencirkıran, M. (2016). Bursa Geophytes and Their Usage Possibilities in Landscape Design. *Journal of Agricultural Faculty of Uludag University*, 30, 692-702.

Anonymous. (2020). T.C. Tarım ve Orman Bakanlığı web site, https://arastirma.tarimorman.gov.tr/beykozbbgam/Belgeler/Teknik%20Bilgi/Geofitler.pdf

Çığ, A., Başdoğan, G. (2015). In vitro propagation techniques for some geophyte ornamental plants with high economic value. *International Journal of Secondary Metabolite*, 2(1), 27-49.

Dafni, A., Cohen, D., Noy-Mier, I. (1981). Life-cycle variation in geophytes. *Annals of the Missouri Botanical Garden*, 68:652-660. DOI: 10.2307/2398893

Davis, P.H. (1965-1985). *Flora of Turkey and East Aegean Islands*. Vol:1-9 University Press, Edinburg.

Doussi, M.A., Thanos, C.A. (2002). Ecophysiology of seed germination in Mediterranean geophytes. 1. *Muscari* spp. *Seed Science Research*, 12:193-201. https://doi.org/10.1079/SSR2002111

Güner, H. (2006). *Inventory of Growing Geophytes in the Botanical Gardens in Istanbul Turkey*. Master Thesis. Istanbul University, Institute of Science and Technology, Istanbul.

Güner, H., Ekim, T., Koyuncu, M., Erik, S., Yıldız, B., Vural, M. (1991). *Türkiye'nin Ekonomik Önem Taşıyan Geofitleri Üzerine Taksonomik ve Ekolojik Araştırmalar*, Ankara.

Hamrick, J.L., Godt, M.J.M. (1996). Effects of life history traits on genetic diversity in plant species. *Philosophical Transactions of the Royal Society*, B351: 1291 - 1298. http://www.jstor.org/stable/56204

Kamenetsky, R. (2013). Biodiversity of geophytes, phytogeography, morphology and survival strategies. In: Kamenetsky R. and Okubo H. Eds. Ornamental geophytes: from basic science to sustainable production, pp. 57-71. CRC. Press, Boca Raton.

Kamenetsky, R., Hiroshi, O. (2013). *Ornamental Geophytes from Basic Science to Sustainable Production*, CRC Press, U.S., 15-19.

Kandemir, N., Yakupoğlu, H. (2016). Morphological and anatomical properties of endemic Iris nezahatiae distributed in the North-East Anatolia Region (Turkey). *BEU Journal of Science*, 5(1), 104-112.

Kılıçaslan, N., Dönmez, Ş. (2016). Göller bölgesinde doğal olarak yetişen soğanlı bitkilerin peyzaj mimarlığında kullanımı, *Turkish Journal of Forestry*, 17(1): 73-82.

Koniak, G., Noy-Meir, I., Perevolotsky, A. (2009). Estimating multiple benefits from vegetation in Mediter-ranean ecosystems. *Biodiversity and Conservation,* 18:3483-3501. DOI: 10.1007/S10531-009-9656-9

Meerow, A.W. (2013). Taxonomy and phylogeny. In: Kamenestky R, Okubo H, Eds. Ornamental geophytes: from basic science to sustainable production. Boca Raton: CRC Press, 17-55.

Özhatay, N., Byfeld, A. Atay, S. (2003). *Türkiye'nin Önemli Bitki Alanları*, WWF Türkiye (Doğal Hayatı Koruma Vakfı), İstanbul.

Parsons, R.F. (2000). Monocots geophytes: comparison of California with Victoria, Australia. *American Journal of Botany*, 48:39-43. DOI: 10.1971/BT98056.

Procheş, S., Cowling, R.M., du Preez, D.R. (2005). Patterns of geophyte and storage organ size in the win-ter-rainfall region of southern Africa. *Diversity and Distributions*, 11:101-109. DOI: 10.111/j.1366-9516.2005.00132.x

Procheş, S., Cowling, R.M., Goldblatt, P., Manning, J.C., Snijman, D.A. (2006). An overview of the Cape geo-phytes. *Biological Journal of the Linnean Society*, 87:27-43. DOI: 10.1111/j.1095-8312.2006.00557.x

Seyidoğlu, N., Zencirkıran, M., Ayaşlıgil, Y. (2009). Position and application areas of geophytes within landscape design. *African Journal of Agricultural Research* Vol. 4 (12), pp. 1351-1357

Tubives (2020). Turkish Plants Data Service. http://www.tubives.com/

Tyler, C., Borchert, M. (2003). Reproduction and growth of the chaparral geophyte, Zigadenus fremontii (Lili-aceae), in relation to fire. *Plant Ecology*, 165:11-20. DOI: 10.1023/A:1021460025277

Verboom, G.A., Stock, W.D., Linder, H.P. (2002). Determinants of postfire flowering in the geophytic grass Eh-rharta capensis. *Functional Ecology*, 16:705-713. http://www.jstor.org/stable/826600

Veselý, P., Bureš, P., Šmarda, P., Pavlíček, T. (2012). Genome size and DNA base composition of geophytes: the mirror of phenology and ecology? *Annals of Botany,* 109:65-75. DOI: 10.1093/aob/mcr267

Yener, D., Akdeniz, N.S. (2020). Evaluation of the natural geophyte taxa of Sarıyer (Istanbul) and their use in urban landscape. *Eurasian Journal of Forest Science* . 8(1): 93-107

Zencirkıran, M. (2002). *Geophytes*. Uludağ Rotary Derneği Yayınları No:1, ISBN: 975-93004-0-0.

Chapter 9

URBAN GARDENING AS A SMART ENVIRONMENT APPLICATION

Aybüke Özge BOZ[1]

Canan CENGİZ[2]

1 Res. Asst. Aybüke Özge BOZ, Bartın University, Faculty of Engineering, Architecture and Design, Department of Landscape Architecture, Bartın, Turkey

2 Assoc. Prof. Dr. Canan CENGİZ, Bartın University, Faculty of Engineering, Architecture and Design, Department of Landscape Architecture, Bartın, Turkey

1. Emergence of Urban Gardens

The concept of "green shaping" a city or any other urban conglomerate dates back to the late 19th century as written by Howards (1902) on the "garden cities of tomorrow". Even so, it is not possible to trace the chronological evolution of modern urban gardens. The idea regarding the need for greener cities remains the same despite changing approaches and intents. "Food-oriented" gardens emerged due to of specific needs: the most famous of which are the Liberty and Victory Gardens established in the United States and the United Kingdom during World War I and II. In some cases the plots that were originally part of the garden-cities or used as Liberty/Victory gardens were used by the neighbors to produce food. However, urban gardens as we know them date back to the seventies; thanks to a mix of ecological movements, public participation and resistance against pollution and over-urbanization (Cangelosi, 2015).

The interest to green areas that support a healthy lifestyle is increasing due to concepts such as rapid urbanization, climate change and urban quality of life (Schram-Bijkerk et al., 2018) The green applications in urban areas create alternatives for ecologic areas and food production while also providing solutions for the impacts of climate change (Židak and Bedenik, 2019; URL-1). Urban gardens are among the important components of urban green areas (Loram et al, 2008). Urban gardens are green areas with the potential to provide fundamental ecosystem services, support human welfare and improve urban biological diversity (Cengiz and Karaelmas, 2019; Tresch et al., 2019).

Urban gardens can also be associated with the general trend for more green areas in cities, consumption of organic, locally grown products, as well as a closer relationship with one's own living environment (Schram-Bijkerk et al., 2015).

Urban gardens comprise the perfect solution for the necessity of a space intended for cultivation purposes (gardens), and a more complicated social process (urban) which is shaped by way of the dynamics of the people who contribute to this activity in a particular political and social framework. They not only represent a concrete source for individual people and families, but also a concept of organization for new ideas and activities regarding the quality of life, urban sustainability as well as the delicate relationship between men, nature and environment (Rusciano et al., 2018).

Grimm et al. (2000), urban gardens are related with environmental, economic and social subjects (Rusciano et al., 2017). The goals in this area are as follows (Rusciano et al., 2017):

1) Environmental (reducing the impacts of urbanization, rescuing

plant species, rescuing natural cycles),

2) Social (save from the cost of social services, create a healthy living community, strengthen the sense of community, provide unofficial training) and

3) Economic (save from the cost of social services, create jobs, balance the savings and expenses of families).

The impact and importance of urban garden projects have increased in recent years. It is one of the most important components at the center of the "community open space" or "urban greening" movement. The insufficiency of the opportunities provided by the large empty spaces in cities as well as the traditional open spaces such as parks and playgrounds in meeting recreational needs has been effective in the advancement of urban gardens (Francis, 1989).

2. Urban Gardening Features

Urban gardening attempts can be used for implementing the international health and sustainability goals for cities (Schram-Bijkerk et al., 2018). Urban gardening developed significantly during the last decade to aid people in bringing nature back to the cities and to make their lives healthier and more sustainable. Urban gardening approach plays a significant role in transforming urban landscape into a sustainable environment (Židak and Bedenik, 2019).

"Typical features of urban gardening are: growing both ornamental and edible plants in an area of a city with limited space; the recreational nature of gardening, when satisfaction is derived from the gardening process itself or because of the pleasing results; social functions of gardening (bringing together people sharing the same ideas); linking the ideas of gardening with those of ecology and sustainable development" (Eidimtienė et al., 2016).

Urban gardens comprise the first and most concrete connection between urban life and rural culture because they support the transformation of cities and enable urban garden users to sustain relations with rural culture (Rusciano et al., 2017).

People may interact with and learn from each other at urban gardens which can be considered as community spaces. Gardening is a universal activity that is able to unite people of all ages, cultures, backgrounds, and physical capabilities (Lebedeva, 2008).

Urban gardens are multifunctional areas where the interaction between people and nature can be developed. Urban gardens enable urban residents to establish interaction with plant, animal and soil variety they normally cannot encounter during their daily lives in addition to enabling them to understand the natural processes that affect food production. In addition, they also create areas where people can physically interact with elements of nature thus increasing their affinity and awe towards nature. For this reason, urban gardens provide positive interactions with nature while helping urban residents to establish a deeper and sustainable connection with nature through positive interactions. Establishing urban gardens to close the gap between people and nature will in turn increase the biophilia among urban communities (Lin et al., 2018).

3. Urban Gardening Classification

Urban gardening includes activities with low economic impact, reduced stress and social interaction. Activities are conducted at a low scale regardless of the reason and hence it is easier to manage and implement and is generally based on a participatory approach. Urban gardens can be classified as below according to its purpose of existence, the size of the acquired production and destination (Table 1) (Matei, 2019):

- Gardens based on individual production (family gardens and land gardens);

- Gardens based on a collective plan which serve a social purpose (educational gardens, treatment gardens and community gardens)

Urban agriculture transformed into a general term that refers to diverse forms of food production intensified in and around the cities. It represents an activity that is continuously growing with agriculture around the city as well as an emerging research area. Urban gardening is the most important compenent of urban agriculture at the individual scale (Drescher et al., 2006).

Table 1. Urban garden as a typology of urban agriculture adjusted in accordance with Cost Action Urban Agriculture Europe (Matei, 2019)

Urban Garden	
Type	**Features**
Allotment Gardens	Subdivided gardens; rented parcels based on a rent contract; Highly formalized and often managed by an organization/ association.
Family Gardens	Production of non-commercial food products for household use and consumption; institutions or organizations are not involved in this case.
Educational Gardens	Teaching tools regarding the food production, processing, and consumption; raising public awareness and spreading ideas.

Community Gardens	It is based on bottom-up initiatives and collective trends; the food production and supply of social functions to and for the community.
Social Gardens	Approaching social problems; promoting the integration of persons facing social exclusion risks.
Therapeutic Gardens	Located within the institutions for mental and physical health; Contemplation gardens and active gardens focused on production
Illegal Gardens	Food production on raw lands; informal, irregular, unregistered, and not subject to public policies

Definitions have been made for the city and surrounding gardens. Some of these are given below (Rusciano et al., 2018):

- Special urban gardens: Areas that have essentially been designed for fruit and vegetable cultivation for private use
- Prison urban gardens: Alternative spaces that reduce the costs involved in the reintegration of prisoners to the professional world
- Urban gardens and schools: Areas for educational-dissemination activities for school children of all levels, who have the role of sharing their knowledge with elderly people (ethnobotany).
- Urban gardens for the elderly: Areas designed as a solution to the problem of the elderly, places where they can participate in physical activities and productive activities, social relationships, returning to the origins regarding the use of the territory through the use of bio-resources.
- Orthotherapy: Supporting rehabilitative programs for disabled patients through gardening and horticulture activities; the psychophysical conditions of patients can be improved by the presence of vegetal elements through the reduction of psychological stress conditions, increase in self-management and on awakening of emotional abilities.

Moreover, two different categories have been set forth in literature (Rusciano et al., 2018):

➢ Thematic urban garden: a (vegetable) garden based on well-defined stakeholders (e.g.: school garden, jail garden district, apartment block garden);

➢ Social urban garden: with a clear function, but not specific stakeholders as a reference (e.g.: therapeutic garden).

4. Benefits of Urban Gardening

Urban gardens provide important benefits in economy, health, education, social and environmental issues indicated below (Bellows et al., 2008; Draper and Freedman, 2010; Heather, 2012; Cabral et al., 2017);

➢ Economy:

- Employment
- Provision of occupational activities
- Local food production
- Increased property value

Urban gardens enable the actualization of professional activities as well as job opportunities by providing the opportunity for implementation and work. They reduce foreign-source dependency via local food production. Moreover, they also increase the value of their immediate surroundings.

➢ Health:

- Physical health
- Psychological health
- Emotional health

Urban gardening is therapeutic by enabling communication with nature in addition to providing the opportunity for exercise while reducing stress, blood pressure and anger. Thus, it contributes to the psychological, physical and emotional recovery of individuals (Patel, 1992; URL-2).

➢ Education:

- Educational activities

Urban gardens provide opportunity to the students to carry out extracurricular activities in addition to enabling exercise, mental stimulation and social interactions. In this scope, urban gardens act as an application area for the lessons of students while also serving as a source of information contributing to the lessons (Bellows et al., 2008). In the meantime, urban gardens also help adults to learn about food production in an applied manner.

➢ Social and Environment:

- Encouragement for social adaptation
- Improvement of social relations
- Opportunities for recreation

- Neighborhood beautification
- Establishing a sense of environment
- Providing ecosystem services

Urban gardens contribute to the development of social relations. They provide opportunities for recreation by creating safe green areas in addition to beautifying neighborhoods in terms of aesthetics as well as neighbor relations (Patel, 1992). Urban gardens can provide a sense of environment (Cabral et al., 2017). They make significant contributions to environment by providing ecosystem services.

5. Ecosystem Services provided by Urban Gardening

Urban gardens provide ecosystem services as multifunctional nature based solutions (Cabral et al., 2017). Together with nature, urban gardens represent special areas where social interaction can be attained through food as an important biophilic element (Lin et al., 2018). Urban gardens make microclimatic contributions in addition to contributing to the water economy of cities as well as the improvement of the quality of air. In addition, they provide important living spaces for wildlife and biological diversity (Cabral et al., 2017; Schram-Bijkerk et al., 2018). Urban gardens provide opportunities for spare time and recreation. They encourage a sense of place, cultural identity and social harmony in order for communities to adopt to change (Cabral et al., 2017). In addition to contributing to the urban space with aesthetic values, they also contribute to the reduction of high CO_2 levels as well as the provision of green open spaces (Rachmawati and Pertiwi, 2017) (Table 2).

Table 2. Ecosystem services of urban gardens (Barcelona City Council, 2013; Camps-Calvet et al., 2016; Langemayer et al., 2016; Cabral et al., 2017; Dennis and James, 2017; Lin et al., 2018; Schram-Bijkerk et al., 2018)

Provisioning Services	**Regulating Services**	**Habitat Services**	**Cultural Services**
Food supply	Erosion control	Refuge for plants and animals	Recreation and relaxation
Medicinal resources and aromatic plants	Regulation of air quality	Genetic diversity	Sense of place and social cohesion
	Local and global climate regulation		Biophilia
	Pest control		Nature and Spiritual experiences
	Pollination and seed dispersal		Entertainment and Leisure

	Sustainment of soil yield	Learning and Education
	Water flow control	Physical activity
	Noise reduction	Aesthetic information
		Maintenance of cultural heritage

Positive values as well as attitudes towards environment and community can be expressed through urban gardening. It is able to generate specificity with regard to place attachment– specific character of places created by urban gardening contributes to the calibration of unique place identity while developing emotional and social ties associated with certain places. There are countless degraded or used areas of brownfields in towns and cities which await more sustainable and sensitive redevelopment. Temporary use of brownfield areas is an opportunity for a specific form of public space for urban gardening and the potential for public places open to neighborhood. Neighborhood spaces and courtyards in provide opportunities for social interactions that enable residents to establish relationships in community, support urban living while also developing attachment to community and place as well as improving the quality of urban environment (Jaššo and Petríková, 2019). Urban gardening enables the solution of environmental problems together with social problems by way of bringing the people together (Eidimtienė et al., 2016).

6. Smart Environment and Urban Gardening

Smart environment encompasses renewable energy, sustainable resource management, environment friendly green buildings, green urban planning, solid waste management, smart water management and drainage systems (URL-3).

Smart environment emphasizes the need for sustainable resource management and urban planning. The natural beauty of the city can be increased by reducing pollution and emission through efforts for environmental protection (Colldahl et al., 2013) (Table 3).

Hamza (2016) defines smart environment by way of natural conditions, pollution, resource management, and also by efforts towards environmental protection.

Smart cities make it necessary to take the environment into consideration in order to limit the understanding of growth and urban sprawl. In this scope, sustainable urban planning and natural resource management are emphasized with regard to smart environment, quality of environment and life from among smart city components (Cengiz and Boz, 2020). Smart environment attracts attention with important applications within the scope of green infrastructure and sustainable urban planning with regard to the quality of environment and life.

Table 3. Smart Environment indicators of European ranking of medium-sized cities (Giffinger et al., 2007)

	Factors	Indicators
Smart Environment	Attractiveness of natural circumstances	Sunny hours Amount of green space
	Pollution	Summer smoke Particulate matter Fatal chronic lower respiratory diseases per inhabitant
	Environmental protection	Individual efforts for the protection of nature Opinions on the protection of nature
	Sustainable resource management	Efficient use of water Efficient use of electricity

Urban gardening is frequently regarded among strategies that can enhance urban sustainability while promoting sustainable urban development in the smart cities and smart environment (Jaššo and Petríková, 2019).

Urban gardening, is a green infrastructure element that is part of smart environmental strategies within the scope of the management of sustainable natural resources (Camps-Calvet et al., 2016). It provides to increasing green infrastructure in the city thereby contributing to the increase of the quality of urban environment, while also considered as a way of establishing communication communicating between the city and its suburbs (Jaššo and Petríková, 2019). Cities have adopted as primary goals not only ecological and social success but also sustainable development leading to economic growth.

As a smart environment application, urban gardening includes ecosystem services that emphasize local and global quality of environment and quality of life, support social development, take economy into consideration and make contributions to mitigation and adaptation to the effects of climate change.

7. Urban Gardening and Climate Change Mitigation and Adaptation

Climate change can be considered as a change in the statistical distribution of weather patterns that continues for extended periods of time

(Alloisio and Borghesi, 2020). It can be due to natural internal or external force, or to persistent anthropogenic pressure in the atmosphere or in land use (VijayaVenkataRaman et al., 2012). Temperature changes and the increase of sea level impose stress on the ecosystems in many regions thus making adverse impacts on human welfare (Alloisio and Borghesi, 2020). Changing temperatures and other excessive weather events (e.g., flooding, droughts, etc) have negative effects on food and soil yield (McMichael et al., 2008; Alloisio and Borghesi, 2020).

Climate change effects mitigation means avoiding and reducing emissions of heat-trapping greenhouse gases into the atmosphere to prevent the planet from more extreme temperatures. Climate change adaptation is used to indicate altering our behavior, systems, and ways of life to protect residents, economies, and the environment from the impacts of climate change (URL-4).

"Adaptation – adapting to life in a changing climate – involves adjusting to actual or expected future climate. The objective is to reduce our vulnerability to the adverse effects of climate change (such as sea-level encroachment, more intense extreme weather events or food insecurity). It also includes making the most of any potential beneficial opportunities associated with climate change (for example, longer growing seasons or increased yields in some regions)" (URL-5).

"Mitigation is a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Mitigation, together with adaptation to climate change, contributes to the objective expressed in Article 2 of the United Nations Framework Convention on Climate Change" (IPCC, 2014):

"The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

According to Mougeot (2000) and Sonou (2001), the success of urban and peri-urban agriculture especially with regard to the development of food safety and ecosystem services within the context of climate change mitigation and adaptation depends mostly on how it is perceived by city authorities as well as the level of integration of ecosystem management, water and sewage management and landscape management policies as well as other urban policies (Lwasa et al., 2014). In this scope, urban gardens contribute to climate change mitigation and adaptation through ecosystem services (Cabral et al., 2017) (Table 4).

Table 4. Urban gardening benefits within a climate change mitigation and adaptation (Demuzere et al., 2014)

Physical Benefits	**Psychological and Social Benefits**
Reduced CO_2	Health and restorative benefits
Thermal comfort	Social and invidiual coping capacities
Reduced energy use	Education
Reduced problems with flooding, peek flows, drought	
Improved water quality	
Improved air quality	

8. Conclusion

Urban gardens contribute to the quality of life with its functions and characteristics in recreation, social health and welfare in addition to social adaptation, ecosystem services, education and therapy. Urban gardens provide direct and indirect benefits to people by way of ecosystem services. Urban gardens emphasize the role of collectivity. They provide opportunities for the integration and recreation of social public spaces as inclusive tools for social development. Urban gardens should be integrated in the urban green space system in order to render them more effective with regard to both social and ecological functions as well as climate change effects mitigation and adaptation. Urban gardens should be taken into consideration in urban green infrastructure plans as an important application for the formation of smart environments aiming for the sustainable and effective use of natural resources.

REFERENCES

Alloisio, I., & Borghesi, S. (2019). Climate change mitigation. In W. Leal Filho, U. Azeiteiro, A. Azul, L. Brandli, P. Özuyar & T. Wall (Eds.), *Climate Action*. Cham: Springer. doi: 10.1007/978-3-319-71063-1_18-1

Barcelona City Council, (2013). Barcelona green infrastructure and biodiversity plan. Barcelona. Retrieved from: https://climate-adapt.eea.europa.eu/metadata/case-studies/barcelona-trees-tempering-the-mediterranean-city-climate/11302639.pdf

Bekci, B., Cengiz, C., & Cengiz, B. (2012). Evaluating urban biodiversity in terms of user preferences: Urban residential landscapes in Bartın (Turkey). *Fresenius Environmental Bulletin*, 21 (6b), 1626-1634.

Bellows, A. C., Brown, K., & Smit, J. (2008). Health benefits of urban agriculture. Venice: Community Food Security Coalition.

Cabral, I., Costa, S., Weiland, U., & Bonn, A. (2017). Urban gardens as multifunctional nature-based solutions for societal goals in a changing climate. In N. Kabisch, H., Korn, J. Stadler & A. Bonn (Eds.)*, Nature-Based Solutions to Climate Change Adaptation in Urban Areas* (pp. 237-253). Cham: Springer

Camps-Calvet, M., Langemeyer, J., Calvet-Mir, L., & Gómez-Baggethun, E. (2016). Ecosystem services provided by urban gardens in Barcelona, Spain: Insights for policy and planning. *Environmental Science & Policy*, 62, 14-23. doi: 10.1016/j.envsci.2016.01.007

Cangelosi, E. (2015). Reshaping spaces and relations: urban gardening in a time of crisis. *Partecipazione e conflitto*, 8(2), 392-416. doi: 10.1285/i20356609v8i2p392

Cengiz, B., & Karaelmas, D. (2019). Urban biodiversity analysis. In L. G. Kaya (Ed.), *New Horizons in Architecture, Planning and Design* (pp. 55-78). Ankara, Turkey: Gece Publishing.

Cengiz, C., & Boz, A. Ö. (2020). Green city as smart environment strategy. In M. Özyavuz (Ed.), *Theory and practice in sustainable planning and design: Planning, Design, Applications.* Peter Lang.

Colldahl, C., Frey, S., & Kelemen, J. E. (2013). *Smart cities: Strategic sustainable development for an urban world* (Master's Thesis). Blekinge Institute of Technology, Karlskrona, Sweden.

Demuzere, M., Orru, K., Heidrich, O., Olazabal, E., Geneletti, D., Orru, H., ... & Faehnle, M. (2014). Mitigating and adapting to climate change: Multi-functional and multi-scale assessment of green urban infrastructure. *Journal of environmental management*, 146, 107-115. doi: 10.1016/j.jenvman.2014.07.025

Dennis, M., & James, P. (2017). Ecosystem services of collectively managed urban gardens: Exploring factors affecting synergies and trade-offs at the site level. *Ecosystem services*, 26, 17-26. doi: 10.1016/j.ecoser.2017.05.009

Draper, C., & Freedman, D. (2010). Review and analysis of the benefits, purposes, and motivations associated with community gardening in the United States. *Journal of Community Practice*, 18(4), 458-492. doi: 10.1080/10705422.2010.519682

Drescher, A. W., Holmer, R. J., & Iaquinta, D. L. (2006). Urban homegardens and allotment gardens for sustainable livelihoods: Management strategies and institutional environments. In P. K. Nair & B. Kumar (Eds.), *Tropical Homegardens: A Time tested Example of Sustainability* (pp.317-338). Dordrecht, Netherlands: Springer.

Eidimtiene, V. V., Auzeliene, I., & Daubaras, L. (2016). Urban gardening: elements, social, cultural and recreational aspects. *MAZOWSZE Studia Regionalne*, 18, 35-47. doi: 10.21858/msr.18.03

Francis, M. (1989). The Urban Garden as Public Space. *Places*, 6(1), 53-59. Retrieved from: https://escholarship.org/uc/item/4ff0f8nm

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., & Meijers, E. (2007). *Smart Cities: Ranking of European medium-sized cities*. Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology, p.1-26. Retrieved from: http://www.smart-cities.eu/download/smart_cities_final_report.pdf

Grimm, N. B., Grove, M., Pickett, S. T. A., & Redman, C. L. (2000). Integrated approaches to long-term studies of urban ecological systems. *BioScience*, 50(7), 571–584. doi: 10.1641/0006-3568(2000)050[0571:IATLTO]2.0.CO;2

Hamza, K. (2016) Smart City Implementation Framework for Developing Countries: The Case of Egypt. In J. Gil-Garcia, T. Pardo, T. Nam (Eds.), *Smarter as the New Urban Agenda* (pp. 171-187). Cham: Springer. doi: 10.1007/978-3-319-17620-8_9

Heather, K. L. (2012). *The environmental benefits of urban agriculture on unused, ımpermeable and semi-permeable spaces in major cities with a focus on Philadelphia, PA* (Master's Thesis). University of Pennsylvania, Philadelphia, USA. Retrieved from: http://repository.upenn.edu/cgi/viewcontent.cgi?article=1044&context=mes_capstones

IPCC (2014). Climate change 2014: Mitigation of climate change. In O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S .Schlömer, C. von Stechow, T. Zwickel & J. C. Minx (Eds.), *Contribution of working group III to the fifth assessment report of the intergovernmental panel on climate change*. New York, USA: Cambridge University Press. Retrieved from: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf

Jaššo M., & Petríková D. (2019) Towards creating place attachment and social communities in the smart cities. D. Cagáňová, M. Balog, L. Knapčíková, J. Soviar & S. Mezarcıöz (Eds.), *Smart Technology Trends in Industrial and Business Management.* Cham: Springer. doi: 10.1007/978-3-319-76998-1_29

Langemeyer, J., Latkowska, M.J., & Gomez-Baggethun. E. N. (2016). Ecosystem services from urban gardens. S. Bell, R. Fox-Kämper, N. Keshavarz, M. Benson, S. Caputo, S. Noori & A. Voigt (Eds.), *Urban Allotment Gardens in Europe* (pp. 115-141). London: Routledge.

Lebedeva, J. (2008). Climate change adaptation and mitigation through urban agriculture: A Montréal case study. McGill University. Retrieved from: https://www.cip-icu.ca/Files/Resources/Report3-Lebedeva

Lin, B. B., Egerer, M. H., & Ossola, A. (2018). Urban gardens as a space to engender biophilia: evidence and ways forward. *Frontiers in Built Environment*, 4, 1-10. doi: 10.3389/fbuil.2018.00079

Loram, A., Warren, P. H., & Gaston, K. J. (2008). Urban domestic gardens (XIV): the characteristics of gardens in five cities. *Environmental Management*, 42, 361-376. doi: 10.1007/s00267-008-9097-3

Lwasa, S., Mugagga, F., Wahab, B., Simon, D., Connors, J., & Griffith, C. (2014). Urban and peri-urban agriculture and forestry: Transcending poverty alleviation to climate change mitigation and adaptation. *Urban Climate*, *7*, 92-106. doi: 10.1016/j.uclim.2013.10.007

Matei, D. (2019). The urban gardens between green space and food utility. *Geographia Napocensis Anul XIII*, 2, 23-31. Retrieved from: http://geographianapocensis.acad-cluj.ro/Revista/volume/nr_2_2019/pdf/Daniela_Matei.pdf

McMichael, A. J., Friel, S., Nyong, A., & Corvalan, C. (2008). Global environmental change and health: impacts, inequalities, and the health sector. *BMJ*, 336, 191-194. doi: 10.1136/bmj.39392.473727.ad

Mougeot, L. J. A. (2000). Urban agriculture: definition, presence, potentials and risks. In M. Dubbeling, S. Geundel, U. Sabel Koschella & H. de Zeew (Eds.), *Growing Cities, Growing Food.*

Patel, I. C. (1992). Urban gardening. *Rutgers NJAES Cooperative Extension*. Retrieved from: https://njaes.rutgers.edu/pubs/publication.php?pid=FS624

Rachmawati, T., & Pertiwi, P. D. (2017). Smart environment program, smart way to smart city. *Policy & Governance Review*, 1(1), 26-36. doi: 10.30589/pgr.v1i1.24

Rusciano, V., Civero, G., & Scarpato, D. (2017). Urban gardening as a new frontier of wellness: Case studies from the city of Naples. *The International Journal of Sustainability in Economic, Social, and Cultural Context*, 13(2), 39-49. doi: 10.18848/2325-1115/CGP/v13i02/39-49

Rusciano, V., Civero, G., & Scarpato, D. (2018). Urban gardens in the city of naples: an empirical analysis. *Calitatea*, 19(1), 436-442.

Schram-Bijkerk, D., Dirven-van Breemen, L., & Otte, P. (2015). Healthy urban gardening. Bilthoven: National Institute for Public Health and the Environment.

Schram-Bijkerk, D., Otte, P., Dirven, L., & Breure, A. M. (2018). Indicators to support healthy urban gardening in urban management. *Science of the total environment*, 621, 863-871. doi: 10.1016/j.scitotenv.2017.11.160

Sonou, M. (2001). Peri-urban irrigated agriculture and health risks in Ghana. *Urban Agriculture Magazine*, 3, 33–34.

Tresch, S., Frey, D., Le Bayon, R. C., Mäder, P., Stehle, B., Fliessbach, A., & Moretti, M. (2019). Direct and indirect effects of urban gardening on aboveground and belowground diversity influencing soil multifunctionality. *Scientific reports*, 9, 1-13. doi: 10.1038/s41598-019-46024-y

URL-1 https://www.thenatureofcities.com/2016/06/30/urban-agriculture-has-many-benefits-is-one-of-them-a-contribution-to-urban-sustainability/ Accessed Date: 26.11.2020

URL-2 https://www.conserve-energy-future.com/urban-gardening-importance-ideas.php Accessed Date: 26.11.2020

URL-3 https://www.akillisehirler.gov.tr/akilli-cevre/ Accessed Date: 28.11.2020

URL-4 https://www.worldwildlife.org/stories/what-s-the-difference-between-climate-change-mitigation-and-adaptation Accessed Date: 28.11.2020

URL-5 https://climate.nasa.gov/solutions/adaptation-mitigation/ Accessed Date: 28.11.2020

VijayaVenkataRaman, S., Iniyan, S., & Goic, R. (2012). A review of climate change, mitigation and adaptation. *Renewable and Sustainable Energy Reviews*, 16(1), 878-897.

Židak, N., & Bedenik, N. O. (2019). Urban gardening-An Integrative approach. *The holistic approach to environment*, 9(2), 27-34. doi: 10.33765/THATE.9.2.2

Chapter 10

THE ROLE OF URBAN PUBLIC GREEN SPACES FOR HEALTHY AND RESILIENT CITIES DURING THE COVID-19 PANDEMIC

Canan CENGİZ[1]
Aybüke Özge BOZ[2]

1 Assoc. Prof. Dr. Canan CENGİZ, Bartın University, Faculty of Engineering, Architecture and Design, Department of Landscape Architecture, Bartın, Turkey
2 Res. Asst. Aybüke Özge BOZ, Bartın University, Faculty of Engineering, Architecture and Design, Department of Landscape Architecture, Bartın, Turkey

1. Introduction

The concept of resilience is valid for different sectors of our community and its effects are observed first and foremost on the environment and public health. The urban resilience concept has various assumptions. However, in the general sense, this term encompasses the meaning of resilience, that is the ability of the urban organism to absorb external stresses and to respond by reloading its functions in the shortest possible amount of time. In the meantime, it also corresponds to being ready for the future as well as to make the necessary changes for accommodating the resources and conditions to face new challenges (Moraci et al., 2020).

COVID-19 has led to unprecedented changes in every sector of urban life thus leading to critical transformations with regard to the modern understandings and approaches related with the planning of resilient urban formations. It is important to revise the design principles and planning frameworks regarding limited or transformed use of space and to take into consideration the socio-economic and psychological states of the public for a more comprehensive and flexible planning (Swapan et al., 2020).

Every regular physical activity is required for both physical and mental health. It may be especially beneficial to protect the body and to reduce the damages caused by COVID-19. In this scope, exposure to nature or green spaces has physical and mental health benefits. Both short and long term planning and design suggestions are of current concerns for encouraging the access of people to urban public green spaces during the COVID-19 pandemic with special attention to social distancing (Slater et al., 2020). Deloya (1993), urban green spaces provide a foundation not only for a healthy population but also for a resilient urban development (Cengiz et al., 2014).

According to Connolly et al. (2020); since climate change and the interventions of people to natural areas of wildlife may increase the frequency of pandemics in the future, there is a need to acquire more information on the models and dynamics leading to pandemics as well as the required preparation, intervention and adaptation processes for cities (Sharifi and Khavarian-Garmsir, 2020). In this context, this last pandemic provides an important opportunity to understand how cities can be affected from pandemics, how to minimize the impacts as well as the actions necessary for increasing the urban resilience against pandemics (Sharifi and Khavarian-Garmsir, 2020).

Planning for health and welfare is the primary objective of all planning activities at the local, urban and regional levels. It overlaps with other fundamental themes such as environmental sustainability, social justice and economic development (Barton and Grant, 2013).

2. Pandemics in History and Their Impacts on Urban Planning

The history of urban development dates back to the Neolithic period. Adopting agricultural activities and the emergence of settled life have led to increasing populations and the establishment of settlement areas with greater and greater population intensity. Contagions and pandemics can be rooted to periods when populations have increased (Jakob, 2008).

Historically, cities have systematically changed as a response to threats against health and other forms of security (Lai et al., 2020a). Pandemics have made significant impacts on cities and communities throughout history (Yurdakul, 2015). Pandemics, famine and long wars have devastated European cities especially during the medieval ages. During this period, people living in cities of Europe have had to struggle against pandemics caused by contagious diseases. It is observed that major pandemics have emerged because people have been affected from diseases passed on to them from animals, difficulties in access to clean water during the transition to settled life, increase of communication between people living in different areas and the fact that people have started living together with the establishment of cities (Özden and Özmat, 2014).

Cities play a central role in the preparation against pandemics as well as in relieving their impacts and adapting to them. Many norms and rules to manage pandemics in cities have first been discussed during the Global Sanitary Conference in 1851. Today, the preparation of cities varies globally. Levels of development and socio-economic indicators of their population play an important role. Cities with intensive urban poverty and deep inequalities are potentially more defenseless compared with those that have better resources that are less crowded and more inclusive (Muggah and Katz, 2020).

Public health and urban planning have common goals. Common references through physiological metaphors – the "lungs" of the city – made to parks and open spaces clearly indicate the connection between public health and the city. The physical order of the city is the focus point of urban planning as it can improve health and prevent the emergence of diseases during the initial stages. In addition, urban and regional planning along with design theories, concepts as well as related regulations and implementations emerge as a response to public health crises such as contagions, pollution through rapid industrialization, congestion due to urbanization and the dwindling green spaces in cities (Banai, 2020).

The academic disciplines and professions that have many different impacts on individuals, communities and societies may support the pandemic processes through various efforts. Developing new understandings now and in the future for the impacts of the pandemic on cities and urban environments; carrying out research studies for understanding the socio-spatial effects of the COVID-19 measures and directives developed by states and authorities to fight against the spreading of the disease; identification of new concepts related with life styles emerging from new spatial environments that integrate models of working and living (Salama, 2020).

The pandemic may force planners and designers to develop a new vocabulary or typology for identifying spaces with regard to social intensity, distances, crowds or public health risks (Honey-Rosés et al., 2020).

Increasing cases of tuberculosis, typhoid, polio and Spanish flu during the 20th century have led to transformation in slums, housing reform, waste management and the development of zones in cities (Lubell, 2020) (Table 1).

Table 1. Timeline of iconic urban planning reforms (Jainer and Yadav, 2020)

Timeline	Public health crisis and related urban reforms
14th century	**The bubonic plague** Led to radical improvements during the Renaissance that forced cities to expand their borders, create larger open spaces over suffocated public spaces and work with specialized professionals like architects and surveyors.
17th Century (1720)	**The Great Plague of Marseilles** A good example on the implementation of urban planning practices in medieval and industrial cities in order to support disease control as well as the means with which waste management helped reubild cities post pandemic.
18th century	**Haussman model of zoning in urban planning** Focused on functionality and a hierarchical order of land use separating residential areas from other forms of land use, especially industrial land use.
1860s	**Cholera and malaria outbreaks in New York city** These outbreaks resulted in the establishment of the Metropolitan Board of Health. It consists of building and zoning codes to control overcrowding, mandated better sanitary conditions and propelled infrastructure investments that have influenced city services
18th and 19th centuries	**Yellow fever and cholera outbreaks** The global need for modern sewerage and sanitation systems such as citywide sewer systems were emphasized during these outbreaks.

19th and 20th centuries	Several 19th and 20th century reports emphasized the importance of the relationship between public health and urban planning. As an example, the World Health Organization published a report in 1999 entitled "Healthy cities and the city planning process" focusing on ensuring healthy urban planning of the urban poor population of cities in the world.
20th century	**Tuberculosis, typhoid, Spanish flu and polio** Originated urban planning reforms like waste management, slum clearance, single-use zoning etc.

Pandemics may affect the urban built environment in two ways: first is the built environment itself including use of urban land, buildings and its surroundings, transportation modes and systems, use of public places etc. whereas the second is the social context including community or neighborhood level participation, social and public policies etc. (Ahsan, 2020).

3. Urban Public Green Spaces and COVID-19

City dwellers can be adversely affected in different ways from the urban green spaces. Such areas improve the environmental conditions in a city by eliminating pollution, reducing noise and regulating temperature. Moreover, they may also be used as active recreational areas and are beneficial for human health (Cengiz et al., 2014; Cengiz et al., 2018). According to James et al. (2009); green spaces are considered as indispensable for urban settlements for the benefit of both the public and the wildlife (Cengiz et al., 2014) (Table 2).

Table 2. The benefits of urban green spaces
(derived from Givoni, 1991; Cengiz et al., 2012)

Benefits	Contributions
Economic	• Increasing the value of the area • Creating attraction areas for inhabitants and tourist alike • Increasing employment and investment • Image boosting
Social	• Providing opportunities for reaction • Providing opportunities to social sustainability • Creating socialization opportunities for different groups of society in terms of socio-cultural characteristics, income, age and so forth • Contributing to the sense of place • Providing areas to organize events and activities • Increasing the aesthetic quality of the city

Environmental	• Serving as wildlife habitat • Contributing to urban temperature stabilization • Providing places with shade in hot areas • Absorbing pollutants • Flood control • Linking the natural and urban environment • Reduces noise • Provides urban water balance
Urban development	• Controlling urban expansion • Providing land for future development • Providing separation between land uses • Increasing pedestrian access to different areas • Contributing to urban transportation, in terms of road safety by separations and as a reference for infrastructure
Public Healthy	• Providing physical health • Providing psychological health • Providing ecotherapy • Ensures integration with nature (biophilia) • Strengthens the immune system

Scientific studies put forth the physical and mental health benefits of recreational access to nature in an urban environment. Increasing our access to "urban green spaces" and carrying out activities at these spaces lead to significant improvements in physical and mental health in addition to providing recreational benefits. Moreover, it is also effective in controlling COVID-19 and ensuring the sustainability of the quality of life (Rodgers, 2020; Sallis and Pratt, 2020). Urban green spaces provide a series of environmental and health benefits that may prove to be even more critical in times of crisis such as the current COVID-19 pandemic (Lopez et al., 2020).

In addition to improving urban planning in the future, cities should also strive to create green spaces in the current communities at locations where lack of green space is identified as a problem. This will in turn improve the general health and life standards of the community. Urban way of life is defined by grey cities full of high rise buildings and giant structures; however, it cannot be denied that people need green spaces in order to work properly and sustain their mental and physical health. It is of vital importance to give priority to green spaces in urban plans and designs in a post-pandemic world (Ahmadpoor and Shahab, 2020).

It is an important strategy to make the cities greener in the healthy city approach. The pandemic may change the type and distribution of green spaces as well as our expectations on what to expect from green spaces. We predict that there will be greater demand for small green spaces or neighborhood parks as spaces of shelter in noisy and crowded cities. These spaces of shelter can be preferred even if they are small parks or a side-street (Honey-Rosés et al., 2020).

Our changing preferences and expectations regarding green spaces may lead to new designs, uses and implementations in green space planning. As an example, it may be expected from green space designers to spare more space for personalized recreation instead of team sports. Running tracks and roads can be expanded. New expectations related with social distancing may require the reassessment of places in green spaces where they can exercise or sunbath (Honey-Rosés et al., 2020).

People's access to services and facilities outside their local areas was limited as part of the lockdown measures thus reducing the intensity of the regular physical activity of individuals. Thus, neighborhoods green spaces took on a greater importance with regard to hosting the outdoor activities of individuals. Such arduous and ambivalent times as these put forth the importance of urban planning and design as well as the necessity for the inclusion of green spaces in neighborhood design. Proximity and quality considerations of green spaces are of particular importance as they can have significant impacts on the physical and mental health of individuals and communities (Ahmadpoor and Shahab, 2020).

Even though several major pandemics took place in the world in recent years (e.g. SARS, MERS), the COVID-19 pandemic has already made a global impact that is unprecedented with regard to its scope and scale. While governments in all four corners of the world have responded to this public health threat by implementing certain social distancing protocols, lockdowns and home quarantine methods, it is assumed that such measures will lead to changes in the relationship between people and public spaces with regard to use and perception (Ugolini et al., 2020).

Visiting parks and gardens may reduce the adverse impacts on physical and mental health of the social distancing practices implemented to reduce the spreading of COVID-19 (Shoari et al., 2020). Preferring activities that increase the opportunities to spend time outdoors gain significant importance when it is considered that the pandemic may result in long term changes in the way people interact in public spaces (Freeman and Eykelbosh, 2020).

Building a nationwide stronger infrastructure comprised of neighborhood parks and green spaces will help in limiting the impacts of future public health disasters. National and local policy makers, urban planners and governments should consider before and during a pandemic what is suitable and important for public health and how the suggestions can be best implemented while preserving social distancing in urban public green spaces. Access to parks and gardens within the scope of urban public green spaces are of vital importance for the health and welfare of individuals and also play an important role in the development of healthier populations (Slater et al., 2020).

It is known that individuals with various chronic diseases such as asthma, hypertension, diabetes are at greatest risk against COVID-19. Air pollution may have an adverse impact on the aforementioned diseases. Green spaces may reduce this threat by decreasing air pollution (UCTEA Chamber of Landscape Architects, 2020).

The management of urban public green spaces that will be implemented to limit the spreading of the COVID-19 virus should be directed based on the role of parks, gardens and other open-green spaces in encouraging psychological and physical health (Freeman and Eykelbosh, 2020).

4. Examples of Implementations for Reducing Risks at Urban Public Green Spaces within the scope of the COVID-19 Pandemic

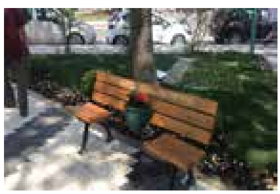
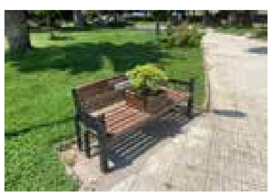
Measures have been taken at various urban public green spaces during the COVID-19 pandemic for reducing risks. Regulations put into effect for identifying the usage areas in parks and gardens within the scope of these measures have been examined along with examples of urban furniture applications.

Various application have been taken at the parks and gardens as part of COVID-19 regarding social distancing rings/circles. Istanbul Metropolitan Municipality Department of Parks Gardens and Green Spaces drew circles with diameters of 2,4 meters at intervals of at least 1,8 meters Park on the green spaces of the Anatolian and European sides (URL-1). Whereas Izmir Metropolitan Municipality Department of Parks Gardens and Green Spaces drew circles with diameters of 4 meters at intervals of 2,5 meters along Kordon which is a large green space (URL-2) (Figure 1).

	
Istanbul Metropolitan Municipality (URL-1)	*Izmir Metropolitan Municipality (URL-3)*

Figure 1. Social distancing rings/circles at the parks and gardens

In this scope, Figure 2 presents bench examples for social distancing implemented by Mersin Municipality, Tekirdağ Süleymanpaşa Municipality, Ankara Mamak Municipality, Bursa Keles Municipality, Hatay Antakya Municipality, Istanbul Bağcılar Municipality, Kahramanmaraş Metropolitan Municipality, Eskişehir Odunpazarı Municipality and Istanbul Beykoz Municipality.

		
Mersin Municipality (URL-4)	*Tekirdağ Süleymanpaşa Municipality (URL-5)*	*Ankara Mamak Municipality (URL-6)*
		
Bursa Keles Municipality (URL-7)	*Hatay Antakya Municipality (URL-8)*	*Istanbul Bağcılar Municipality (URL-9)*

		
Kahramanmaraş Metropolitan Municipality (URL-10)	*Eskişehir Odunpazarı Municipality (URL-11)*	*Istanbul Beykoz Municipality (URL-12)*

Figure 2. Bench examples for preserving social distancing

5. Proposal on the future of Urban Public Green Space Planning in the context of COVID-19 Pandemics

The presence of urban public green spaces in urban planning, design and management, their use and distribution hold significant importance for developing healthy and resilient cities against contagious diseases.

The COVID-19 pandemic has shown the need for new and integrated approaches in urban planning. Urban density, public health, urban pandemic resilience, technology use, transportation and urban public green space systems and locations have to be taken into consideration with new approaches and standards within the scope of the urban planning understanding of the future.

An urban approach has to be adopted after COVID-19 in which less dense and horizontally expanding decentralized cities are formed with special focus on green spaces, less vehicle use, more opportunities for walking and biking including urban farms (Megahed and Ghoneim, 2020).

Plans should be revised for the projected and already existing outdoor public meeting spaces in order to avoid overcrowding. Large sized stadiums, arenas and entertainment venues should be replaced with systems of small-or medium-sized open spaces for outdoor activities such as sport and leisure, recreation, biking, performances, exhibitions and political meetings (Lai et al., 2020b).

It is of significant importance to take into consideration the urban public spaces affected from COVID-19 and to put forth the related problems (Table 3). Comprehensive studies should be carried out at every level and scale for these spaces in order to prevent the spreading of the virus. In this scope, identifying the problems and difficulties related with planning, design, use and perception at urban public spaces and generating solution suggestions are required for developing healthy and resilient urban environments as well as for quality of life.

Table 3. Post-coronavirus urbanism: Research areas (Megahed and Ghoneim, 2020)

Scope	Research Areas
Post-pandemic urbanism	• Density of cities • Walking, cycling, and public transportation
Post-pandemic public spaces	• Design, use and perceptions • Design and disease transmission • Street design and furniture • Shared facilities and services • Flexibility and transformation

Approaches such as designs for buildings that can rapidly change function when faced with a pandemic; walkable urbanization for preventing diabetes and obesity; solutions related with pedestrian circulation for preventing the spreading of the disease or solutions will come to the forefront after the COVID-19 pandemic. Increase in open and green spaces that enable access to clean air and physical activity thus increasing public health which can be transformed immediately into logistic and treatment centers as well as easy access to these areas will form the most important actions in the struggle against a pandemic in the city (UCTEA Chamber of Landscape Architects, 2020).

The contributions of recreation to mental and physical health are well-known. Some studies report that vitamin D reduces the risk of acute respiratory tract infection. Sunbathing in open spaces is considered as the most effective method for this. The creation of more open and green spaces in the future will encourage people to stay for longer periods of time in open spaces (UCTEA Chamber of Landscape Architects, 2020).

Some suggestions for reducing risks in urban public green space planning and design during and after a pandemic (Freeman and Eykelbosh, 2020);

- Increase urban public green space amount and establish an accessible distribution in the city

- Shutting down sports fields and/or providing limited supervision to ensure distancing during activities and to discourage activities that involve physical contact,

- Encouraging dispersion and non-collective activities through the increase of available space. Additional urban public green spaces may include streets and parking lots closed to vehicles.

- Distance should be maximized and interaction between park users should be minimized especially where narrow trails or passages may bring people closer together (e.g. unidirectional traffic on trail loops).

- Features that lead to conglomeration of people such viewpoints or seating should be closed. If such points of gathering can't be closed (e.g. entrances and exits to the park), limited supervision should be provided to such areas in order to encourage physical distancing.

6. Conclusion

Throughout history, periods of pandemics have led to economic, environmental, social and technological outcomes related with the improving of urban sustainability, urban resilience and quality of life. Foreseeable urban planning and design approaches related with the process and outcomes of such pandemics with rapid urbanization and increase in population density are of special importance for urban and public health.

Urban public green spaces that are important for urban quality of life require a comprehensive management understanding for limiting the spreading of the disease during periods of pandemic and for providing opportunities for controlled social life. Measures taken within the scope of planning and design should focus on social and physical distancing.

Pandemics that have had significant impacts on many aspects from urban formation to urban infrastructure studies throughout history are periods of comprehensive transformation. Hence, approaches related with the use of green spaces in urban public areas that do not hinder human-nature interaction at the planning and design dimension should be adopted in order to reduce the impact value of pandemics on the community. Human-nature interaction during the COVID-19 pandemic of today has important functions for physical, psychological recovery as well as for contributions to the immune system.

REFERENCES

Ahmadpoor, N., & Shahab, S. (2020). Realising the value of greenspace: A planners' perspective on the COVID-19 pandemic. *The Town planning review*. doi: 10.3828/tpr.2020.37

Ahsan, M. M. (2020). Strategic decisions on urban built environment to pandemics in Turkey: Lessons from COVID-19. *Journal of Urban Management*, 9(3), 281-285. doi: 10.1016/j.jum.2020.07.001

Banai, R. (2020). Pandemic and the planning of resilient cities and regions. *Cities*, 106. doi: 10.1016/j.cities.2020.102929

Barton, H., & Grant, M. (2013). Urban planning for healthy cities. *Journal of Urban Health*, 90(1), 129-141.

Cengiz, C., Cengiz, B., & Bekci, B. (2012) Environmental quality analysis for sustainable urban public green spaces management in Bartın, Turkey. *Journal of Food, Agriculture & Environment,* 10(3&4), 938-946.

Cengiz, C., Bekci, B., & Cengiz, B. (2014). A comparative study of public green spaces in the changing urban texture in terms of preferences for ornamental plants and visual quality: the case of Bartın (Turkey). *Fresenius Environmental Bulletin*, 23(9a), 2326-2342.

Cengiz, C., Cengiz, B., & Boz, A. Ö. (2018). Urban green space design-climate relationship: Bartın case. In *V. International Multidisciplinary Congress of Eurasia (IMCOFE 2018), Proceedings Book* (pp. 31-41).

Connolly, C., Ali, S. H., & Keil, R. (2020). On the relationships between COVID-19 and extended urbanization. *Dialogues in Human Geography,* 10(2), 213–216. doi: 10.1177/2043820620934209

Deloya, M. C. (1993). Urban forestry activities in Mexico. *Unasylva,* 173(44), 28-32.

Freeman, S., & Eykelbosh, A. (2020). COVID-19 and outdoor safety: Considerations for use of outdoor recreational spaces. *National Collaborating Centre for Environmental Health.* Retrieved from: https://ncceh.ca/documents/guide/covid-19-and-outdoor-safety-considerations-use-outdoor-recreational-spaces

Givoni, B. (1991). Impact of planted areas on urban environmental quality: A review. *Atmospheric Environment,* 25(3), 289-299.

Honey-Rosés, J., Anguelovski, I., Bohigas, J., Chireh, V.K., Daher, C., Konijnendijk, C., ... & Nieuwenhuijsen, M. J. (2020). The impact of COVID-19 on public space: a review of the emerging questions. *Cities & Health*. doi:10.1080/23748834.2020.1780074

Jainer, S., & Yadav, S. (2020).COVID-19 and green, open spaces: What is going to be our new normal? Retrieved from: https://www.downtoearth.org.in/

blog/urbanisation/covid-19-and-green-open-spaces-what-is-going-to-be-our-new-normal--71501

Jakob, T. (2008). Urbanization and Epidemic Disease. Byrne, J.P. (Ed.), *Encyclopedia of Pestilence, Pandemics, and Plagues* (Vol. 1, pp.737-742). United States of America: Greenwood Publishing Group.

Lai, K., Webster, C., Kumari, S., & Sarkar, C. (2020a). The nature of cities and the Covid-19 pandemic. *Current Opinion in Environmental Sustainability*. doi: 10.1016/j.cosust.2020.08.008

Lai, S., Leone, F., & Zoppi, C. (2020b). Covid-19 and spatial planning: a few issues concerning public policy. *Tema. Journal of Land Use, Mobility and Environment,* 231-246. doi: 10.6092/1970-9870/6846

Lopez, B., Kennedy, C., & McPhearson, T. (2020). Parks are Critical Urban Infrastructure: Perception and Use of Urban Green Spaces in NYC During COVID-19. Preprints. Retrieved from: 10.20944/preprints202008.0620.v1

Lubell, S. (2020). Commentary: Past pandemics changed the design of cities. Six ways COVID-19 could do the same. Retrieved from: https://www.latimes.com/entertainment-arts/story/2020-04-22/coronavirus-pandemics-architecture-urban-design

Megahed, N. A., & Ghoneim, E. M. (2020). Antivirus-built environment: Lessons learned from Covid-19 pandemic. *Sustainable Cities and Society*, 61. doi: 10.1016/j.scs.2020.102350

Moraci, F., Errigo, M. F., Fazia, C., Campisi, T., & Castelli, F. (2020). Cities under pressure: Strategies and tools to face climate change and pandemic. *Sustainability*, *12(18)*, 7743. doi: 10.3390/su12187743

Muggah, R., & Katz, R. (2020). How cities around the world are handling COVID-19- and why we need to measure their preparedness. Retrieved from: https://www.weforum.org/agenda/2020/03/how-should-cities-prepare-for-coronavirus-pandemics/

Özden, K., & Özmat, M. (2014). Salgın ve kent: 1347 Veba salgınının Avrupa'da sosyal, politik ve ekonomik sonuçları. *İdealkent*, 5(12), 60-87.

Rodgers, C. (2020). Nourishing and protecting our urban 'green' space in a post-pandemic world. *Environmental Law Review*, 22(3), 165-169.

Salama, A. M. (2020). Coronavirus questions that will not go away: interrogating urban and socio-spatial implications of COVID-19 measures. *Emerald Open Research,* 2(14), 1-16. doi: 10.35241/emeraldopenres.13561.1

Sallis, J. F., & Pratt, M. (2020). Physical activity can be helpful in the coronavirus pandemic. Retrieved from: https://americawalks.org/physical-activity-can-be-helpful-in-the-coronavirus-pandemic/

Sharifi, A., & Khavarian-Garmsir, A. R. (2020). The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management. *Science of the Total Environment*, 749, 1-14. doi: 10.1016/j.scitotenv.2020.142391

Shoari, N., Ezzati, M., Baumgartner, J., & Fecht, D. (2020). Accessibility and allocation of public parks and gardens during COVID-19 social distancing in England and Wales. Retrieved from: https://www.medrxiv.org/content/10.1101/2020.05.11.20098269v1. doi.org/10.1101/2020.05.11.20098269

Slater, S. J., Christiana, R. W., & Gustat, J. (2020). Recommendations for keeping parks and green space accessible for mental and physical health during COVID-19 and other pandemics. *Preventing Chronic Disease*, 17, 1-5. doi: 10.5888/pcd17.200204.

Swapan, M., Alam, A., Rogers, D., Houston, D., Lobo, M., & Nasreen, Z. (2020). Cities after COVID-19: Reconsidering urban form, mobility, housing and planning in Australasia. *Urban Policy and Research,* Special Issue Guest Editorial Panel. Retrieved from: https://www.researchgate.net/publication/342736573_Cities_after_COVID-19_Reconsidering_urban_form_mobility_housing_and_planning_in_Australasia_Special_Issue_Guest_Editorial_Panel

UCTEA Chamber of Landscape Architects. (2020). Salgınlarla mücadelede peyzaj mimarlarının rolü üzerine. Retrieved from: http://www.tmmob.org.tr/icerik/peyzajmo-salginlarla-mucadelede-peyzaj-mimarlarinin-rolu-uzerine

Ugolini, F., Massetti, L., Calaza-Martínez, P., Cariñanos, P., Dobbs, C., Ostoić, S. K., ... & Sanesi, G. (2020). Effects of the COVID-19 pandemic on the use and perceptions of urban green space: An international exploratory study. *Urban Forestry & Urban Greening*, 56, 1-9. doi: 10.1016/j.ufug.2020.126888

URL-1 https://www.ibb.istanbul/News/Detail/36857 Accessed date: 12.12.2020

URL-2 https://www.izmir.bel.tr/tr/Haberler/izmir-de-yesil-alanda-cemberli-sosyal-mesafe-donemi/43622/156 Accessed date: 12.12.2020

URL-3 https://www.haberturk.com/izmir-de-sosyal-mesafe-cemberi-2687918 Accessed date: 12.12.2020

URL-4 https://www.mersin.bel.tr/haber/buyuksehir-belediyesi-nden-korona-bank Accessed date: 12.12.2020

URL-5 https://www.suleymanpasa.bel.tr/haber/S%C3%BCleymanpa%C5%9Fa-Belediyesinden-sosyal-mesafeli-bank--4155 Accessed date: 12.12.2020

URL-6 https://www.hurriyet.com.tr/yerel-haberler/ankara/mamakta-sosyal-mesafeli-bank-41525941 Accessed date: 12.12.2020

URL-7 https://www.internethaber.com/mersin-ve-bursa-belediyesinden-koronaya-ilginc-cozum-korona-bank-foto-galerisi-2101779.htm?page=5 Accessed date: 12.12.2020

URL-8 https://atayurtgazetesi.com.tr/antakya-belediyesinden-sosyal-mesafeli-bank-uygulamasi/ Accessed date: 12.12.2020

URL-9 https://www.haber7.com/guncel/haber/2981778-bagcilarda-tek-kisilik-bank-donemi-basladi Accessed date: 12.12.2020

URL-10 https://kahramanmaras.bel.tr/haber/2020/05/21/sosyal-mesafe-banki-hayirli-olsun#&gid=null&pid=6 Accessed date: 12.12.2020

URL-11 http://www.eskisehirgundem.com/?sec=1&newscatid=1&newsid=157417 Accessed date: 12.12.2020

URL-12 https://www.sabah.com.tr/istanbul/2020/12/11/beykoz-sahilde-korona-viruse-karsi-sosyal-mesafeli-banklar Accessed date: 13.12.2020

Yurdakul, E. S. (2015). Tarihte Önemli Bulaşıcı Hastalık Salgınları. *Türkiye Klinikleri Halk sağlığı-Özel Konular*, 1(3), 1-6.

Chapter 11

LEED CERTIFICATION AND THE PROCESS OF NEIGHBORHOOD FORMATION

***Duygu AKYOL*[1]**

1 Araş.Gör, Karadeniz Teknik Üniversitesi,Orman Fakültesi, Peyzaj Mimarlığı Bölümü, Peyzaj Planlama ve Tasarım Anabilim dalı

1.Introduction

Green building evaluation systems and certification programs have an important place in concretely revealing the environmentalimpacts of buildings. Life Cycle Assessment (YDD) methods developed for this purpose are generally used in the design phase of the structures for purposes such as material and product selection and their scope is limited. Certificate programs to be evaluated in this context are included in this group such as Bees (USA), BEAT 2002 (Denmark), EQUER, PAPOOSE and TEAM (France), EcoQuantum (Netherlands), ATHENA (Canada), Envest 2 (UK) and LEGEP (Germany) (Sev and Canbay,2009).

Criteria-based assessment and certification programmes stand out for being more comprehensive, easy to implement and easy to understand the results .In the UK, theBuilding Research Institution Environmental Assessment Method (BREEAM), introduced by the Building ResearchAuthority (BRE) in 1990, is the first of these programmes. This method has been followed by numerous certification systems such as LEED (USA), SBTool (International), EcoProfile (Norway), PromisE (Finland), Green Mark for Buildings (Singapore), Green Star (Australia), SBAT (South Africa), CASBEE (Japan) and Environmental Status (Sweden). In addition to these systems listed as BREEAM, LEED, Green Star and CASBEE, internationally participating SBToolhas been adapted to national conditions in various countries and started to be used(Sev and Canbay,2009).

Today, with the concept of sustainable space, water and energy savings, certificate systems implemented around the world have started to gain importance and become a focus in many branches. Although the certificate systems to be mentioned generally evaluate the processes of building construction repair formation, recently these certificates have started to be used for evaluations on the basis of neighborhood, city and region.

In the study, certificate programs will be discussed in general and information about leed certificate will be given specifically and it will be discussed how this affects the process in neighborhood formation and what alternatives it will offer.

2.Definitions and Uses of Leed and Other Types of Certificates

It is seen that there has been a rapid increase in the use of green building evaluation systems such as LEED and BREEAM in the decade we have been involved in certificate programs based on the criteria mentioned in the introduction section. Other certificate programs do not show prevalence such as LEED and BREEAM because they include criteria created in line with the values of certain countries. The main certificate programs and usage areas used are as follows;

2.1Breeam

Breeam (Building Research Establishment Environmental Assessment Method), first uncovered by BRE in 1990, is the first of its green building assessment systems. There are many subcate categories of the BREEAM system. However, many of these categories are systems developed with the UK's conditions in place, and its implementation in other countries has some problems. Bre has launched international versions of BREEAM since 2008. (Withered and Ilicalı,2009) Under each category in the certificate system, health and well-being,energy, transportation, water, materials, waste, land use and ecology, pollution titles are included.

Breeam'sstarting point is environmentaldevelopment, the most comprehensive component of sustainable development. With BREEAM, offices, eco housing for nuclear families, apartments, schools, shopping malls, dormitories, nursing homes, industrial structures, are evaluated and studies are also carried out on the existing structures version. Evaluation tables organized according to a wide range evaluate the environmental performance of the structures according to various categories. In addition, BREEAM International, Turkey, BREEAM Europe and BREEAM Gulf have been developed for countries in the gulf region for evaluations to be made in countries outside the UK. In addition, with BREEAM Bespoke, evaluation criteria are determined specifically for the type of structure. Hotels, laboratories, holiday complexes and accommodation facilities and mixed function structures are evaluated under this version.

BREEAM evaluations are decided which type of evaluation the project is suitable for after the application, then the studies are initiated for each type of structure by selecting the appropriate one for the project from the stages given below.

- Design and Procurement: Design stage evaluation.
- Construction Evaluation (Post Construction): Evaluation of the implementation of BREEAM subjects determined during the design phase.
- Management and Operation: Evaluation of existing buildings in terms of operation process.

The BREEAM certification system brings in some new rules in accordance with the country, region and project, especially in projects outside the UK. The formation of these rules is determined by the long-term work between the designer and BREEAM; therefore, it may be difficult to adapt the system to short-term projects (URL 1).

2.2LEED

The LEED (Leadership in Energy and Environmetal Design) assessment system, which was first launched by the American Council on Green Buildings in 1998, was designed to improve the construction industry in sustainability. Its purpose is to change the materials and methods used in the construction sector in accordance with sustainability principles over time and thus ensure that buildings that harm nature inthe least wayare built (URL 2). Leed evaluates within the following categories.

- New Builds and Major Repairs (LEED-NC)
- Existing Structures (LEED-EB)
- Commercial Interiors (LEED-CI)
- Schools (LEED-S)
- Neighborhood Development Projects (LEED-ND),
- Residences (LEED-Homes)
- Shopping Malls (LEED-Retail)

In addition, studies are carried out on Health Structures and Laboratories.

Below each category are six main headings:

- Sustainable Land
- Water Saving
- Energy and Atmosphere
- Materials and Resources
- Interior Quality of Life
- Innovation

Alcause these headings have the same name for each category, their content differs from category to category.

2.3 Greenstar

Green Star, developed by the Australian Green Building Council (GBCA) in 2003, is largely similar to BREEAM and is carried out to assess the lifecycle impacts of structures. This scoring system was originally developed foroffices. Shopping centers and educational buildings were later added to these categories; In the performance categories of the Green Star system, as in BREEAM and LEED, criteria for energy, material and resource protection and indoor air quality come to the forefront. The scores collected by the evaluated structure for each performance category are multiplied by the weight coefficients determined by considering regional and climatic differences. This ensures that the system can be evaluated in different climate zones and a realistic evaluation is obtained. (Sev and Canbay,2009)

2.4 Casbee

Developed in 2001 in cooperation with the Japan Sustainable Building Consortium (JSBC) and the Green Building Council (JaGBC), the Detailed Assessment System for Environmental Effectiveness of Buildings (CASBEE) was prepared taking into account the sustainability principles of Japan as well as Asian countries. In this system, vehicles gain diversity according to the stage at which the buildings are found. In other words, without depending on the function of the building

- Design;
- New Builds;
- Existing Structures;
- Renewal stages

different evaluation tools are used for . The purpose of the design tool is to assist the design team in selecting suitable locations for the project and reducing the environmental impact of the project. Two systems have also been developed for temporary structures and exhibition spaces (CASBEE for Temporary Construction) and detached residences (CASBEE for Detached House), as well as three other systems to assess heat island impact, urban development projects and the performance of buildings within the urban area(URL 3).

The CASBEE evaluation process is based on two principles by taking a very different approach from other systems. The first is the environmental quality and performance of the structure (Q) and the other is the environmental loads of the structure (L). The Q/L value expresses the environmental effectiveness (BEE) of the structure. CASBEE, which is seen as a highly complex systemcompared to other systems, is less likely to be implemented in countries other than Japan due to the fact that most of its methodology and documentation are in Japanese (URL 4).

3.Sustainable Neighborhood Concept

Although the concept of sustainable urban development has an urban or local feature, it has emerged at the global level and has become a common policy area in the world regarding the creation of the cities of the future and the inability of economic, environmental and social development at the urban level.

Research from the 1970s to the present has shown that if current development trends continue, a sustainable development cannot take place without being addressed as a social, economic and political whole and without collective practices. However, when viewed on the city scale, it is seen that in addition to environmental, ecological, social and economic dimensions, legal, cultural, political and psychological dimensions come to the forefront. Spatial planning is one of the most important disciplines in implementing the concept of sustainable development. (Mamunlu, 2009) .

Especially in recent years, many countries have been developing various measurement systems in order to ensure sustainability on an urban scale by highlighting their local characteristics. In these systems, the basic unit is considered as a building. However, the building, which is considered as a basic unit, is inadequate in creating or defining society as scale. The use of this scale in defining sustainability actually goes averse to the concept's own content. While the concept of sustainability holds social economic and ecological scales, the use of building scale when talking about sustainability on an urban scale gives birth to a fragmental approach. Accordingly, on the city scale, the neighborhood remains undefined as the smallest unit that best defines the concept of society. With this concern, systems are being developed in America, Japan, the UK and Australia that make it possible to measure Sustainability on a neighborhood scale as well. The aim here is to set sustainability criteria in line with the local environmental and social characteristics of communities in parallel with building-scale studies and to create Sustainable, Healthy Societies with a holistic approach in practice (Özdal, Özdede, 2012). Sextracted systems evaluate neighborhoods in different classes.

The criteria that allow us to measure sustainability on a neighborhood scale are defined internationally, just like on a building scale. Depending on these international criteria, evaluating the studies on the neighborhood scale where local identity and social characteristics can be observed will create many problems. In this context, the certification systems used to measure sustainability on a neighborhood scale should includecriteria that reflect the local characteristics of each country.

4.Leed Neighborhood in the Concept of Sustainable Neighborhood (Leed ND)

As mentioned above, the use of leed certification system has started to become widespread in our country, but the prevalence of this use has been mainly on buildings. In this section,*"Leed Neighborhood"* will be mentioned as a concept that the concept of sustainable neighborhood can find application and as a certification system that is widespread in many countries around the world. For this certification system, it will be explained what kind of applications can be made as a neighborhood-scale application or what kind of measures can be taken.

Leed Neighborhood is a system created to reflect the basic aspects of sustainability on a neighborhood basis. There are rating strategies in this certification system and these strategies are discussed in three sections.

1) Intelligent placement and connections

2) Design relations on a neighborhood scale

3) Green infrastructure and buildings.[1]

4.1Intelligent placement and connections

The area limit of this system according to Leed ND; it can include a neighborhood or a region that emerges with the formation of several neighborhoods. The main point here is that if sustainability is desired in a neighborhood, first of all, the livable capacity in the region should be high, walkability should be high, neighbor interaction should be high, mixed and compact usage such as business shopping should be well transported to the residents of the region where there is a sense of place, social cohesion and flexibility should be present.

One of the first strategies of the certification system, the first question asked for smart settlements and connections, is where to build settlements or places to be created in the city. An example is equipping the structures with green building techniques within the neighborhood units and applying all the requirements of leed certification for the building structure. However, although the buildings in the neighborhood boundaries, which will be created at the moment this application is made in a poor residential area (within natural large areas), are made with green construction technique, the desired successful result will not be achieved. Because first of all, natural area destruction will occur, however, people will be dragged to long transportation alternatives to continue their lives, and the number of individuals and public transport will increase with long transportation, as a result of which they will not be able to benefit the environment that will be made with green building techniques and lost under the shadow of the air contaminated by vehicles. The main goal here is to make the neighborhood units in previously renovated or implemented areas due to the settlements. With this, both open and natural areas will be protected and residential workplace public spaces will coexere by having a more compact layout on a city-by-city basis. In the areas outside the settlement, the use of space will be enabled and the natural area structure surrounding

1 Section from Sustainable Neighborhood Phenomenon to Green substructures • A Citizen's Guide to Leed for Neighborhood Development:How to Tell if Development is Smart and Green translated from the booklet.

the neighborhood units will be formed (Akyol and Şenik, 2019).

Another issue mentioned here is the opening of empty industrial areas in the city center. At that time, industrial zones made smart settlements and were established both in the service sector, in areas with transportation diversity and in areas with high walkability. It is envisaged that the incentives and financial assistance required to open these areas to the settlement will be made. In addition, the definitive and clear determination of the proposed natural boundaries with this certification system is that these designated areas (wetlands, river and lake edges, agricultural areas, etc.b) are never opened to settlement.

Dependent Neighborhoods

It is emphasized that for good neighborhood formation and interaction, there should be regular street connections and pedestrian paths together with smart layout. The aim here is to create a strong connection between the neighborhoods by increasing mobility with walking on the basis of the region used. Currently, the pedestrian roads of many residential units continue in long blocks of streets, connecting to dead spots or detouring to the main roads. This also reduces the use of parks on the back of the neighborhood.

Public Transport

The use of public transport is also a situation that is emphasized in the certification process. In this regard, it is recommended to select public transportation without private use. For this, it has been mentioned that public transportation systems should be planned close to workplace areas and areas used for settlement. As mentioned in the previous section, it is said that the .b, etc. of the settlements should be compact. With this understanding, public transportation is encouraged by the short time of users with the settlement, which is already compact.

Figure 1; Example of public transport

4.2Neighborhood Scale Design Relations

With this strategy, the main question is different from the question asked in the first strategy. In the first strategy, the concept of sustainable neighborhood asked where this concept should be built. In this strategy, the question of how this formation should be built in order to be in the neighborhood, what should be done in the design dimension is asked.

The point to be reached with these questions is; streets with high walkability, a diverse and compact neighbor relationship, high quality public spaces, reducing dependence on automobiles, not being able to ensure collective participation. It is emphasized that there will be less infrastructure needs and less water and energy needs with the whole that will occur.

Another important point is that mixed uses are included on the basis of neighborhood or region. In this way, it will have the chance to continue sustainability once again in the living and interacting region. However, it is necessary to diversify the designs according to people of all ages and socio-economic situations in neighborhooddesigns (Düzenli et al.2018).

Walkable Streets

The most important point is to increase the walkability in the neighborhoods, as mentioned in the first place. For this reason, it is tried to explain what kind of alternatives will be brought in thedesign with this system (Özkan,2017). First of all, in order to increase the number of people walking in a neighborhood environment, the roads need to be safe, comfortable and inviting. However, in today's neighborhood structures, buildings are increasingly isolated from the streets and the formation of streets is gradually decreasing. Pedestrian sidewalks on many main streets are divided by car parks or comfort cannot be achieved with materials used to create a lack of pavement width in the pedestrian's sense of place.

The design conditions that the certification system wants or, if done, the scoring increases are as follows; The exits of the buildings should be designed to make it easy for pedestrians to reach the road, the trees used on pedestrian roads should not be positioned in such a way as to disrupt pedestrian circulation, but rather to guide it and make it feel safe. On the other hand, car parks on the street are recommended to be used as buffer zones in a way that protects the pedestrian from traffic on the street, not in a way that disrupts pedestrian transportation.

Figure2 ; Charlottesville, Virginia (Credit:citydata.com)

Figure3 ; San Francisco,California Credit: Dan Burden /www.pedbikeimages.org

Bicycle Use

The use of bicycles is in a separate place for this certification. With the use of bicycles, which can form the skeleton of real sustainability, both air pollution is reduced and blind spots where communication by car or public transport cannot be achieved can be accessed in this sense. In order to ensure the use of bicycles, a bicycle path network must first be established. However, parking for bicycles or a low-speed road section should be provided for bicycle use only.

Figure 4; Portland, Oregon Figure 5; Seattle, WashingtonLaura (www.pedbikeimages.org)

Mixed Use Theory

With mixed uses, all uses in a settlement are made easier, however, vehicle use is reduced. This healthy settlement and continuously functioning structure. The most helpful use in this regard is parks, open areas, ecological zones (Yilmaz et al.,2017). Sustainability, which is the main purpose of the certificate, i.e. self-sability, provides the birth of different uses here. Another aspect in this regard is that each user produces and consumes their own basic nutrients on a neighborhood basis. Thus, life can be sustained without harming the main environmental factors with continuous operation in the region where it is located.

Shelik6; Portland, Oregon Figure7;Orenco Station Hillsboro, Oregon

Figure 8; Vancouver,CanadaDanBurden/www.pedbikeimages.org

4.3 Green Infrastructures and Neighborhood Applications

The green infrastructure system is a model that is based on sustainability in the protection of natural resources and in the planning and design of green spaces with the concept of sustainability that has appeared in recent years. According to the definition of many sources, the green infrastructure system supports natural life while coexing sustainable functional and cultural systems. In addition to its natural and functional benefit on the ecosystem it provides green infrastructure, it provides cultural links between landscapes and open spaces (Kaplan, 2010). Therefore, it has positive effects on biodiversity and on human health. The most important positive effect is to improve the quality of life, but also to protect natural resources by ensuring the sustainability of air and water quality (Akyol, et al.2019).

Well, why has the green infrastructure system come up so much in recent years? After realizing the importance of green spaces, he raised the idea of creating connections between these areas that will benefit people with the increase of parks, green areas, promenade areas, recreation areas, etc. in many cities (Mumcu et al. 2019). As a result of the developing analysis on habitat fragmentation, the importance of sustainability, which is necessary for biodiversity, has been raised by determining and calculating fragmented landscapes and revealing the concept of a different connection.

These two concepts, highlighted as sustainability and habitat fragmentation, explain the emergence of the green infrastructure model with a 150-year history to ensure physical and functional connectivity. Physical connection systems that guarantee the accessibility of individuals through green spaces; Functional connections that enable the cross-habitat passage of natural areas and all living things point to a green infrastructure systemthat is completely interlocked with green corridors (Tokuş,2012).

Green Infrastructure System Applications by Neighborhood

The question of how green infrastructure systems described above can be applied on a neighborhood or a city scale will be tried to be answered in this section.

Within the framework of the sustainable neighborhood, it was first explained where and how the settlement would be located, and then some qualities were made in terms of design of how to make the best use of the settlement in the existing location. In this section, green infrastructure systems that are complementary to both stages will be mentioned. What will be the green infrastructure works that can be done on the basis of the neighborhood will be mentioned about their impact on the environment.

Transformation of Old Buildings

Here, it is aimed to re-use the old buildings in the residential area. However, when these structures are being gained, it is of great importance to transform leed by using the necessary materials in accordance with the hardening process. In this way, the buildings that form the characters of the neighborhood or settlement in the cultural sense that will prevent the visual and physical pollution that exists in the region in ecological terms will be able to attract visitors and ensure the continuity of the culture.

Methods of Reducing Pollution

The main objectives of this method are; to prevent wind and water erosion, to prevent air pollution and sediations. One of the most noticeable examples in this method is the re-use of rainwater, which is found in many European countries. Rainwater retention techniques here; A low and swampy area in a neighborhood, a road covered with permeable materials can be a sidewalk, green roofs, water retention basins, large green areas.

Pollution is not only thought of as water air soil pollution. Light pollution is one of the types of pollution that negatively affects life in life. Sustainable living, which is tried to be created in neighborhood life or settlement, can also be damaged by the wrong use of light, especially disrupting the movement of natural life and reducing the quality of life in that place. For this purpose, the use of low intensity light systems at frequent intervals benefits the use of upward lights rather than downward lights.

Thermal Insulation

Recently, with climate change, the feeling of the seasons in different ways affects life in cities. Therefore, the differences between life in the city and the natural area are quite common. One of these differences is temperature. Especially when we look at the neighborhood scale, the overseading of concrete structures in the streets and streets causes us to feel the temperature rate more than in a natural place. According to the studies of a research company called Local Government Commission, the heat felt on large unsadated roads on a normal summer day was 10 o C more than the heat felt on narrow buttree-reforestation roads.

The reforestation of the streets proposed here is to use plantation in the roof system, if the ustu is closed in the parking lots between the streets, the use of sunlight reflective materials is the use of sun reflective materials on the streets on the floorboards.

Figure 9; Green Roof at Walter Reed Community CenterArlington, Figure10; Green Roof at Portland State University, Portland,

Wide Energy Efficiency

The idea put forward in this section is that the presence of low-density and low-rise buildings instead of high-rise buildings in the neighborhoods can benefit both in terms of heating and lighting, especially with the light to be provided from solar energy.

The use of renewable energy sources is also important. Geothermal well use, generating the necessary energy for the neighborhood from the wind, hydroelectric, biofuel use or the use of central cooling heating systems are some examples that can give this. Other options are the solar power of traffic lights, which can be stored during the day.

Recycling System

It is very important for this system that all materials used when forming a neighborhood unit in a city consist of recycled materials. This covers a wide range from water pipe to asphalt, concrete to asphalt. The use of composting method at home is one of the recommended methods for solid waste disposal. One of the recommended ideas is to collect wastewater from houses and use it for irrigation.

5.Leed Nd's Impactıon The Development of Neighborhoods/ Districts

In the previous section, the purpose of sustainable sites and the process scheme are mentioned. In case the subject is more understandable, all these applications made in this section will be discussed about what benefits Leed ND will provide to settle.

Objectives of Sustainable Settlements

- Reducing pollution and waste production with the use of energy and raw materials,
- Protecting sensitive ecosystems,
- To achieve sustainable development, to make informed planning and work at all levels from international level to local level,
- To ensure the participation of all segments of society in the decisions to be made regarding the environment and development (Erdoğan,2006).
-

6.LEED ND and Turkey

This section will look at the criteria of the scoring ruler in the Leed Neighborhood Development certification system and how many of these criteria may apply to our country. In addition, a control table will be created on the basis of criteria that may apply.

When we look at these criteria, there are several criteria that have a low and difficult chance of being applied in our country. The inability to apply these criteria is not due to the lack of existing conditions in our country, but more to the unplanned construction that exists in cities and, accordingly, in the places. These criteria, which are thought to cost a great deal of costs in the first place, can depreciation itself in a short time with the sustainability it provides and also reveal the chance of quality life.

Although the criteria with the characteristics of each field in leed certificate types vary from country to country, certification conditions are generally applied in certain molds. Here, all the criteria requested by the certification system are fulfilled to the letter and full score can be obtained.

Table 1: Leed Neighborhood Development certificate evaluation criteria

Smart placement		Protection of endangered species and ecology	*
Wetlands and water availability	X	Agricultural land protection	*
Bicycle network	X	Compact development	
Housing and closeness to work		Mixed-use policies	
Slope status and protection of the land		Street networks	
Space preferences		Reduced parking footprints	
Wetlands protection design		Transportation demand management	X
Habitat restoration		Access to civil and public space	
Long-term protection management of wetlands	X	Access to recreational facilities	
Walkable streets	X	Neighborhood schools	X
Community and social participation rate		Local food production	X
Certified green building		Minimum Building Energy Efficiency	
Minimum Building Water Efficiency		Construction Activity Pollution Prevention	
Water-Efficient Landscaping	X	Building renovation	
Design and Construction		Historical Resource Protection and Adaptive Use	
Rainwater Management	X	Heat Island Reduction	
Solar Orientation		On-site use of Renewable Energy Sources	
Regional Heating and Cooling		Infrastructure Energy Efficiency	
Wastewater Management	X	Solid Waste Management Infrastructure	X
Light Pollution Reduction	X		

The first question that comes to mind in the light of all the reviews is; Whether LEEDND is suitable for Turkey. Because many elements in this certification system are regulated according to the laws and sectoral codes in the USA. In this context, both NGOs, the private sector and the state should make arrangements on the same plane in line with the compliance of certification with our country.

For the development of the certificate system suitable for Turkey, it should be activated by the councils or groups whose work is determined, such as creating infrastructure for the development of the certificate system suitable for Turkey, establishing strategies by partnering with the public and universities and supporting the development of eco-centered educational content in the curriculum in universities as a moment, monitoring developments in this field in the world and establishing local libraries related to ecological products (URL 5).

Conclusion

In the study, it was first shown that they were informed about some certification systems and scored on which subjects and criteria. Later, the concept of sustainable neighborhood, which is a content of the Leed Neighborhood Development certification system, which is the main subject of the study, was emphasized and its social impacts were mentioned. Rating strategies were mentioned without the criteria of certification and information about green infrastructure was also presented. In the last section, leed certification system was evaluated for our country and its advantages and disadvantages were mentioned.

Since the leed neighborhood development certification system was created, many cities and the most important element of the city have started to be seen as a savior of the sites. The importance it attaches to sustainability is seen as the biggest pluses of providing prosperity and quality life to the residents of that region. However, the current criteria of the certification system, especially the criteria related to wetland planning, species protection and water management, appeal to a little more developed countries and developing countries are disadvantaged in this regard.

If we evaluate this issue for our country; many of the criteria meet the existing resources of our country. However, it is certain that there will be some disruptions in the application part. Because with the existing urban plans and urban design strategies, a long period of access cannot be spent, the infrastructure schemes of the cities are changing day by day and cannot be set to a certain standard. In order for this to be done, we must first have a large-scale, national urban strategy, and then it is necessary to reduce this scale to regional dimensions or even urban dimensions. It is then necessary to raise the level of sustainable thinking throughout the country and to get help from the public system. Regulatory regulations should not be prepared only with these thoughts and should not remain on the shelves, many officials with knowledge of this issue should be contacted in order for the applications to take place.

If a certification system expected to be developed is required to be applicable on a country and region scale, first of all, the evaluation criteria must be determined taking into account the economic and social conditions of the country's climate geography. The above-mentioned criteria in our country vary on a regionalscale. When this is not taken into account during the evaluation phase ofthesystem, a result that affects the whole country emerges.

REFERENCES

- Aydin,T. (2005). Sustainable Neighborhood Reimplification Approach and Example of Kucukçekmece in The Vaccination of Urban Poverty,Mimar Sinan Fine Arts University, Institute of Science, Department of Urban and Regional Planning,Istanbul,Page;46-49.
- A Citizen's Guide to LEED for Neighborhood Development:How to Tell if Development is Smart and Green.
- Erdogan,D.(2006).Neighborhood Phenomenon within the Framework of SustainableApproaches and Aydin Center de Liberation, Bridged,Seven September Neighborhoods Sampling, Gazi University Institute of Science
- Kaplan,A. (2010). New Understandings and Practices in Planning design; Green Infrastructure, Urbanism in the Context of Landscape, Ege University Department of Landscape Architecture.
- Kocabaş,A. (2012). Green Sustainable Urban Transformation; Conceptual Framework and Application Tools, International Building Life Congress, Chamber of Architects Bursa Branch.
- Leed 2009 For Neghborhood Development,For Public Use and Display LEED 2009 for Neighborhood Development Rating SystemCreated by the Congress for the New Urbanism, NaturalResources Defense Council, and the U.S. Green Building Council.
- Mamunlu, H., (2009). Basin Planning and Management In the Context of Sustainable Developmentin IstanbulUrbanArea: Kucukçekmece Lake BasinExample, PhD Thesis, Mimar Sinan Fine Arts University Institute of Science, İstanbul.
- Moltay,D; (2011),LEED 2012,Journal of Green Building,December 2011,Page;26-28.
- Özdal,S., Özdede ,S.(2012). Local certification systems,2012,World Urbanization Day 36th Colokium Presentation Statement.
- Sev,A. , Canbay N.(2009).Green Building Evaluation and Certificate Systems Applied Worldwide, Building Journal April Issue,Page;44-49.
- Somalı,B; Ilıcalı,E.(2009). Evaluation of Leed and Breeam International Green Building Evaluation Systems,2009,IX Plumbing Engineering Congress,Syf;1081-1088.
- Uslu ,A. (2012) , Opportunities to Support Green Infrastructure and Biodiversity in Urban Landscape, Ankara University Faculty of Agriculture, Department of Landscape Architecture.
- Yilmaz, S., Düzenli, T., & Dinçer, D., (2017). Evaluatıon Of Factors Related To Well-Beıng Effects Of Urban Green Spaces On Users. Fresenıus Envıronmental Bulletin , Vol.26, 174-185.

- Düzenli, T., Alpak, E.M. , & Tarakci Eren, E., (2018). Open Space In The Context Of Spatıal Organization. International Journal of Eurasia Social Sciences , Vol.9, 1188-1201.
- Akyol, D., Özkan, D. G. , & Dedeoglu Özkan, S., (2019). Measurıng The Qualıty Of Urban Lıfe In The Trabzon Provınce. Fresenıus Envıronmental Bulletin , Vol.28, 7991-8000.
- Ozkan, D. G. , (2017). Impact of Environmental Features of Walkable Spaces on The Sense of Dependence on the Ground: Trabzon Coastal Band Example. Social Sciences Studies Journal, Vol.11, 1701-1708.
- Akyol, D., & Şenik, B., (2019). A Local Sertification System on the SustainableNeighborhood Scale: Trabzon Konaklar Neighborhood Example. Artium , Vol.7, 1-11.
- Mumcu, S., Yilmaz, S., & Akyol, D., (2019). With Nature In Mind: 'Green Metaphors' As An Approach To Reflect Environmental Concerns And Awareness In Landscape Design. A/Z : Itu Journal Of Faculty Of Architecture , Vol.16, 131-144.
- URL 1 www.breeam.org
- URL 2 www.usgbc.org
- URL 3http://www.cevreonline.com/ceverci/yesilbinasertifika.htm
- URL 4http://www.cevreonline.com/ceverci/yesilbinasertifika.html
- URL5https://cedbik.org/static/media/source/10/attachments/leedsertifikasi.pdf?v=281217111930
- URL 6 https://www.nrdc.org/

Chapter 12

REFLECTION OF FORTIFIED SEGREGATION ON URBAN SPACES/ NEIGHBOURHOODS A CRITICAL APPROACH TO THE THRESHOLDS IN ANKARA

Hatice KALFAOGLU HATIPOGLU[1]
Seher Beyza MAHMUT[2]

1 Faculty of ArchitectureandFineArts, Department of Architecture, Ankara Yildirim Beyazıt University, Esenboga Campus, Block D, Esenboga/Ankara.
2 Graduate School of Natural Science, Ankara Yildirim Beyazıt University, Etlik Campus Keçiören/Ankara

1 . Introduction

Segregation is the separation of social groups into particular roles and/or spaces (Norton&Mercier, 2019; Ritzer, 2007). Also, urban segregation is a concept used to indicate the fragmentation between different social groups in an urban environment. Design is an important indicator of social life, since there is a strong relationship between spatial arrangements and lifestyles of people. With the support of right design decisions, it is possible to achieve a social integration which contributes to the sustainable community.

The city is a place of highest concentration of power and culture of a community which composes a social entity. Density and heterogeneity are the main features of the social and cultural spaces (Simmel, 1950). And neighburhoods as the smallest representative unit of the city integrates people through the development of social practices in everyday life (Roitman, 2005). The selection of living territories results in a fragmentation in the city which constitutes a clustering as places of different groups. These groups, which based on the homogeneity of the neighbourhoods start to define themselves in terms of "us" and "them" (Rapaport, 1977). Moreover these places differ in lifestyles, symbol systems and environmental quality although they stay near each other. Although the tendency of similar people to live together is rejected in the theory, settling in this way have been a reality of our cities (Rapaport, 1977).

The most obvious and clear example of this segregation can be observed on neighborhood scale. Neighborhoods are one particular type of homogeneous area. People choose their neighborhoods related to shared images and a desire to preserve a lifestyle, religion or culture. Reasons of clustering in neighborhoods can be differentiated in time. For example, even in the medieval cities of the West and in the traditional Ottoman city, the neighborhoods display a heterogeneous socio-economic structure, although they include religious and ethnic groups. With the emergence of capitalist society, the capital accumulation is concentrated in the cities; instead of being attached to religious and ethnic identity, it started to differentiate depending on income and class identity (Kurtuluş, 2003). In today's world, the essence of people's economic, social and cultural relations determine their consumption and activity patterns. The individual is at the forefront of what he or she consumes as mentioned by Erich Fromm (1976) with the sentence "I am what I have and what I consume". Moreover, the reflection of this lifestyle can directly be observed on the spatial articulation. For this reason, economic restructuring triggers changes in the global city's structure (Maloutas, 2004). As a consequence, while the city is being spatially fragmented; at the same time, society is fragmented by socio-economic and cultural divisions. Process of fragmentation in physical and social structure are mutually interdependent (Bilsel, 2006). As a result, the city becomes segregated, consisting of countless walled-islands with divided social groups.

In this study, it is aimed to answer the questions of why socio-spatial segregation come into life in order to mediate a change for the future and reveal the consequences of this fragmentation within the city. Additionally, the spatial segregation process of Ankara and the formation of walled islands by the upper income group has been discussed and the fictions of these habitats have been examined through the Merkez Ankara Project.

2. Thresholds by Fortified Borders and Contemporary Walled Islands

Segregation is both the formal and informal separation of one group from another. Often this division is based on race, ethnicity, gender, social class, sexual orientation, or religion (Ritzor, 2007). Although the separation between social groups can occur by non-geographical means as well, (Feitosa et all. 2007) the concept of urban segregation is explicitly spatial.

People are socially more prone to be with people whose lifestyles are similar to them. However, this situation becomes visible due to intensification of social differences over time and causes social segregation. Andersen (cited in Özgür, 2004) defines the term as follows: “Social segregation is the spatial segregation of ethnically or socially different groups, leading to increased social and cultural differences between groups”. Contribution to unwritten rules and behaviours bring to cultural homogeneity (Rapaport, 1977) and this situation provokes the formation of islands that can be defined as “enclaves” which is a small, distinct area for an insular group of like-minded people (Finegan, 2017; Caldeira, 2012).

Urban segregation depends on the specific structure of the city, and can be classified under the factors of income, class, race, and ethnicity (Reardon & O’Sullivan, 2004). Marcus (2005) indicates that enclave grouping can be classified as outcast (the community of socially excluded people), immigrant and cultural enclaves (community of same ethnic/lifestyle/thought people) and citadel (spatial segregated uppor income groups). All of these groups are based on habitat selection which is shaped according to the values and environmental conditions. As a result signs, symbols and boundaries reinforce the identity of these groups (Rapaport, 1977).

According to Wirth (2002) enclaves occur sometimes consciously and sometimes unconsciously. However, essentially, grouping of the low income group occurs due to necessity, while the high income group’s cluster which is also named as “gated community” form voluntarily. By the way, gated communities provide security and exclusivity to its residents by security personnels, architectural interventions and physical obstruction (Norton & Mercier, 2016). Crime probabilities in cities, desire of achieving better lifestyle and avoiding of people who ask for money and food are mentioned in the literature as the main reasons for moving to gated housing areas (Roitman, 2005). Additionally, formation of these places occurs as a result of the increasing income inequality in society.

There are different opinions that discuss the results of these contemporary walled islands resulting from socio-spatial distinctions and whether they have negative or positive consequences on urban land.

On one hand it can be defended that people tend to come together because they have more sense of belonging and reliability of these communities which include people from similar backgrounds. Because predictability is increased in these fixed and recognised areas composed from people with similar perspectvies/backgrounds. Moreover they create a social network conveniently, which share the same symbols and unwritten rules, activity systems creating congritive environments (Roitman, 2005). Accordingly these communities provide the possibility of organising and communicating to the inhabitants. On the other hand this spatial fragmentation is against to the dynamics and heterogeneity of the city. The same group of people in a homogeneity are not able to integrate to the community which causes socio-spatial problems especially for disadventaged urban populations causing restrictions by other groups such as denial of basic infrastructure and public services, fewer job opportunities, intense prejudice and discrimination, and higher exposure to violence. In order to prevent these cases it is indicated that more non-segregated environments should be created which are gradually seperated and distributed. (Feitosa et all., 2007; Uzun, 2006).

Housing estates with physical barriers are considered as a different spatial texture and a new form of housing types in the cities after the 1980s (Kurtuluş, 2003). Although it has formed initially as a low-rise and low-density settlement, gated building blocks with high-rise and high-density have taken a place in each urban layer even in the center or periphery of the city in time. By the way, the formation of these types of settlements represents homogenous islets which is opposed to heterogeneity of urban life (K.Hatipoğlu & Mahmut, 2020) and against the "neighborhood" ideas/concepts (Özgür, 2004). According to the concept of neighborhood; social relations, physical environment, cultural and recreational areas in which housing block is located affects the livability of land and satisfaction of users/inhabitants. Opportunities or barriers directly influence the behavior of people; therefore, it has been connected with the general health, happiness and welfare of the individual / family and society (Akyol, 2010).

Today, gated communities are publicized in the market with a clean and peaceful environment in which they provide neighboring relations, offering recreational areas, providing social and commercial spaces inside the islet. In reality, it has tended to elevate the world within itself, excluding the outsiders and creating a city in the city which has been created as a village by architectural details or landscape interventions.

Gated communities have damages on the transition/permeability of urban structure and trigger to sprawl welfare areas on periphery or urban transformation areas in the centers of the cities. Additionally, according to Ipek (2003), these residential areas do not have any contribution to daily life, social facilities within blocks are not used conveniently and it cannot promote an efficient social quality of life. Additionally, he states that daily life is adversely affected due to transportation services from periphery to city center (cited in Özgür, 2004).

3.Fragmentation on Ankara Case

Although spatial segregation in cities has been observed for centuries, the examples in the West have become clear, especially after the industrial revolution. While the employees/workers have lived around the working areas and factories, the upper-class of the city has settled in the periphery away from the complexity/confusion of urban centers. This situation has been experienced in Turkey, as well as in cities around the world in a usual manner.

In the Ottoman period of Turkey, this situation existed in the form of cultural enclaves on the scale of the neighborhood. Even if people have lived in neighborhoods in accordance with their ethnicity or religion, there are common public spaces that bring all citizens together. Rapoport (1977) explains the situation in Antioch, the city southeast of Turkey, as follows; there were several ethnic and religious residential quarters -extremely significant, independent, self-contained, exogamous- and within the quarter/neighborhood one has known everyone and felt safe.

Before proclamation of Republic in 1923, Ankara, capital of Turkey, is composed of Jewish, Christian and Muslim neighborhoods. The Jewish Quarter was close to the center of the city. Today, some of the traditional houses and a synagogue have still stand in the neighborhood which name has changed as İstiklal Neighborhood. Inhabitants of this area have been leaving it because of the deterioration and security problems. Likewise, it is known that there was a church located very close to the present 100. Yıl Bazaar in Ulus and this region is known as a part of the Christian Quarter (Etöz & Esin, 2015).

After seven years of the 1916 fire in Ankara, the city was declared as capital city and even though the socio-spatial atmosphere of the city has changed extremely, the conflict between the traditional and contemporary urban structure continues. Moreover, this socio-spatial segregation within the city has influences on the zoning plans of the city. The plans of 1924 Jansen's and 1928 Lörcher's which aims to create a prestigious neighborhood such as "Devlet Mahallesi"/"Bahçelievler" for high-income group and "Amele Mahallesi"for low-income group, have been the basis for the emergence of dual structures. By the implementation of development plans, habitat selection of the lower income groups has been formed in the north and the middle-upper income groups has been formed in the south of the city (Şenyapılı, 2004). At the same time, with the development of the city in terms of job opportunities, transportation and service facilities, people have migrated from rural areas to there and they have formed small neighborhoods with their relatives.

In the current situation of the city, it can be indicated that the fragmented structure has increased since the 1980s mainly because of the economic situations. Near the center, there are mostly lower income groups, while upper income groups have been trying to move away from the center and move to the periphery. The regions such as Ümitköy, Konutkent and Koru have been developed depending on the projects aiming to address the upper income groups (Şenyapılı, 2004). Additionally, some of the squatter settlements in Ankara have been transformed to new walled islands in order to provide housing supply to citizens who are able to pay huge amounts of money. There are a lot of examples of this odd-transformed urban land, one of the example is Sinpaş Ege Valley Housing Project [Fig. 1], was constructed on Dikmen Valley which was full of squatters before the construction. Then, the area was closed by physical borders; however, there are still squatter settlements around it, and when the area is visited, unseen borders between lifestyles are observable (K.Hatipoğlu & Mahmut, 2020). The situation is totally same in several areas in Ankara [Fig 2-3]

Fig. 1. Sinpaş Ege Valley Housin Project *(K.Hatipoğlu & Mahmut, 2020)***Fig. 2. Güneypark Houses in Çankaya** (Author's Archieve)

Fig. 3. Yonca Life Houses in Yenimahalle *(Author's Archieve)*

Although these housing communities have tended to move away from the center, recently, they have been observed in the vicinity of the city center. The main example of it is the Merkez Ankara Project [Fig 4-5] covering an area of 125 acres. Due to its location, close proximity to the Gençlik Parkı and the Hippodrome, the main advertisement discourse of the project is "located in the Real Center of Ankara" (Merkez Ankara Project, 2019). Thus, people who prefer to live there will be close to many central services/facilities such as public spaces, public transportation stops and office residents.

Fig. 4--5. Images from Merkez Ankara Project *(Merkez Ankara Project, 2019)*

Additionally, such housing communities use common public spaces as an advertisement object. Similar to Park Eymir Houses at the end of Eymir Lake, Park Vadi Houses near Dikmen Valley and Göksu Park Site around Göksu Park; Merkez Ankara Project use Hippodrome and newly constructed City Garden. This leads to commodification of public spaces and using it as an advertisement object in order to generate more income. By the way, it will be possible to deduce that public spaces will be owned by certain groups and exclude others. This means that pseudo-public spaces will be formed with social boundaries together with the residential areas covered with physical walls.

Project catalog has included many statements that were mentioned as definitions of enclave/gated community have been presented as advantages of the Project (Merkez Ankara Project, 2019). The idea of designing a new city within the city, all the elements that provide the vitality of urban life has been implemented within the project.

Another remarkable detail in the project is offering an alternative and modern lifestyle with full privileges in contrast to the traditional lifestyle of Ankara. Security, parking areas, green spaces and sports fields are features of this privileged world and marketing techniques aimed to throw up these features in order to attract people. If the opportunities in residents are increased by the designers of the projects, the cost of the housing unit also will increase and usage of areas will be impossible for the low or middle income groups as is now (Özgür, 2004). By the way, a huge area has been served to a high-income group of people and has prohibited the usage of land by all citizens because of the physical borders and invisible social walls. As a result, segregation tendencies are fuelled by the increasing marketization of the housing sector. Marketing material expresses that people can buy places full of community, new lifestyle, exclusivity, prestige, privacy and security as commodities.

4. Discussion and Conclusion

The research shows the socio-spatial segregation and formation of gated enclaves in the city because of the different lifestyles which generally differs depending on the economic situations of people. General situation in Ankara and Merkez Ankara Project located in the city center as a representative case have been discussed in order to demonstrate and analyse the process of the aformentioned segregation.

So should the new city fictions be more aimed at closing the areas or intertwining them, and these issues will continue to be discussed inevitably. There is a need to transform the city to a direction which creates a livable place for everyone instead of a specific group's needs. As long as this cannot be achieved, social segregation will continue in an acceleration parallel to spatial segregation which damage the heterogeneity and Dynamics of the city. The main objective should be to act for neighbourhoods in which everyone can live together despite their differences. Increasing neighborhoods / islands that are shaped according to income distribution will increase social tension and cause several problems especially for disadventaged groups. Since there is no clear solutions on how the city will internalize these areas and how to avoid closures, a policy with strategies should be developed to dissolve this fragmentation.

In this context it is important to act with local solution , which do not spread the inhabitants into the city and to create an imposed heterogeneity. Weber indicates that the high number of inhabitants and the concentration of settlements made it impossible for the inhabitants of a place to recognize each other mutually (cited in Wirth, 2002). Moreover the neighborhoods should be supported by public spaces and in each other articulated spaces in order to encourage areas for social interaction. However the prevention of this segregation is not possible only with the efforts of planners, but different disciplines such as politics, economy and local authorities should be involved as an actor in the solution process. It is a responsibility for all disciplines to encourage heterogeneity with different backgrounds for the equality and livability of the community main objective is to find a common goal that can bring together all the citizens.

REFERENCES

Akyol, A. (2010). Kapalı Konut Siteleri ve 'Mahalle' Kavramı. *İdealKent , 2*.

Bilsel, C. (2006). Kentsel Dönüşüm, Çözülen Kentler ve Parçalanan Kamusal Alan. *Mimarlık Dergisi* , 327.

Caldeira, T. (2012). Fortified Enclaves: The New Urban Segregation. *The Urban Sociology Reader* .

Etöz, Z., & Esin, T. (2015). *1916 Ankara Yangını.* İstanbul: İletişim.

Feitosa, F., Camara, G., Monteiro, A. M., Koschitzki, T., & Silva, M. P. (2007). Global and local spatial indices of urban segregation ,. *International Journal of Geographical Information Science , 21* (3), 299-323.

Finegean, E. (2017). Garner's Modern English Usage by Bryan A. Garner. *Dictionaries: Journal of the Dictionary Society of North America , 38* (2), 120–133.

Fromm, E. (1976). Original Text in German: " Ich bin, was ich habe und was ich konsumiere". Stuttgart: Sein und Haben.

K.Hatipoğlu, H., & Mahmut, S. B. (2020). Borders (in between): A City within a City Decoding Different Morphologies of Fragmented Housing. *Civil Engineering and Architecture , 8* (5), 880 - 889.

Kurtuluş, M. (2003). Mekânda Billurlaşan Kentsel Kimlikler: İstanbul'dayen Sınıfsal Kimlikler Ve Mekânsal Ayrışmanın Bazı Boyutları. *Doğu Batı* (6), 75-96.

Maloutas, T. (2004). Editorial: Urban Segregation And The European Context, Επιθεώρηση Κοινωνικών Ερευνών. (113), 3.

Marcus, P. (2005). *Enclaves yes, ghettos no: Segregation and the state.*

Merkez Ankara Project. (2019). 2020 tarihinde https://www.merkezankara.com.tr/ adresinden alındı

Norton, W., & Mercier, M. (2016). *Human Geography.* Don Mills, Ontario: Oxford University Press.

Özgür, F. (2004). Sosyal ve Mekansal Ayrışma Çerçevesinde Yeni Konutlaşma Eğilimleri: Kapalı Siteler, İstanbul, Çekmeköy Örneği. *PlanlamaDergis* .

Rapaport, A. (1977). The City in Terms of Social, Cultural and Territorial Variables. *uman Aspects of Urban Form* , 248-315.

Reardon, S., & O'Sullivan, D. (2004). Measures of Spatial Segregation. *Sociological Methodology* , 121-162.

Ritzor, E. (2007). *The Blackwell Encyclopedia of Sociology.*

Roitman, S. (2005). Who Segregates Whom? The Analysis of a Gated Community in Mendoza, Argentina. *Housing Studies , 20* (2), 303-321.

Simmel, G. (1950). *The Sociology of Georg Simmel* . New York: The Free Press.

Şenyapılı, T. (2004). *Barakadan Gecekonduya: Ankara'da Kentsel Mekânın Dönüşümü.* İstanbul: İletişim.

Uzun, N. (2006). Yeni Yasal Düzenlemeler ve Kentsel Dönüşüme Etkileri. *Planlama Dergisi* .

Wirth, L. (2002). Bir Yaşam Biçimi Olarak Kentlileşme (Translation). A. Alkan, & B. Duru. içinde Ankara: İmge Yayınevi,.

Chapter 13

THE ARCHITECTURAL USE OF ALUMINUM IN 21ST CENTURY

Mustafa KUCUKTUVEK[1]

1 Associate Prof. Dr., Antalya Bilim University, Faculty of Fine Arts and Architecture, Department of Interior Architecture, Antalya, Turkey

1. Introduction

New requirements have arisen for advanced structures. These requirements lead architects to make energy-efficient and ecological designs. This new change in the 21st century creates new developments in architecture and construction techniques. Modern architecture should be human friendly. If the development in building materials is well understood, it becomes easier to make designs with aesthetics, durability, longevity, recyclability, and low carbon emission in addition to modernism in architecture. However, there are not many building materials available that can meet these expectations of architects.

Few building materials are available that respect the natural environment and are suitable for responsible use of natural resources. There are important expectations from the lands and the construction sector in terms of sustainability. At the same time, building materials should be useful. For example, high strength building materials that are easily available, easy to assemble, and can be produced in complex shapes are more preferred (Biedrońska, J., Misiołek W. Z. 2009).

Extruded profiles, which have a wide variety of uses in architecture, have superior properties that cannot be found in other building materials. Among these features, there is also the production of aluminum in many geometric ways. Aluminum structures have more common design options than steel structures. This flexibility and diversity in manufacturing and design made aluminum even more preferred in the 21st century. Again, mounting options such as welding bonding and mechanical joining, which cannot be applied in every building material, are among the superior properties of aluminum. Recently, researchers are even more concerned with the history of aluminum, which started to take its place in the construction industry in the last century (Bojęś A 2006).

The use of aluminum in the door and window joinery; It started in Poland and western Europe before World War II. In the 1950s and early 1960s, aluminum began to be used together with glass and composite plates, especially on building facades. This development played an important role in the development of energy-efficient lightweight building facades. This new technology has provided the potential to bring aesthetics to the fore in architecture. These characteristic facades are common in 1950s American architecture. Over the years, there have been different trends for the use of aluminum in architecture to increase or decrease. The main reasons for these trends are generally the cost of aluminum as well as the application cost during the manufacturing process on the construction site (Tobin J. 1996).

Aluminum producers need to increase their dialogue with the architectural and construction industries. The purpose of this book chapter is not only to discuss how much we have learned and applied aluminum in the 21st century but also to discuss alternative opportunities for aluminum as a structural and decorative material in architecture. There is a new attraction in architecture that creates new opportunities for aluminum and aluminum profiles. Significant developments in architectural design create an opportunity for new aluminum products to emerge. Close cooperation between the aluminum industry, particularly aluminum manufacturers and architects, can significantly contribute to both groups. Regarding the scientific developments for the use of aluminum in architecture, we can say that education has an important role in both the architecture and engineering/design communities. We need to warn the Aluminum community about potential possibilities in an architectural design known as green architecture, or particularly about the possibilities known as the LEED (Leadership in Energy and Environmental Design) Green Building Rating System® in the USA (URL-1; Biedrońska J. and Misiołek W. Z 2008).

The reason why aluminum has become widely used and popular in the last century is its strength and versatility. Aluminum can be described as a revolution not only in architecture but also in other leading industries in the last century. Aluminum alloys were not used for structural purposes before. It was generally used for decorative purposes. The reason for this may be that it can be easily shaped and polished.

For this reason, aluminum was used for decorative purposes in the Empire State Building, which was built in the early 20th century and became the tallest building in the world for many years. It is generally preferred to be used in window joinery, elevator doors, and decorative strips. Other uses of aluminum in the 20th century can be listed as gutters, roofing, panels, and other decorations.

The biggest reason why aluminum was not preferred in the building sector in the last century was its cost. However, there were some technological developments in the production of aluminum. Therefore, the production cost has decreased by approximately 80%. Aluminum, which has started to be preferred in structural applications due to the decrease in cost, has found new application areas.

In the 21st century, aluminum began to be widely used in architecture, door and window joinery, roof and facade cladding, canopies, balustrades, and divider walls.

Aluminum, which was not popular in the past, continued to push the boundaries until the 21st century. Modern aluminum alloys, for example, can easily support the weight of heavy glass openings. Thus, it can maximize the amount of natural light to buildings. The combination of glass and aluminum frames in skyscrapers pushes the boundaries around the world due to their superior properties. In addition to achieving gravity-defying shapes, aluminum frames allow the design and build of buildings that are taller, more energy-efficient, and with significantly reduced CO2 emissions than ever before.

Aluminum window frames and facade covering are extremely resistant to any corrosion that the weather can create, including acid rain, and will not be damaged by cleaning products. Besides, unlike wooden or PVC-U frames, aluminum window frames do not swell, crack, split or bend over the years due to moisture and heat, regardless of the weather. Aluminum is a cheaper alternative to wood. Time and money can be saved in maintenance. With the right glass options, aluminum windows have good thermal performance.

The reason for the worldwide popularity and strength of aluminum's building and construction materials is that it is low in cost compared to its quality, it is environmentally sensitive, and allows the most important architectural designs in the world to be realized. These superior properties of the material play a key role. Due to the flexibility that aluminum provides in the design, customers may demand light streaks, bright colors, or wavy surfaces. New aluminum production technologies have the potential to best meet the requirements of the building industry. As we mentioned before, it is also possible to achieve these unique designs in an environmentally friendly and affordable way.

The most vital in any commercial building or residence is fire protection. Only fireproof architectural products can be used in buildings over 20 meters in height, according to international standards. However, regardless of the height of the building, these fire resistance requirements apply in all cases, especially in public buildings (such as hospitals, kindergartens, schools, hotels, train stations, and airports). A1 is the largest non-flammability class. Some aluminum building materials are not only fire-resistant but also have the highest A1 rating according to the worldwide non-combastibility standards (DIN EN 13501; DIN 4102-20; 96/603/EC).

2. Suitable characteristics of aluminum for architecture

Aluminum alloys are highly valued for their lightweight, easy shape, and environmental friendliness. One of the primary reasons why aluminum is invaluable for architectural purposes is its extremely high weight/strength ratio. For this reason, wide glass openings, a common feature of skyscrapers, are made possible by aluminum. It is also fire resistant and has some other physical properties that make this material safer than other building materials.

Aluminum is different from other building materials with its stylish appearance. With developing technology, it is possible to have a variety of products in which different metallic colors and brightness are obtained. Aluminum, which can also be used structurally, manages to attract the attention of designers with its excellent formability. One of the reasons why aluminum has started to be preferred in the modern architecture of the 21st century is its durability. Due to the natural anodizing property of aluminum, it is much higher against corrosion than other metals. Compared to other building materials, it is resistant to all weather conditions and is not affected by harsh climatic conditions. Since it is long-lasting and its maintenance cost is low.

Aluminum's wide application variety in buildings and its excellent performance even in the most challenging conditions have pushed the limits of what is possible by enabling architects to take great steps in design in the last century.

3. How aluminum changed architecture?

Since its widespread emergence in the early 20th century, aluminum has been a revolutionary driving force in modern architecture. It is strong, lightweight, durable, endlessly recyclable, corrosion-resistant, and can be transformed into almost any other traditional structure such as aluminum, brick or wood realizes what its materials cannot do in architecture.

4. The manufacturing process and technical properties of aluminum

The basic components of bauxite (Al2O32H2O) are used in the production of aluminum in architecture and industry. Bauxite contains hydrated aluminum oxides and some silica and iron. There are also aluminum ores other than bauxite. Some of these are corundum, kaolin or china clay, and chrysolite. The ore is first purified by Bayer's process and then reduced to aluminum in two stages by Hall Hiroult's process. In the first stage, roasting, grinding, heating (with sodium hydrate), and filtering are used to convert bauxite to alumina. It is then shaken for several hours at 1000 °C to precipitate the hydrate which has been separated, washed, and calcined. In the next step, aluminum is extracted by electrolysis of alumina in a molten crystallite bath (a fluoride consisting of alumina and sodium). Aluminum is shiny metal and has a silver-white color. Aluminum is malleable, less ductile than copper, but superior to zinc, tin, and lead. Aluminum is a very light, soft, strong, and durable metal. It has low thermal conductivity but is a good conductor of electricity. Aluminum can be riveted and welded, unfortunately not soldering. Aluminum is a harder material than tin. The tempering degree is 350 °C. Tensile strength is 117.2 N/mm^2 in the form of casting, but 241.3 N/mm^2 when pulled on wires. Its melting point is 657 °C. Aluminum is known to be resistant to nitric acid, dissolving slowly in concentrated sulfuric acid and soluble in hydrochloric acid. It is not affected by carbonic acid, carbonic oxide, sulfur, vinegar, seawater, and the like at normal temperature. However, it is rapidly eroded by caustic alkalis (Duggal, S. K. 2008).

5. The use of aluminum

Since pure aluminum is very soft, it is not suitable for structural purposes. Copper, manganese, zinc, silicon, nickel must be alloyed with aluminum to obtain structurally satisfactory properties. Aluminum is the most suitable material for making roof and facade systems, door and window frames, balustrades, and corrugated sheets. Since aluminum sheets are resistant to corrosion, they can be used on doors to prevent rotting in bathrooms and stamp them in various ways. It consists of aluminum alloys, angle brackets, channels, I-sections, round and rectangular pipes, rivets, and bolts. Besides, aluminum powder is used in paint production. Aluminum is used in internal combustion engines and aircraft. Also, kitchen utensils and medicine, chocolate, etc. It is also widely used in the production of packaging (Duggal, S. K. 2008).

There are some obstacles to the use of aluminum in architecture. We can explain these obstacles as follows. Considering that aluminum with lower hardness is three times lighter than steel, part of the price difference can be compensated. However, it is known that the price of aluminum is about three times the price of steel. They are resistant to architects working with new methods of production and construction of plans that require industrial buildings rather than manufacturing. For this reason, it is increasingly difficult for aluminum to stay out of building material. As it is the most delicate material on architectural objects, producers must have sufficient knowledge of artistic form, technical and technological physical properties. Working with aluminum requires precision and punctuality of details and an understanding of construction physics. In other words, the application of aluminum on architectural objects is not based on any improvised repair or additional repair and intervention that is nothing that is considered "normal" in manufacturing or traditional construction. Another reason is the traditional resistance of some architects to all sorts of new things and materials and in this case aluminum. So what is the state of aluminum and its application in architecture? It seems that the three reasons mentioned above are slowly being overcome. When architects know aluminum at least as much as they know about concrete or steel, we can say that the possibilities for shaping aluminum will increase further and its intensive application in architecture is possible (Dunovski. V. and Balkoski, D. 2016).

The basic and usual material for a window for a long time was wood and natural stones. In time, human beings have started to use metal constructions, and today light metal constructions and polyvinyl chloride (PVC). It has many advantages, especially if profiled aluminum constructions are used for large windows. The most outstanding properties of aluminum are durability and resistance to deformation caused by external factors (Dunovski. V. and Balkoski, D. 2016).

Due to the superior properties, we have mentioned, aluminum is widely used in many sectors. The main sectors are transportation, electricity, packaging and food industries, and architecture. Aluminum is a metal building material that offers both environmental and economic advantages due to its recyclable feature. Recyclability and environmental awareness are among the most important parameters in terms of sustainability. For this reason, it is a valuable building material in terms of sustainability. As it is known, the commercial use of aluminum started at the end of the 19th century. It was used in some applications in the construction industry in the 20th century, and today it continues to grow rapidly with the development of aluminum alloys. As a result, aluminum can be considered culturally a symbol of modernity in architectural design. Technological breakthroughs and economic growth have taken place in the 21st century. This development in technology has allowed aluminum to be used in new applications by going beyond its traditional use. New options such as the use of nanorods, 3D printing, composite materials, aerospace, and biomedical devices are among the current applications of aluminum.

The use of aluminum is expected to increase significantly in the 21st century. This is due to aluminum's excellent structural and aesthetic characteristics, significant scrap value, and accelerated global production, as well as a growing recycling market. The use of aluminum will continue to be a part of our daily life for centuries. Therefore, with the increase in aluminum production and consumption, it is necessary to minimize the negative environmental side effects related to the technological developments in aluminum production. At the same time, it can be said that additional research and development studies will be needed to create more technological innovations in the coming years (Ashkenazi, D. (2019).

The discovery of new materials and the development of new technologies has not only irreversibly changed humanity's cultures since ancient times but also affected our environment. The term "material of past cultures" is often used in archaeological studies, focusing on ancient objects as evidence of past civilizations (Hurcombe, 2014).

Material Culture, the materials used, consumption habits and purchasing, the use of altered items, work tools, the trade of artifacts, the trade of household goods, and the relationships between civilizations and their physical objects (objects), including the interpretation of objects, rituals and individuals using the objects, and surrounding buildings represent the relationships between. These physical objects on our planet reflect the society in which we live, the social status of man, and therefore material culture prevails in our world. Innovation, which is based on technological breakthroughs, shows itself as a dynamic process that produces economic growth and social benefits, although it changes over time (Hekkert et al., 2007; Li et al., 2018).

In order to achieve technological sustainability in the 21st century, social changes such as new regulations and industrial networks are inevitable (Hekkert et al., 2007).

6. Aluminum pergola/canopy application examples

6.1. Example I

The example I is a sliding glass system with a thin aluminum frame, double glazed panel. The system is made of minimally designed thin-framed aluminum profiles and is particularly suitable for large-area applications. It is completed with aesthetic and ergonomic accessories that perfectly fit into modern architectural living spaces.

The system has a silent and easy sliding movement and the sliding panels in a single row can be moved horizontally in one direction or parallel to both directions. Pergola applications are shown in Fig. 1. a, b, c.

Figure 1. a, b, c. Pergola and lighting application (URL-2)

6.2. Example II

Example II is an aluminum bioclimatic system that expands the usage options of outdoor living spaces with its high performance and allows you to provide climate control in all weather conditions thanks to its adjustable angled lamellae. An innovative concept, a practical and modern touch added to outdoor living spaces in example II. Pergola and lighting application examples are displayed in Fig. 2. a, b.

Figure 2. a, b. Pergola and lighting application example (URL-2)

6.3. Example III

Example III special architectural model is designed to provide stylish solutions for every project. Architectural models provide a suitable solution for every request with different mounting and carrier shapes. Canopy example is displayed in Fig. 3. a. b.

Figure 3. a. b. Canopy example (URL-2)

Due to the architectural requirements, the need for entrance cover in various forms and sizes arises. These types of eaves, canopies, etc. designs created by using materials of very different qualities are worked on specific to the project.

6.4. Custom built to fit your application.

Perfection Canopy Systems provide long-lasting protection from the elements while harmonizing with nearly any architectural and site design. The extruded aluminum systems resonate quality and value from any angle (URL-3).

6.5. Canopy design made easy

To design an aluminum canopy; the substructure configuration, width, and height must be measured first, then column and beam dimensions must be selected. Then the required spacing between the sub-structure has to be selected, then the foundation style has to be decided, a deck profile has to be chosen and finally, a finish has to be chosen. A canopy example is displayed in Fig. 4.

Figure 4. A canopy example (URL-3)

7. Aluminum joinery systems

Aluminum joinery hinged window and door frames are quite common as systems used in living spaces. The expected features of these systems can be listed as the ability to feel the external environment sound at a minimum level in the space, to take the needed daylight into the environment, and to offer a comfortable use, especially the thermal insulation and air-water sealing performance. Hinged systems are very rich in terms of usage options and they have many aesthetically oriented additional solutions such as hidden sash windows and flush doors, as well as standard uses such as inward and outward opening door-window, double-axis, transom, pivot.

7.1. Aluminum automatic sliding doors

Nowadays, doors should be functional, fast, aesthetically easy to open and close without any problems while providing entry and exit to spaces and offer aesthetics, comfort, and prestige together. The most important reason why automatic sliding doors are preferred is the air conditioning feature; In this way, automatic doors provide heat savings in winter and protect the indoor air in summer.

7.2. Why can aluminum window frames be used outdoors?

Aluminum window frames and facade covering are extremely resistant to any corrosion that the weather can create, including acid rain, and will not be damaged by cleaning products. Besides, unlike wooden or PVC-U frames, aluminum window frames do not swell, crack, split or bend over the years due to moisture and heat, regardless of the weather. Aluminum is a cheaper alternative to wood. Time and money can be saved in maintenance. With the right glass options, aluminum windows have good thermal performance.

7.3. Heat insulated aluminum door and window joinery system

The aluminum window and door system, which adds visual appeal to your building with its unique line and reduces your energy consumption by 60% with its high thermal insulation, can fulfill most architectural expectations with its wide range of application options. The windows and doors are enriched with new options and the joinery system brings along application and assembly facilities. The heat-insulated aluminum joinery system is shown in Fig. 5.

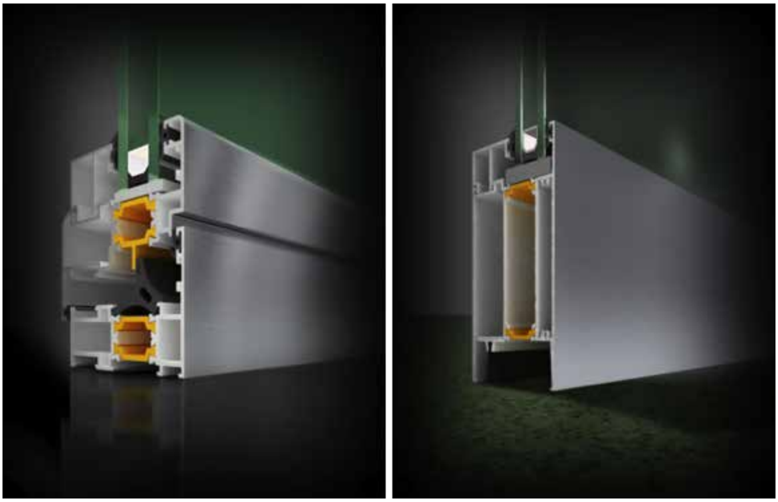


Figure 5. Heat insulated aluminum door and window joinery system (URL-4)

8. Aluminum divider walls

Today, interior partitions of modern offices are formed by various types of interior partition systems with aluminum carriers. Offices, which are formed in a blank way, provide a more transparent working environment and gain importance in terms of architecture.

9. Aluminum mesh cladding systems

Aluminum mesh cladding systems are generally applied for visual purposes in fire stairways or sunshades on the covered facade. Depending on the project, it can be different colors, patterns, and sizes of pore gaps. Expanded metal products are resistant to the external environment and are an excellent facade cladding material.

It also represents an important decorative value in facade claddings. Architects can create their unique styles with our unlimited facade designs, with different colors and designs in our products, and thus differentiate them.

Aesthetic touches that shape metal are important in the construction and building industry. In this way, artistic structures emerge. However, another important issue is the materials used in construction and buildings. As the variety of materials increases, much more modern and comfortable structures emerge. While mesh is among the important elements used in the construction industry, it is also an important material for the industry.

9.1. What are its highlights?

It is known as mesh expanded, which is used as a building material in the construction industry. This product is obtained by cutting and expanding. It has an important use in the construction industry. In terms of having a decorative structure, it is a product that is used in many architectural and industrial areas.

9.2. Other important features of the mesh standard product

- The size of the product can be extended as far as the selected eye range and the grid allow.

- Mesh Standard can be produced from materials such as Aluminum, Stainless Steel, and Copper.

- Various eye range options are available. These range options can start from 6 × 10 mm dimensions up to 50 × 115 mm.

- In metal mesh production, the width is maximum 3 meters. (URL-5)

REFERENCES

Ashkenazi, D. (2019). How aluminum changed the world: A metallurgical revolution through technological and cultural perspectives. Technological Forecasting & Social Change 143 101–113

Biedrońska, J., Misiołek W. Z. (2009) Application of aluminum in "green" architecture – today and tomorrow. Architecture Civil Engineering Environment. The Silesian University of Technology No. 1

Bojęś A. (2006). Aluminium in architecture as material, technique and aesthetics. Świat Aluminium, 5/2006

Hurcombe, L. (2014). Archaeological Artefacts as Material Culture. Routledge, NY.

Biedrońska J. , Misiołek W. Z. (2008). The Role and Use of Aluminum in "Green" Architecture. Proceedings of the Ninth International Aluminum Extrusion Technology Seminar ET '08, Orlando, FL, USA, 13-16 May 2008, Vol.I, p.649-656

DIN EN 13501 (2018). Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; English version EN 13501-1

DIN 4102-20 (2017). Fire behaviour of building materials and buildıng components - part 20: complementary verification for the assessment of the fire behaviour of external wall claddings

Duggal, S. K. (2008). Building Materials, New Age international Publishers**.** New Delhi

96/603/EC (1996). Commission Decision of 4 October 1996 establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products

Dunovski. V. and Balkoski, D. (2016.) Development of Aluminum in Architecture Int.

Hekkert, M.P., Suurs, R.A., Negro, S.O., Kuhlmann, S., Smits, R.E., (2007). Functions of innovation systems: a new approach for analysing technological change. Technol.

Hurcombe, L. (2014). Archaeological Artefacts as Material Culture. Routledge, NY.Journal of Engineering Research and Applications.

Li, M., Porter, A.L., Suominen, A., (2018). Insights into relationships between disruptive technology/innovation and emerging technology: a bibliometric perspective. Technol. Forecast. Soc. Chang. 129, 285–296.

Tobin J. (1996) An Architect's Perspective on Aluminum. Proceedings of the ET '96 Seminar, Chicago, IL, USA, vol.2, 263-265

URL-1 Green Building Rating System®. www.usgbc.org. Accessed date 10.12.2020

URL-2 Suntech Unique Outdoor life. http://www.albayrak.com/urunler/index.html Accessed date 10.12.2020

URL-3. Perfection Architectural Systems. LLC an AVAdeck Company http://www.perfectionarch.com/products/flat-canopy.php. Accessed date 10.12.2020

URL-4: http://www.elipsyapi.com.tr/sistemler.php Accessed date 10.12.2020

URL-5: http://www.sisikaluminyum.com.tr/tr_tr/aluminyum-mesh-kaplama-sistemleri/ Accessed date 10.12.2020

Chapter 14

THE EFFECT OF TECHNOLOGICAL DEVELOPMENTS IN ALUMINUM ON ARCHITECTURAL CLADDING SYSTEMS

Mustafa KUCUKTUVEK[1]

1 Associate Prof. Dr. , Antalya Bilim University, Faculty of Fine Arts and Architecture, Department of Interior Architecture, Antalya, Turkey

1. Introduction

It can be said that the main task of architects is to create an atmosphere suitable for performing a certain function of humans. Today, although indoor and outdoor spaces are shaped with equal responsibility and seriousness, the environment in which people spend most of their time is the interior. A building as a closed area provides protection from external climate and weather changes and must provide the necessary conditions for working and living regardless of outdoor weather and climatic conditions, sounds, and noises. Spaces made up of windowed exterior walls are a vital shell in which many useful human activities take place. The evolution of the window is as old as the architecture itself. Mankind has been working to improve windows and doors since the beginning of architecture. One of the features of this evolution of the window is due to the relationship of the surface of the window hole to the outer walls. The advancement of technology has had an impact on the techniques and capacity of construction. This development also had an impact on the enlargement of window sizes. From this, we can conclude that windows and window openings are and still are an important means of expression in architecture. In addition to creating a visual contact with nature, the windows provide daylight and air to the rooms and underline the structure's role as a human living space that is not found in any other element of the building (Dunovski. V. and Balkoski, D. 2016; Sanda, A. *et al.* 2019).

The design of a facade is a very good example of how the physical properties of aluminum are justified in both design and final application. It is very beneficial to use a wide variety of extruded aluminum profiles with different geometries and mechanical properties in the design and manufacturing processes of energy active glass facades. The requirement for joining is particularly important due to the need to install large panels to be used as building facades (Biedrońska, J., Misiołek W. Z. 2009).

The role and function of the exterior wall in buildings is very important. External walls should be statically appropriate, architecturally aesthetic, suitable for the functionality of the space, providing the necessary internal regime, resistant to climate changes such as rain, snow, wind, heat, cold, sun, and have noise-preventing properties. All these needs and tasks, wood, stone, brick, concrete, etc. It has been tried to be removed by traditional building materials. However, today there is a rapid development of technology in the building materials industry and the expansion of new building materials with high qualities. The leading properties of these building materials; They are lightweight, have the ability to dry assembly and eliminate all wet processes in the structure, are immune to oxidation and diffusion of steam, have good sound and heat insulation, are good for transportation and assembly, and offer new opportunities for architectonic forming. Such new building materials replace traditional materials such as wood, brick, stone, and concrete because they can better meet the needs of an exterior wall (Dunovski. V. and Balkoski, D. 2016; Zamora, J. L. And Calderon, J. M. 2007).

2. Aluminum Products for Fire Safety

The most vital in any commercial building or residence is fire protection. Only fireproof architectural products can be used in buildings over 20 meters in height, according to international standards. However, regardless of the height of the building, this requirement applies to public facilities such as nurseries, schools, hospitals, hotels, and airports in all circumstances. Aluminum construction materials are not only fire-resistant, but many of our products have also achieved the highest A1 rating in accordance with non-combustibility standards (DIN EN 13501, DIN 4102 and 96/603/EC).

3. Aluminum is a Sustainable Environmental Solution

It is considered the material of the future in the aluminum building sector and architecture. (Ajla Aksamija 2013). This is because it is 100 percent recycled. It can be recycled by consuming 95 percent less energy compared to the production of aluminum from ore and without any change in the quality of aluminum. Moreover, this material maintains its importance among sustainable materials as it can be recycled more than once. Today, aluminum production is largely made from primary sources, but approximately 35 percent is produced from recycled aluminum. For most aluminum products, it can be used simply with the potential to be recycled without any loss of natural properties. Therefore, the life cycle of an aluminum product used on building facades is not the traditional “cradle to grave” sequence. It is a renewable “cradle to grave” cycle. Thanks to its endless recyclability feature, it is known that a large part of the approximately one billion tons of aluminum produced until now is still used in the production cycle and a part is recycled many times. An important feature that distinguishes aluminum from other materials is its long life. Therefore, the demand for aluminum is increasing. In order to meet this demand, primary aluminum production will continue to be higher than for converted aluminum. However, improving the products used and increasing their efficiency is an important element for sustainable development.

Increasing the amount of aluminum collected worldwide with the contribution of local authorities in recycling is one of the important parameters for leaving a good future (URL-1).

4. Structural Aluminum Curtain Wall Systems

Extruded profiles produced from aluminum and alloys used in architecture, a wide variety of geometric shape options with unique physical properties. This diversity makes aluminum structures superior to commonly used steel structures. Aluminum is preferred in architecture due to its design and manufacturing flexibility. It allows easy assembly using important techniques such as aluminum, welding, mechanical or adhesive bonding. Researchers are very familiar with the use of aluminum in architecture and construction and the history of aluminum application in this field (Bojęś A.2006).

With the advancement of technology, architects and designers have sought new products that will bring together technical features (thermal insulation, durability, sound absorption, etc.) and aesthetic concerns.

Hotels, business centers, congress and movie theaters, theaters, cultural centers, museums, etc. With the use of aluminum in important architectural structures, buildings that are worthy of 21st-century building technology can be designed.

4.1. Structural Silicone Aluminum Stick Facade System

When viewed from the outside in the facade system, an aluminum profile is not seen, and a complete glass appearance is created. The width and depth of the joint gap between the glasses can be solved in different sizes depending on the architectural and static requirements. In the joint gaps between two glasses, silicone filler or cord joint gap and alternatives can be selected. If desired, hidden wing mechanisms can be placed inside the modules by applying a wing profile.

4.2. Cassette Structural Silicone Aluminum Stick facade system

In the cassette structural silicone aluminum stick facade system; glass cassettes adhere to the cassettes made of aluminum profiles with structural silicone. The glazed cassettes prepared in the factory provide quick assembly on site. With this system, it is possible to install glass inside the building. The width and depth of the joint between two glass modules can be solved in different sizes depending on architectural and static requirements. Silicone sealant or EPDM roving alternatives can be selected for joint gaps. If desired, hidden wing mechanisms can be placed inside the modules without changing the details.

4.3. Half Covered Aluminum Stick Systems (Two Sides)

It is possible to achieve different effects by using only horizontal or vertical cover profiles in the facade system. Cover profiles in different sections and forms can be used according to visual requests. Wing application is also possible in semi-lidded systems.

4.4. Aluminum Composite Panel Cladding Systems

It is the construction of the building envelope created with aluminum curtain wall systems with a modular technique. All components that make up the panel facade modules are turned into finished products in a controlled factory environment and assembled on site (Ajla Aksamija 2013).

High-quality product

Fast assembly opportunity

Completion of manufacturing under the quality control system in the factory environment.

The technical drawing details are giving Fig. 1.

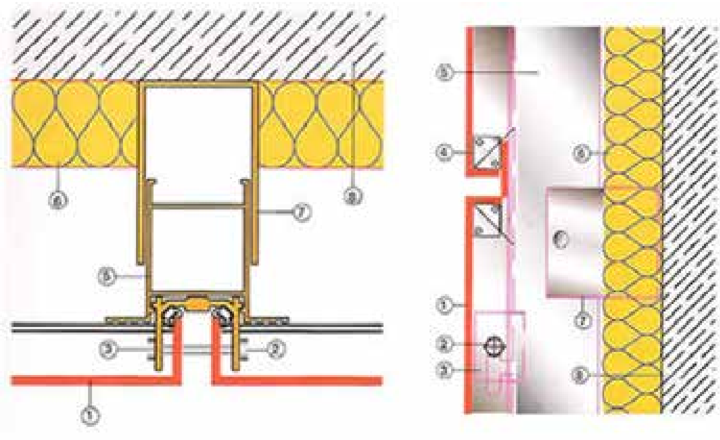


Figure 1. Aluminum composite panel cladding systems (URL-2)

It is a type of cladding made with a “fire-resistant” (non-flammable) aluminum composite panel developed to be used on the exterior facades of buildings. In addition to standard production sizes, optional special sizes, products with painted surfaces covered with high-strength protection film are used. Solid, metallic, sparkling (silvery), natural stone, and wood pattern color options are available. Colors are 30% brightness as standard. Depending on the architectural preference, it is possible to produce between 30% and 80% brightness. Thermal insulation is provided behind the composite panel cladding, in front of the wall, with the application of rock wool and vapor balancer. It is also possible to make claddings with painted aluminum sheets with a cross-section of 2 or 3 mm (URL-2).

4.5. Covered Curtain Wall Systems

The aluminum cover profile of various widths used on the outer surface of the covered curtain wall system can be applied in many different geometric forms according to the demands of the architects.

4.6. Double Facade Systems

It is the resolution of the building envelope with a double skin supported by a second facade. It is possible to create a double facade by using different aluminum curtain wall systems together. The facade systems and material types to be used can be decided according to the building concept. Double façade systems are widely used especially in projects where heat and sound performances should be high. Especially in terms of architecture despite the high cost of double facades that are widely used in Europe.

5. Transparent Facades

5.1. Transparent Facades with Steel Carriers

Double glazing or laminated single or double glazing glasses, which are punctured on four sides employing special stainless steel ball joints, are mechanically attached to the carrier steel construction. In this system, main carriers can be made with various alternatives in the form of normal steel or stainless steel in line with architectural demands. EPDM roving and ultraviolet resistant silicones are used for waterproofing in glass joints.

According to architectural preference, the supporting construction can be created vertically or horizontally. Stainless spider holders can be designed in different ways according to the feature of the project.

5.2. Transparent Facades with Glass Columns

In transparent facades, the rear carrier glass column is formed by laminating glasses that have passed the “heat soak” test due to static and safety conditions. Due to the high application height and manufacturing limits of glass plates, joints can be combined with stainless steel plates. The façade glasses, which are pierced on four sides without the need for any carrier in the horizontal, are mechanically connected to the rear glass carriers by means of stainless ball joints. In this transparent facade system, glasses can be used as a laminated single glass or laminated double glass.

5.3. Steel Tensioned Transparent Facades

It is a curtain wall system used to create movement and difference in architecture. Without steel or aluminum collage, the loads on the glass surface of the facade cladding material are transferred to the high-strength stainless steel tension members via the glass handle. In the system, horizontal and vertical glass joints are sealed with ultraviolet resistant silicone.

6. Aluminum Skylight Systems

A second carcass is created by using aluminum profiles on the main carrier steel construction. Glass or opaque materials of suitable sizes are adapted into this carcass. Depending on the openings passed, system solutions can be made with aluminum profiles without the main carrier steel construction. Profile sections are dimensioned by calculating snow, wind, and live loads in accordance with the relevant norms and local regulations. The rainwater drain and cleaning system must be solved. Smoke evacuation or ventilation windows can be opened into skylight systems (Fig. 2).

Figure 2. An aluminum skylight example (Elips Yapı) (URL-2)

7. Ceramic Curtain Wall Systems

Ceramic facade cladding system (Fig.3); It is applied together with the carrier aluminum construction on the deaf parts of the buildings. Ceramic facade cladding system It is one of the preferred materials for interior and exterior facades due to its high abrasion and impact resistance, low water absorption, stain-proof, easy installation, resistance to external weather conditions, and many color and size options.

The ceramics used on the facade offer various color and texture options and add color to the facades, especially with their granite patterned options.

Aluminum profiles are used as the sub-construction, and rock wool or glass wool is also installed behind the ceramic cladding on exterior facades where thermal insulation is important. The installation of ceramics is done by mechanical methods thanks to the special apparatus for the aluminum substructure created.

It has taken its place in the curtain wall sector with its fast assembly, resistance to climatic conditions, and light structure that does not load the facade.

Figure 3. Ceramic facade cladding system (Elips Yapı) (URL-2)

8. Natural Stone Cladding

Various stone materials are assembled on their special construction after the stone wool laid in front of the wall. Surfaces in many natural and artificial views are obtained.

Stone claddings are an increasingly used method in the building sector because of protecting the buildings from external factors in today's architecture, maintaining the indoor climate, not requiring periodic maintenance, being natural, durable, and aesthetic.

While it offers advantages to users, its color not fading and resistance to freezing-thawing allow it to be used in all conditions. Cultural stones are becoming an important facade cladding alternative with advantages such as lightness compared to natural stone, less cost in purchase and application, fast and practical application, and no maintenance cost. Aluminum and natural stone cladding systems should be combined.

9. Compact Laminate Claddings

Exterior compact laminate panels used on the exterior have extra effective air protection in accordance with the norms (EN 438 2016).

The protective layer on its surface ensures that the panel is resistant to heat, freezing, water, and steam (weather conditions), resistant to impacts, long-lasting color, and resistant to acid rain. Panels have B1 class fire resistance according to the norm (ÖNORM B 3800/1).

Panel thicknesses are between 2-20 mm. Exterior compact laminates, which can be used with application methods such as hidden or visible screwing, mechanical mounting, bonding system, hanger system with hanger system, siding system, and colored rivet system, can be used in all types of facade designs with a wide variety of color alternatives. can be used.

Compact Laminate; They are facade cladding boards obtained by saturating a large number of craft papers to phenol resin under high temperature (150 °C) and pressure (100 bar kg/cm^2), forming a layer of decorative paper impregnated with melamine resin. Compact laminate panels are producing according to the quality norms (EN 438 2016).

Since the building surface and the cladding are completely separated in buildings covered with a compact laminate facade cladding system. As well as providing the level of ventilation, humidity, heat loss, and temperature differences are prevented. With its wide range of color and pattern options, it offers more flexible and creative solutions compared to other curtain wall panels derived from metal and composite (Cikis, D. T. 2007).

9.1. Application Areas of Compact Laminate Panels Exterior Cladding Panels

Since the plates commonly used on the exterior of buildings can be easily processed just like wood, they can also be used in the manufacture of outdoor furniture.

Advantages of Compact Laminate Panels:

-Color and pattern richness

-Ease of maintenance and repair

-Does not contain harmful substances

-Resistant to UV rays and guaranteed color fastness

-Resistance to atmospheric conditions

-Fire resistance

-Physical resistance to impacts such as impact and scratching

-Chemical resistance against effects such as acid rain and air pollution

-Providing the opportunity to obtain an aesthetic image

-Economics

-Advanced technology

9.2. Application Techniques of Compact Laminate Panels

9.2.1. Hooked system

It is a mechanical mounting system that can be applied for compact laminate panels with 8 or 10 mm wall thickness (Fig. 4). Special cross-sectional aluminum rails are mounted horizontally to aluminum angle profiles, which are connected to the building facade by means of vertical brackets. Channels are opened for the joint lath to be placed on the joint edges of compact laminate panels. The brackets attached to the back of the panels are attached to aluminum rails with adjustable screws. The joints are covered by inserting a compact laminate joint lath of 3mm thickness between the joints. The main principle in choosing this system is the climatic conditions or the specific situation of the project. It is the oldest system related to compact laminate curtain wall systems and has been abandoned in the world since 1995. It should not be forgotten that it is more expensive than the bonding system, the application time and workmanship is increased by half.

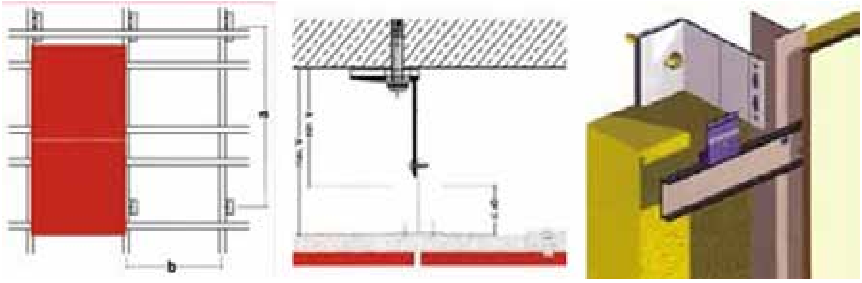


Figure 4. The compact laminate panel, hooked system (URL-2)

9.2.2. Bonding System

It is applied by bonding compact laminate panels with a wall thickness of 6 or 8 mm to aluminum T and L profiles anchored to the building facade using brackets or to the steel profile frame system anchored to the building facade employing chemical dowels and metric rods (Fig. 5). Panel thickness is entirely related to climatic conditions, and joint gaps between panels can be open, as well as joint closure systems such as damper and lamp. In roof parapets, the joints are closed with the joint cladding system developed and elastic mastic is applied over the joint, which is resistant to weather conditions. The joint gap distance should be equal to the panel thickness in open systems.

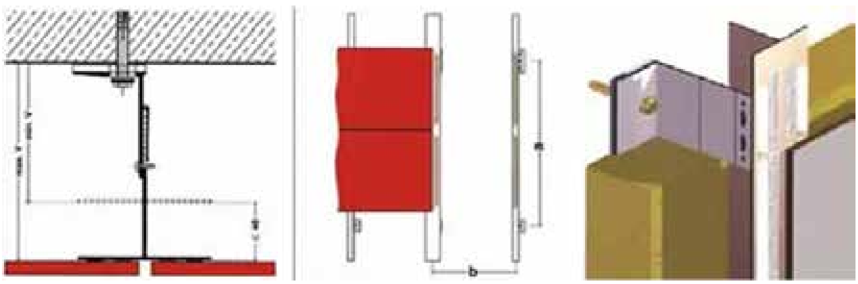


Figure 5. The compact laminate panel, bonding system (URL-2)

9.2.3. Riveted System

It is a semi-visible mounting system that can be applied for compact laminate panels with 6 or 8 mm wall thickness (Fig. 6). It consists of mounting the panels to aluminum L and T profiles anchored using brackets to the building facade employing special colored rivets. It is preferred in stadiums or similar wide-faced surfaces. (It is mandatory to detect the caps attached to rivet heads)

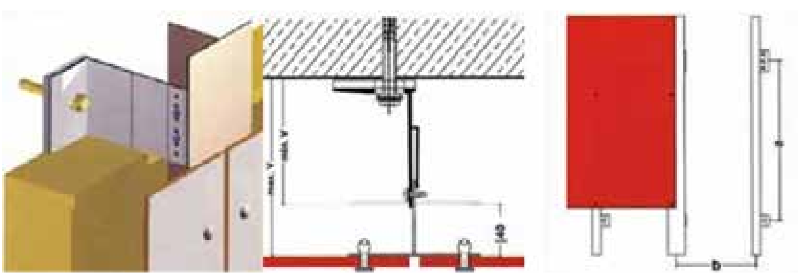


Figure 6. The compact laminate panel, riveted system (URL-2)

9.2.4. Lap Siding

It is a concealed mounting system that can be applied to compact laminate panels with a wall thickness of 4 or 6mm and used in villa building type structures (Fig. 7). Aluminum or wooden infrastructure can be used. According to the infrastructure system, mounting is performed with riveting or special clips system. Compact laminates can be cut from a full-size slab in the desired modulation, as well as lap siding compact panels in 3050x250x6 mm dimensions can be supplied ready-made.

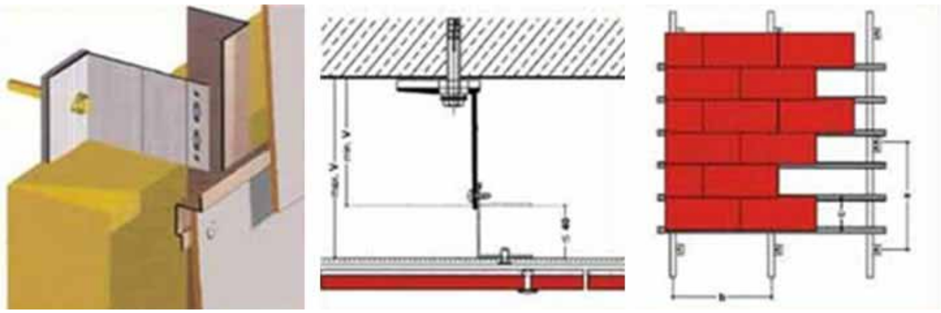


Figure 7. Compact laminate panel, lap siding system (URL-2)

10. Terra Cotta Facade Cladding

Terracotta panels are produced in two types as "double-walled" and "single-skinned". The carrier profiles fixed to the terracotta panels and building facades with anchors are suspended with specially manufactured panel holders. The integrity of the façade is ensured by placing joint gap profiles in vertical joints when necessary. Joint gaps formed between the horizontal panels allow natural ventilation behind the facade. Thermal insulation material can be placed in the gap between the wall and the panels. No additional action is taken after installation on terracotta panels.

Today, exterior wall or surface construction consists of transparent and non-transparent surface structures. Transparent surface constructions are determined by the total surface of the outer wall with functions such as heat, humidity, noise, light, where there is a complex interaction very important for the microclimate of the space. The outer wall (facade plate) forms the basis of the specific criteria of architectural choice and is a synthesis of all efforts to achieve polychromic, dimensional harmony of a set of technical and economic decisions to the architectural idea. There are many obstacles to consider in making an idea come true. The surface constructions of the buildings and today's energy-saving needs require us to make the right choices. While designing the facades of buildings, the building, maintenance, heating, lighting, etc. expenses should be considered (Dunovski. V. and Balkoski, D. 2016).

In high-rise buildings, the performance of aluminum siding and curtain walls gains more importance. As buildings rise, the weather conditions to which they are exposed also change. High-rise buildings need a facade system that protects both aesthetically and the building from external factors. An example of structural aluminum curtain wall systems constructed by Elips Yapı (a construction company) in a multi-story building in Batumi, Georgia. It is shown in Fig. 8.

Fig. 8 *Structural aluminum curtain wall systems (Batum Orbi Twin Tower) (URL-3)*

Structural aluminum wall systems offer architects flexibility in their designs with almost unlimited geometries and color options. In this way, the factors that limit architects in their designs are minimized. The high strength and durability of different alloys of aluminum and profile types enrich the buildings.

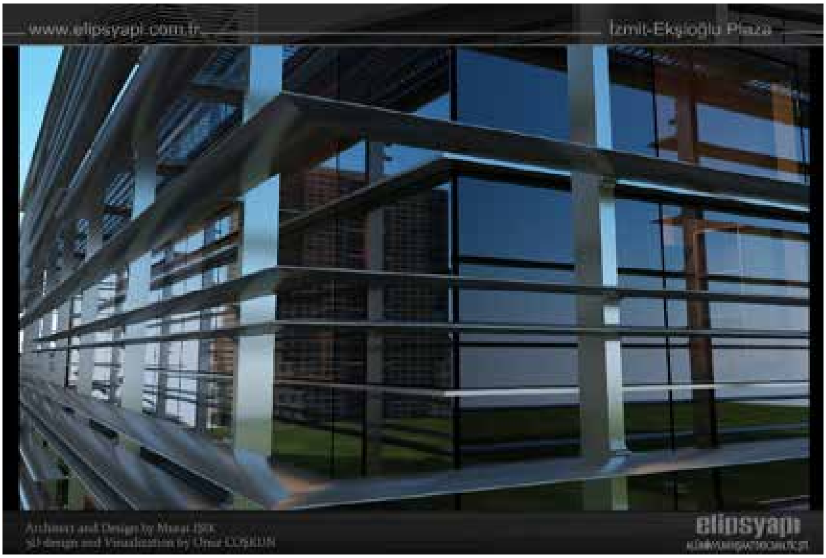


Fig. 9 *Structural aluminum wall systems. Architectural Design by Arc. Murat Isik, 3D design and visuaşization by Onur Coskun (URL-3)*

REFERENCES

96/603/EC (1996). Commission Decision of 4 October 1996 establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products

Ajla Aksamija (2013). Sustainable Facades, Design methods for high-performance building envelops Perkins+Will, published by John Wiley& Sons, Inc., Hoboken, New Jersey

Biedrońska, J., Misiołek W. Z. (2009) Application of aluminum in "green" architecture – today and tomorrow. Architecture Civil Engineering Environment. The Silesian University of Technology No. 1

Bojęś A. (2006). Aluminium in architecture as material, technique and aesthetics. Świat Aluminium, 5/2006

Cikis, D. T. (2007). The evolution and change of building facades: a research for developing alternative composite surface materials. Master Thesis. Izmir Institute of Technology.

DIN EN 13501 (2018). Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; English version EN 13501-1

DIN 4102-20 (2017). Fire behaviour of building materials and buildıng components - part 20: complementary verification for the assessment of the fire behaviour of external wall claddings

Dunovski. V. and Balkoski, D. (2016). Development of Aluminum in Architecture Int. Journal of Engineering Research and Applications www.ijera.com ISSN: 2248-9622, Vol. 6, Issue 4, (Part - 5) April 2016, pp.53-56

EN 438 (2016). High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (usually called laminates)

ÖNORM B 3800/1 (2004). Burning behavior of materials excluding building products – Part 1: Requirements, tests and evaluations

Sanda, A., Sandak, J., Marcin, B., Kutnar, A. (2019). State of the Art in Building Façades. DOI: 10.1007/978-981-13-3747-5_1

Zamora, J. L. and Calderon, J. M. (2007). Design of lightweight façades. Architectural Project Introduction Handbook. Institut de Tecnologia de la Construcció de Catalunya (ITeC) (Institute of Construction Technology, Catalonia)

URL-1: https://recycling.world-aluminium.org/review/sustainability/. Accessed date 10.12.2020

URL-2: http://www.elipsyapi.com.tr/sistemler.php Accessed date 10.12.2020

URL-3. Elips Yapı. http://www.elipsyapi.com.tr/proje.php?id=122 Accessed date 10.12.2020

Chapter 15

SPATIAL AND TEMPORAL CHANGE OF LAND SURFACE TEMPERATURE IN THE PROVINCE OF ADANA, TURKEY

Hakan OGUZ[1]

1 Hakan OGUZ, Professor, Kahramanmaras Sutcu Imam University, Faculty of Forestry, Department of Landscape Architecture, 46100. Kahramanmaras

1. INTRODUCTION

Land Surface Temperature (LST) has become very popular topic especially in the past 20 years after Landsat 5, 7, and 8 imageries were delivered through internet for free by the U.S. Geological Survey (USGS). LST is quite important because it is one of the key parameters in the popular studies of climate change, vegetation monitoring, urban climate, and evapotranspiration. It can be simply described as the temperature of the earth's top surface.

With the help of remote sensing, we can retrieve LST for large areas with sufficient spatial and temporal resolution rather than measuring it at single point (Li et al. 2013).

Many methods or techniques have been developed in order to calculate LST from satellite imageries but the following three are the most popular ones; single-channel (SC), split-window (SW) and radiative transfer equation (RTE).

In the past 30 years, several articles have been published on thermal analysis using satellite imageries such as MODIS, ASTER, Landsat TM, Landsat ETM, and Landsat 8 data (Li et al. 2013; Barsi et al. 2003; Cristobal et al. 2009; Jimenez-Munoz and Sobrino, 2008; Jimenez-Munoz et al. 2009; Oguz, 2013; Oguz, 2015; Oguz, 2016a; Oguz, 2016b; Oguz and Ozturk, 2017; Oguz, 2018).

For this particular study, two Landsat 8 scenes with different years (2013 and 2020), both cover the province of Adana, were downloaded from the USGS webpage. The main objective of this study was not only to retrieve the LST for Adana but also to analyze the temporal and spatial change of LST.

2. MATERIALS AND METHODS

2.1. Input Data

Landsat 8 imagery is the core part of this particular study. Two Landsat 8 scenes acquired on September 13, 2013 and August 31, 2020 (with path/row: 175/34) were downloaded from USGS website. Landsat 8 captures images of the earth every 16 day and can be downloaded free of change from USGS webpage (USGS, 2020. Landsat 8 has two sensors on board: the operational land imager sensor (OLI) and thermal infrared sensor (TIRS). OLI has 9 bands with 30m spatial resolution (except for panchromatic band) while the TIRS has two thermal bands with 100m spatial resolution as illustrated in Table 1 below (USGS, 2020. Having two thermal bands in Landsat 8 is the main improvement compare to previous versions of Landsat.

Table 1. Landsat 8 band descriptions

Band Number	Band Width	Description	Resolution (m)
Band 1	0.435 - 0.451	Coastal/Aerosol	30
Band 2	0.452 - 0.512	Blue	30
Band 3	0.533 - 0.590	Green	30
Band 4	0.636 - 0.673	Red	30
Band 5	0.851 - 0.879	NIR	30
Band 6	1.566 - 1.651	SWIR-1	30
Band 7	2.107 - 2.294	SWIR-2	30
Band 8	0.503 - 0.676	Pan	15
Band 9	1.363 - 1.384	Cirrus	30
Band 10	10.60 - 11.19	TIR-1	100
Band 11	11.50 - 12.51	TIR-2	100

Among the popular methods, the radiative transfer equation method has been employed for this particular study. The detailed information regarding the RTE methodology can be obtained from the papers published by (Oguz, 2016a; Oguz, 2016b).

2.2. Study Area

Adana is the sixth most populated city of Turkey and located in southern part of Turkey. The city is situated on the Seyhan River, 35 km inland from the north-eastern coast of the Mediterranean Sea. The southern and central portion of the province mostly falls within the Cukurova Plain, to the north, the plains give way to the Taurus Mountains. The provinces adjacent to it are Mersin to the west, Hatay to the southeast, Osmaniye to the east, Kahramanmaras to the northeast, Kayseri to the north, and Nigde to the northwest. The province is divided into 15 districts but Ceyhan, Yuregir and Seyhan districts were selected as the study area since they are among the most populated districts of Adana as illustrated in Figure 1 (Wikipedia, 2020).

Home to 2.2 million people, Adana is one of the largest province in Turkey, as well an agriculturally productive area, owing to its large fertile plain of Çukurova. The north of the city is surrounded by the Seyhan reservoir. The Seyhan Dam, completed in 1956, was constructed for hydroelectric power and to irrigate the lower Çukurova plain. Two irrigation channels in the city flow to the plain, passing through the city center from east to west. There is another canal for irrigating the Yuregir plain to the southeast of the city.

Adana has a hot-summer Mediterranean climate (Csa) under both the Koppen classification, and a dry-hot summer subtropical climate (Csa) under the Trewartha classification. Winters are mild and wet. Frost does occasionally occur at night almost every winter, but snow is a very rare phenomenon. Summers are long, hot, humid and dry. During heatwaves, the temperature often reaches or exceeds 40 °C (Wikipedia, 2020).

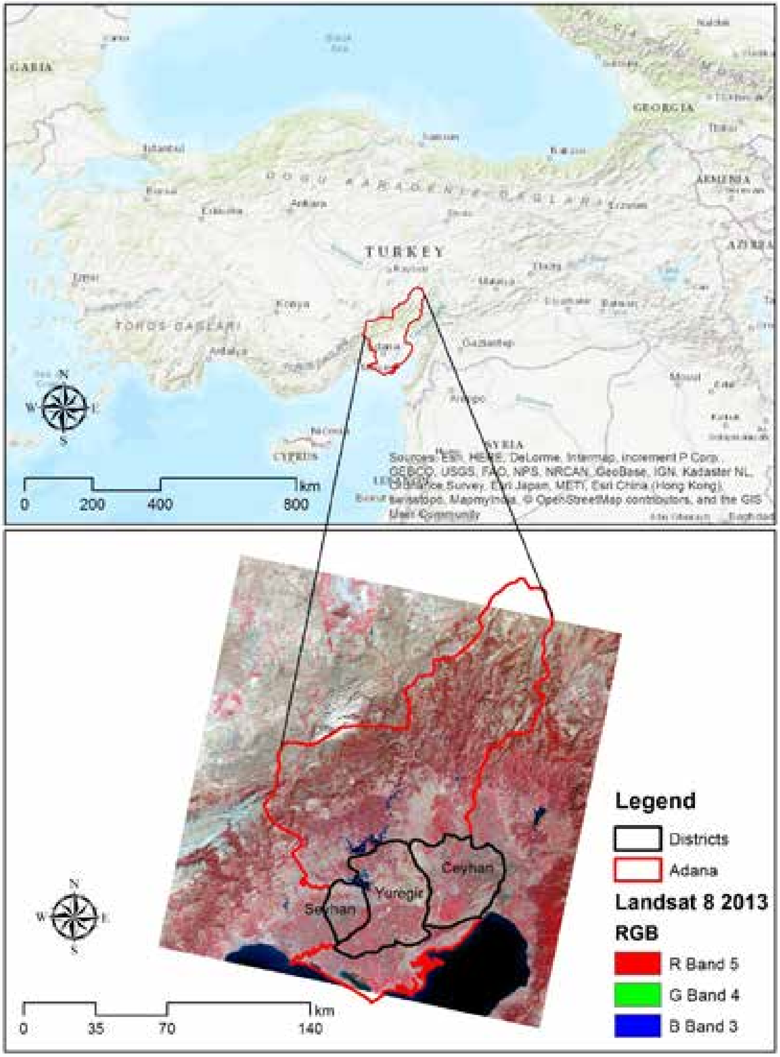


Figure 1. Location map of Adana and the districts of Seyhan, Yuregir, and Ceyhan.

In order to retrieve LST from the Landsat 8 satellite imagery, LST Calculator tool developed by Oguz (2016a) has been employed. The tool follows the following flow diagram as shown in Figure 2. Figure 3 illustrates both Landsat scenes in false color composites downloaded and used for LST retrieval.

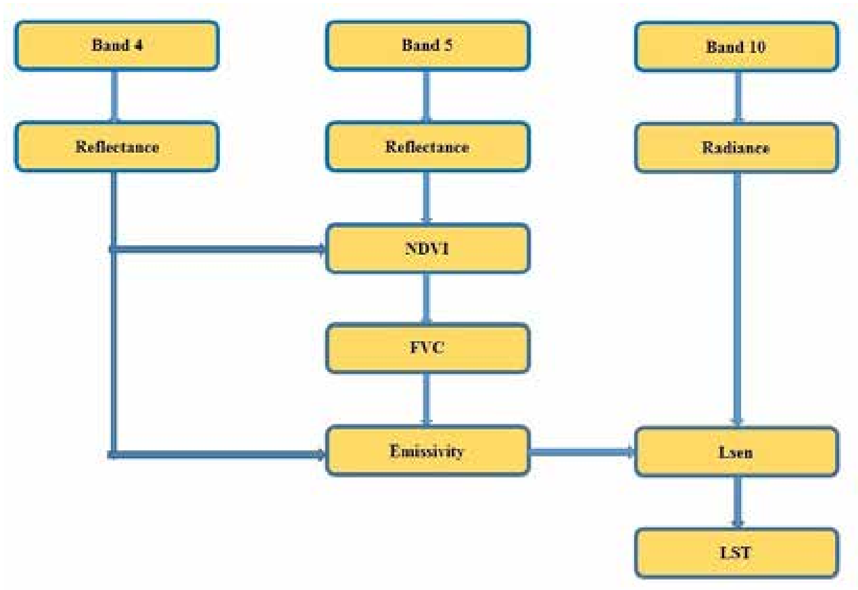


Figure 2. Flow diagram of the LST retrieval

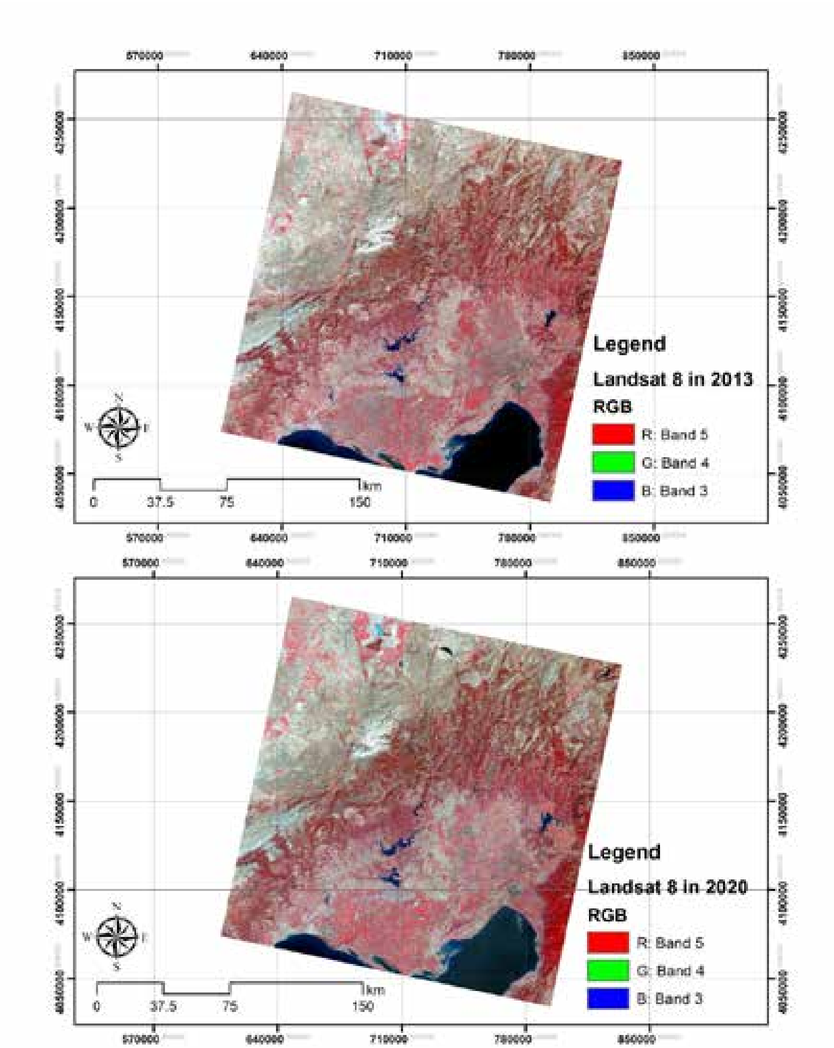


Figure 3.Landsat 8 scenes in false color, 2013 (top) and 2020 (bottom), that were used for LST retrieval

3. RESULTS

In order to retrieve LST from Landsat 8 imageries, atmospheric correction parameter calculator developed by Barsi et al (2003) has been used to obtain required coefficients for our model as illustrated Figure 4(a and c). Atmospheric correction parameter calculator is used to calculate the atmospheric transmission, upwelling radiance and downwelling radiance as shown in Figure 4(b and d).

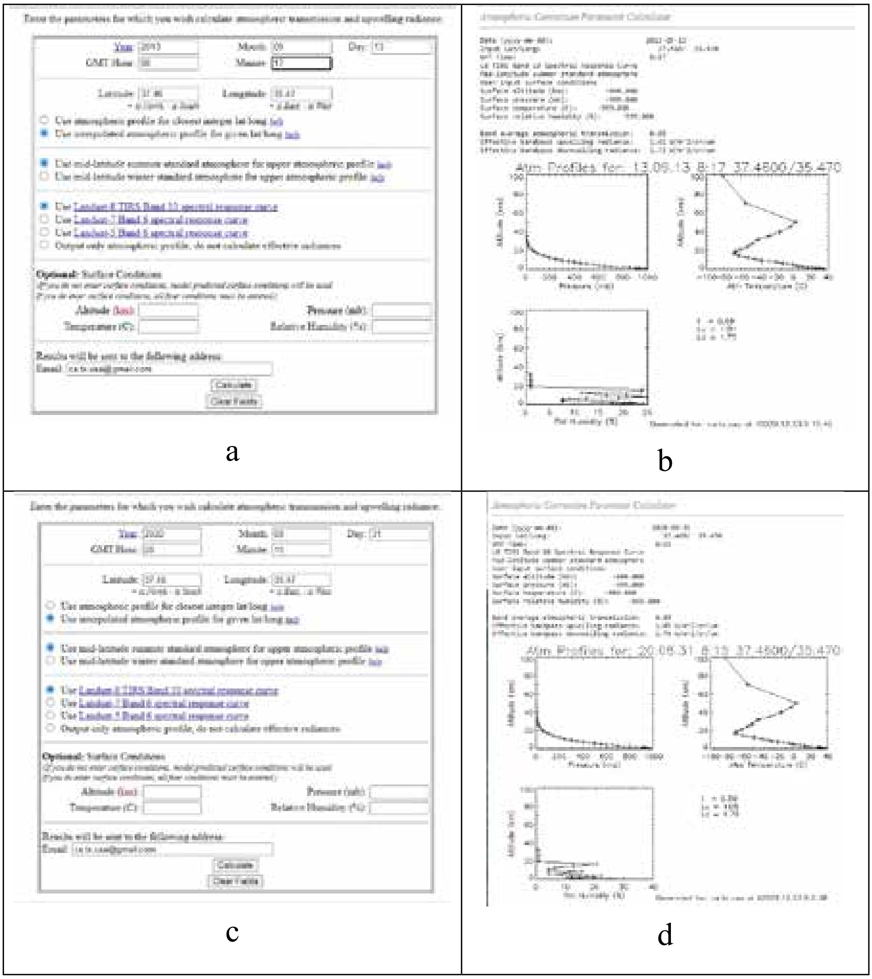


Figure 4. Atmospheric correction parameter calculator (a) 2013, (b) output for 2013, (c) 2020, (d) output for 2020

After required coefficients obtained, the LST tool developed by Oguz (2016a) was employed as illustrated in Figure 5 below.

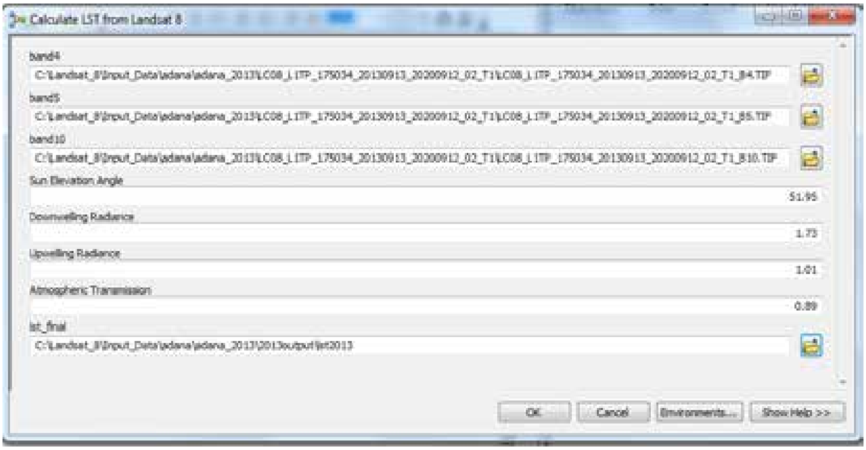


Figure 5. LST tool

LST values for the both scenes were finally calculated and then the spatial distribution map of LST for the years 2013 and 2020 were created using ArcGIS 10.8 software as illustrated in Figures 6 and 7 below.

As shown in Figure 6 below, minimum and maximum surface temperatures were found to be 2.7 ºC and 38.7 ºC respectively.

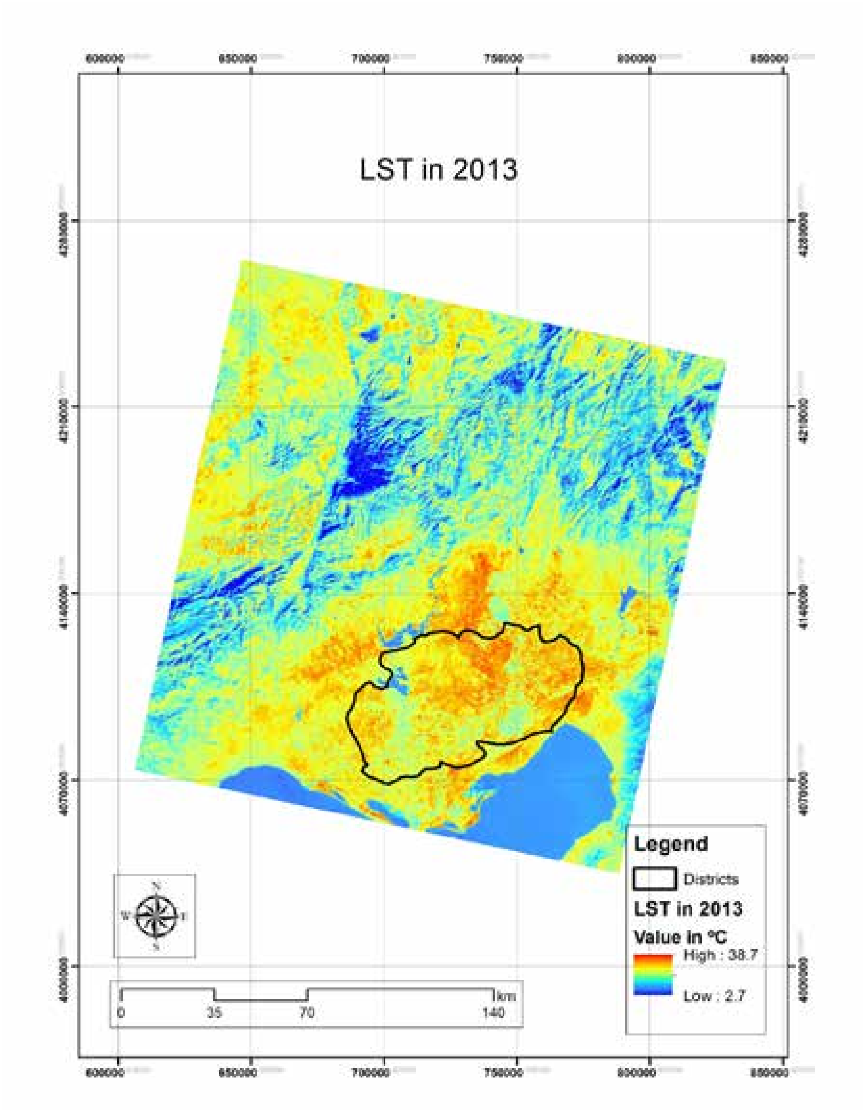


Figure 6. Spatial distribution map of LST in 2013 for whole scene.

.

In Figure 7. minimum and maximum surface temperatures were found to be 7.5 ºC in water surfaces and 42.5 ºC in bare land and urbanized areas respectively.

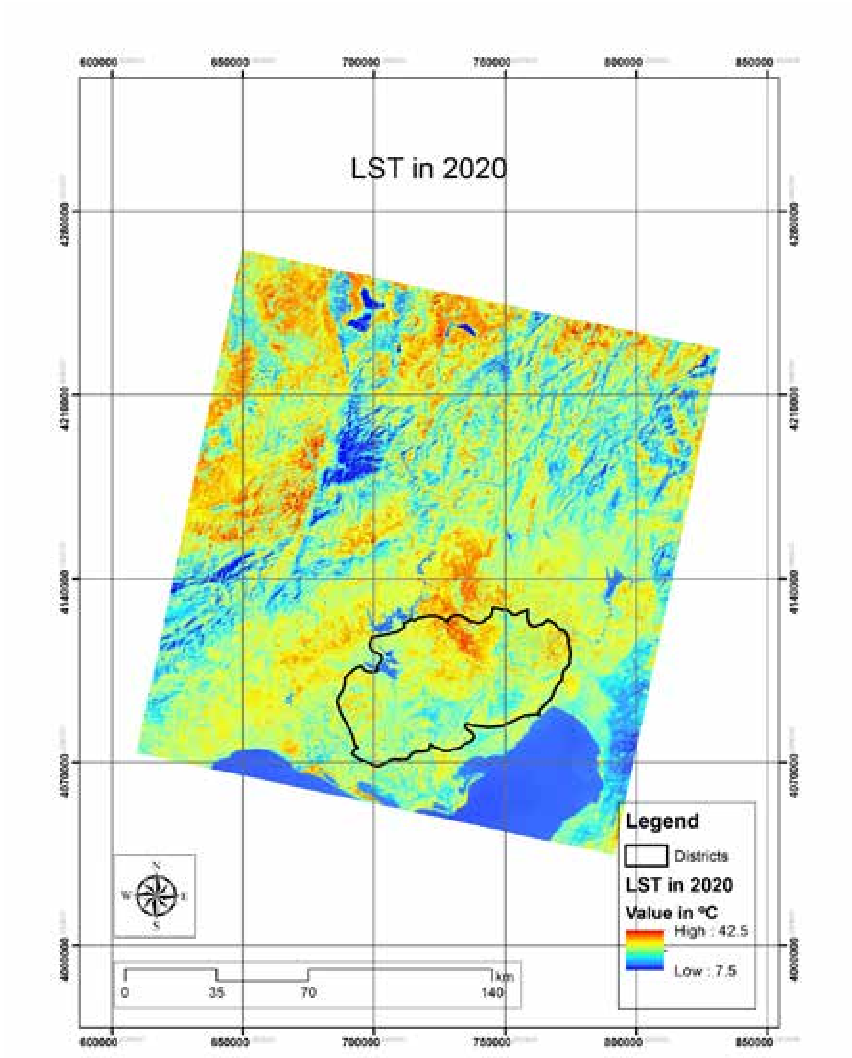


Figure 7. Spatial distribution map of LST in 2020 for whole scene.

In order to see the variation in LST over the study area, districts of Seyhan, Yuregir and Ceyhan were merged using dissolve tool in ArcGIS and then spatial distribution maps for the three districts were clipped out using the extract by mask tool in ArcGIS. Figures 8 and 9 illustrate spatial distribution maps of LST in district level in 2013 and 2020 respectively.

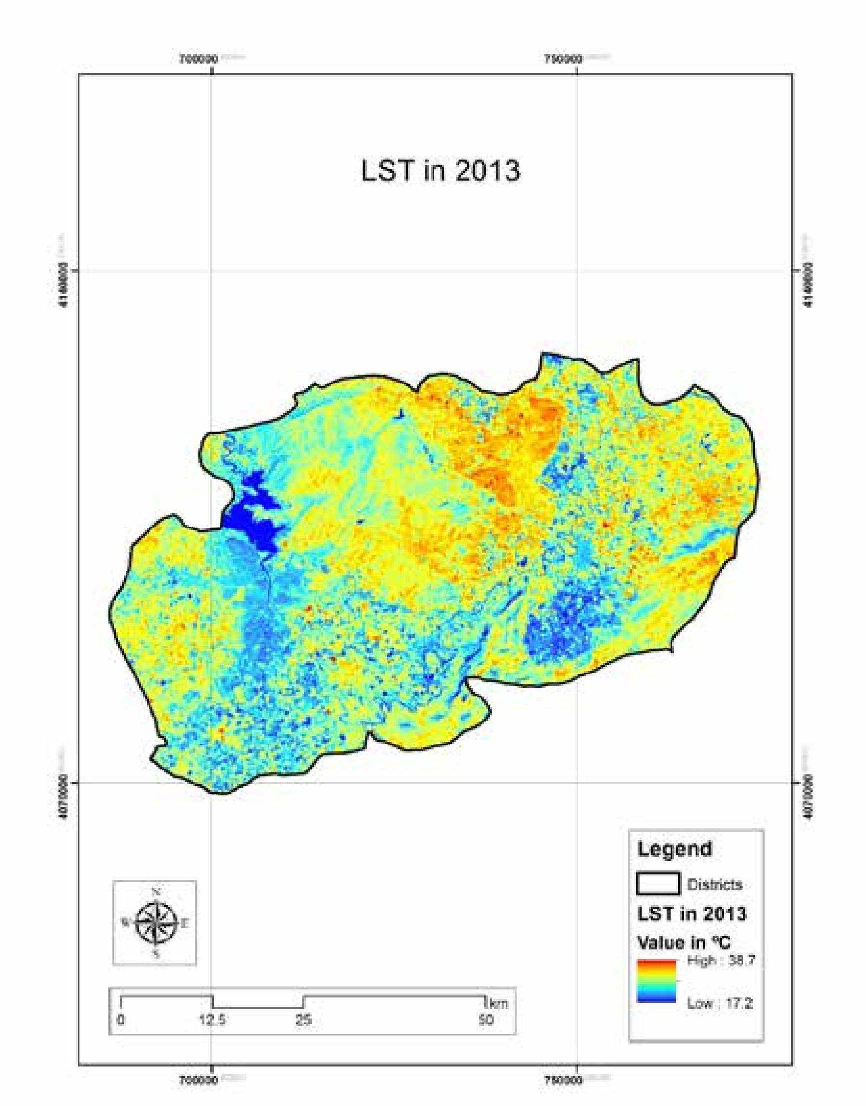


Figure 8. The spatial distribution map of LST in 2013 for the districts of Seyhan, Yuregir, and Ceyhan.

The lowest surface temperature was found to be 17.2 ºC in Seyhan Dam reservoir while highest surface temperature was located in bare land as 38.7 for the year 2013.

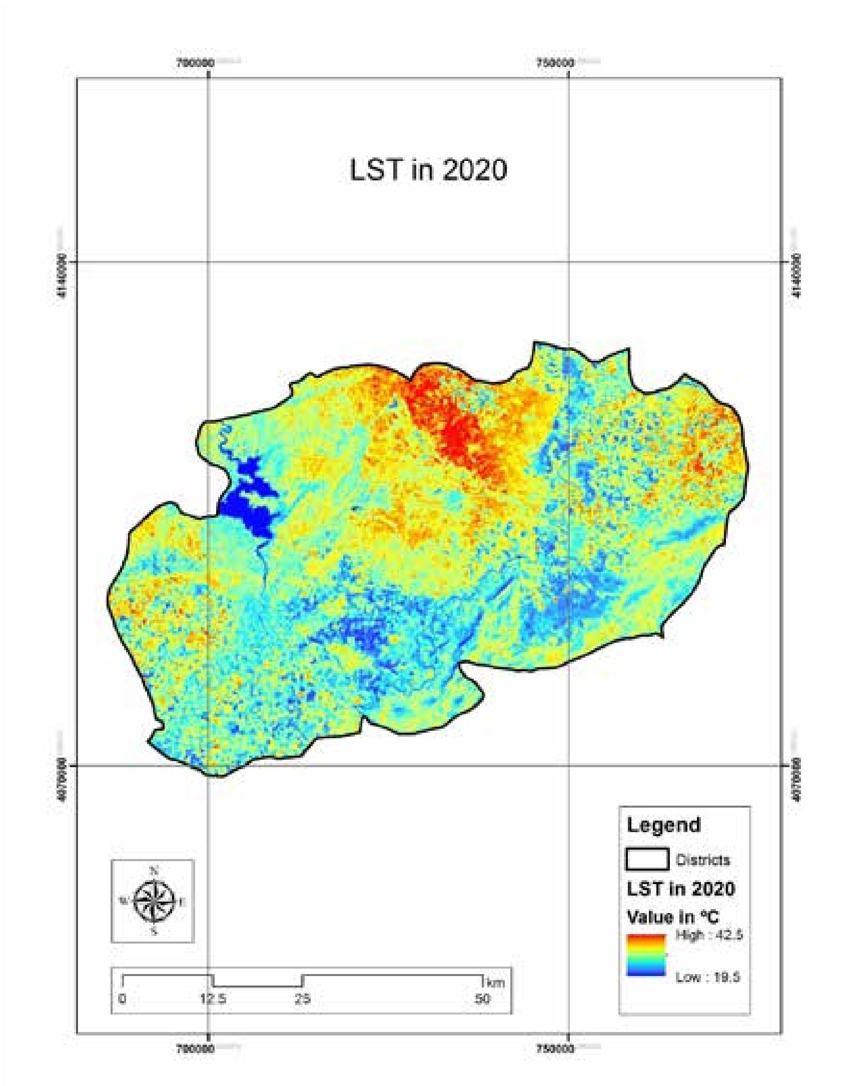


Figure 9. The spatial distribution map of LST in 2020 for the districts of Seyhan, Yuregir, and Ceyhan.

As shown in Figure 9 above, minimum and maximum LST values were found to be 19.5 ºC in the reservoir and 42.5 ºC in bare land respectively.

4. CONCLUSION

Contrary to expectations, surface temperatures in urban areas were found to be much lower than in bare land. This phenomena usually occurs in cities that are surrounded by lands with no or little vegetation cover.

Land surface temperature is one of the key parameters in thermal analysis studies. The popularity of LST is being increasing for thermal analysis. Accurate calculations of this parameter is an essential and challenging topic for the global change research. Therefore, the RTE method has been used in this study because of the accuracy of the model compare to single channel and split window algorithms.

ACKNOWLEDGEMENTS

The author is thankful to the U.S. Geological Survey for providing the Landsat 8 data which were used in this study.

REFERENCES

Barsi, J.A., Schott, J.R., Palluconi, F.D., Helder, D.L., Hook, S.J., Markham, B.L., Chander, G., and O'Donnell E.M. (2003) "Landsat TM and ETM+ thermal band calibration". Canadian Journal of Remote Sensing, 29(2), 141–153.

Cristóbal, J., Jiménez-Muñoz, J.C., Sobrino, J.A., Ninyerola, M. and Pons, X. (2009). "Improvements in land surface temperature retrieval from the Landsat series thermal band using water vapor and air temperature". Journal of Geophysical Research, 114(D8), D08103.

Jiménez-Muñoz, J.C. and Sobrino J.A. (2008). "Split-window coefficients for land surface temperature retrieval from low-resolution thermal infrared sensors", IEEE Geoscience and Remote Sensing Letters, 5(4), 806–809.

Jiménez-Muñoz, J.C., Cristóbal, J., Sobrino, J.A., Sòria, G., Ninyerola, M. and Pons, X. (2009). "Revision of the single-channel algorithm for land surface temperature retrieval from Landsat thermal-infrared data", IEEE Transactions on Geoscience and Remote Sensing, 47(1). 339–349.

Li, Z.L., Tang, B.H., Wu, H., Ren, H., Yan, G., Wan, Z., Trigo, I.F. and Sobrino J.A. (2013). "Satellite-derived land surface temperature: Current status and perspectives", Remote Sensing of Environment, 131, 14-37.

Oguz H (2013) LST calculator: A program for retrieving Land Surface Temperature from Landsat TM/ETM+ imagery Environmental engineering and management journal 12(3):549-555

Oguz, H. (2015). "A Software Tool for Retrieving Land Surface Temperature from ASTER Imagery", Journal of Agricultural Sciences. 21, 471-482

Oguz, H. (2016a). LST Calculator: A Python Tool for Retrieving Land Surface Temperature from Landsat 8 Imagery. In: Recep Efe, İsa Cürebal, Abdalla Gad, Brigitta Toth (Eds.) Environmental Sustainability and Landscape Management, Chapter: 36, p. 560-572, St. Kliment Ohridski University Press, Sofia.

Oguz, H. (2016b). Automated Land Surface Temperature Retrieval from Landsat 8 Satellite Imagery: A Case Study of Kahramanmaraş – Turkey. In: Recep Efe, İsa Cürebal, Abdalla Gad, Brigitta Toth (Eds.) Environmental Sustainability and Landscape Management, Chapter: 40, p. 598-604, St. Kliment Ohridski University Press, Sofia.

Oguz, H. & Ozturk, M. (2017). Monitoring Land Surface Temperature using Landsat 8 Imagery: A Case Study of Rome – Italy. In: Recep Efe, Murat Zencirkıran, 166 Innovative Approaches in Agriculture, Forestry and Aquaculture Sciences Jan A. Wendt, Zeynal Tumsavas, Halil Unal, Bilyana Borisova (Eds.) Current Trends in Science and Landscape Management, Chapter: 54, p. 655-659, St. Kliment Ohridski University Press, Sofia.

Oguz, H. (2018) Land surface temperature retrieval from Landsat 8 imagery: A case study of Istanbul-Turkey. Innovative Approaches in Agriculture, Forestry and Aquaculture Sciences. Chapter 13. p.159-165. Gece Akademi.

USGS (2020). http://landsat.usgs.gov /landsat8.php (accessed on December 11, 2020)

Wikipedia (2020). https://en.wikipedia.org/wiki/Adana (accessed on December 18, 2020)

Chapter 16

SUSTAINABLE DESIGNS IN BIOMIMETRY

***Makbulenur ONUR*[1]**

***Selver KOÇ ALTUNTAŞ*[2]**

1 Research Assistant Makbulenur ONUR, Karadeniz Technical University, Department of Landscape Architecture,Trabzon. mnurbekar@gmail.com

2 Research Assistant Selver KOÇ ALTUNTAŞ, Karadeniz Technical University, Department of Interior Architecture

1.INTRODUCTION

The sustainability approach first entered our lives with the idea of development. This concept has increased its importance day by day and has drawn a general framework of what should be sustained. The sustainability movement started to make a name for itself in the last quarter of the 20th century. Ecological approaches developed in this process have rejected processes and technologies based on destroying and polluting the nature. Instead, it started to create many powerful designs in different areas as an environmental and human friendly approach. (Tohum, 2011, Gülpınar Sekban, Bekar, Acar 2019). However, for the sustainability of the whole, it should always be considered that the parts that make up the whole must be sustainable. This idea has gradually reduced the scope and scale of sustainability, making it possible to design sustainability in local buildings and even on object scale. Sustainable urbanization approach primarily aims to protect and improve natural resources. It also integrates designs with the aim of social and economic development. In this context, almost all of the built environment and natural environment, social and economic elements that affect urban development and affect urban development are included in sustainability. All of these should be interrelated and balanced; requires the form of development to be decided through participatory processes (Tohum, 2011).

Today, various projects are carried out to improve the environmental and spatial quality of cities. At the common intersection of all these are economic revitalization goals to support social and infrastructural transformations. All of these are guided and implemented through urban design projects and guides. The understanding of urban design has also undergone a great transformation in the last 30 years, with the changes in urbanism theory and practice, as a condition of the transformation of economic and social organizations in the world and the transformation of dominant ideas (Akyol, Gülpınar Sekban 2019). All this can no longer be thought and thought almost without the concept of sustainability.

Urban sustainability; As can be seen from the definition of sustainability, social relations, economy and ecology have a balanced and harmonious systematic. When the concept of sustainability is examined at the urban scale in general terms, a sustainable urban area should provide a balance between environmental protection-use balance, social peace, economic development, equality and transportation. In this context, it is necessary to construct a healthy and livable urban environment, spaces and green areas that are natural process-oriented, provide ecological gains and serve users in the city (Bekar, Gülpınar Sekban, Acar 2018a; Gülpınar Sekban, Bekar 2019).

In this process, individuals have to adapt absolutely to the living conditions created by industrialization and urbanization. It is very important to regularly correct and rehabilitate the negative effects of the energy they spend in the adaptation process in order to maintain their psychological balance (Bekar, Gülpınar Sekban, Acar 2018b, Mansuroğlu, 2002 ve Surat, 2014).

Within the scope of this study, "biomimetry", which is a subtitle of sustainability, has been examined. Today, biomimetry has taken its place in many disciplines. In the scope of the study, how it is used in landscape architecture, architecture and interior architecture profession discipline is examined. What is the target of the approach has been discussed. How it is used in what kind of designs is explained with examples. As a result of the study, it has been set forth with the examples given in these professional disciplines.

Trying to understand and apply the forms of the formation and production processes in nature brings about changes in the field of architecture as well as in many design disciplines. The development of technology in problem solving offers suitable environments, tools and design approaches to designers, engineers and many scientists. Be change and transformation also leads the subject to develop different perspectives towards the environment, nature and object. In the studies conducted, an approach was introduced with the term "biomimetic" in the 1950s. This understanding of design has the potential to be a powerful concept and tool for the development of new materials, tools and methods. This new discipline takes nature beyond a formal imitation and finds ways to behave like nature. Observed for the purpose of solution for more than 3000 years, nature is not only examined for the solution of the problem, but also guides in solving new problems specific to the disciplines with the solutions it contains (Mutlu Avinç, Arslan Selçuk 2019).

2. BIOMIMICRIC DESIGN

Nature contains the most perfect of everything in it. It is up to human beings to learn and observe something from this magnificent engineering. When you stop and think about it, it is not difficult to understand how nature regularly renews itself, produces solutions to the problems that arise, and improves it naturally without programming. The name of this branch of science, which is also called biomimetics, comes from the language from which many scientific terms come from, namely Latin. "Bio" means "life" in Latin, "mimicry" means "imitation". Biomimetry, after this information received from nature, it is seen that biomimicry means life, that is to imitate nature, as its name suggests (URl-1).

Biomimicry is a practice that learns from the strategies used by species living today and imitates them. It also offers an empathetic, interdependent understanding of how life is progressing and where its outcome fits. Biomimicry encourages conservation for ecosystems and their inhabitants because they have what we need.The goal is to solve our biggest design challenges sustainably and in solidarity with all life on earth. These processes and policies create new life alternatives. He does not only teach biomimicry from the wisdom of nature. Designers turn to biomimicry to achieve a unique design that is efficient and effective. But they often gain a deep appreciation and connection about the natural world. As Alessandro Bianciardi, Biomimicry Launchpad participant and Mangrove Still co-founder, says, "I can't help but feel a kinship with these trees because I have spent years of my life imitating them. Actually, I see all trees differently now. " (URL-2).

Biomimicry, which points to the systematization process of design approaches inspired by nature, turned into a term and entered the design scene. Since the middle of the last century, biomimicry has increasingly gained a conceptual significance and is increasingly integrated into design processes by increasing its depth and scope steadily, making biomimicry no coincidental element accompanying individual design processes. As a result of this design, it makes it an important component of the research and development processes of the design discipline under the guidance of science (Çekilel, Uçar 2020).

Lenau outlined the steps of biomimetics in the 2009 study (Figure 1).

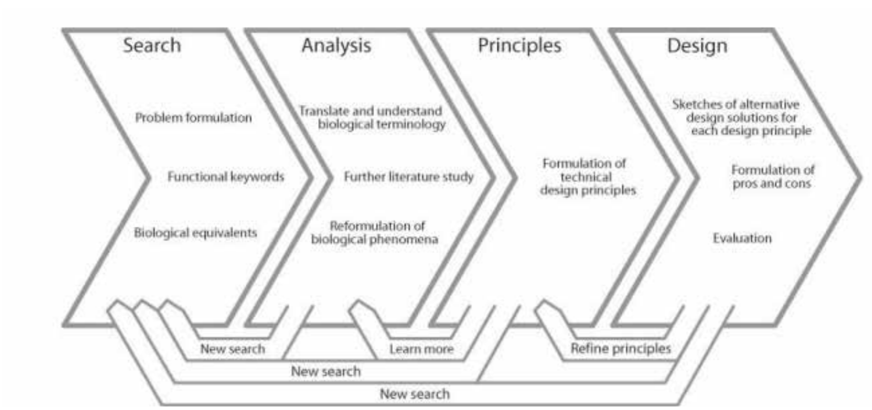
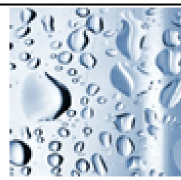
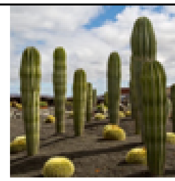
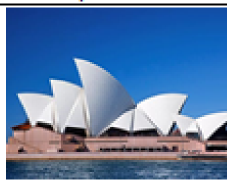
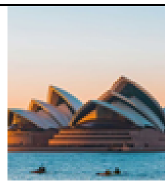
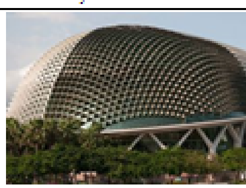
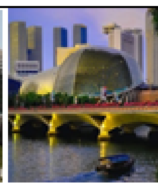
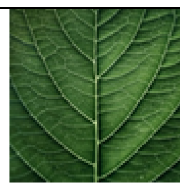
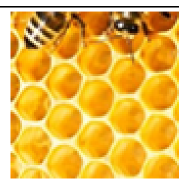


Figure 1. Biomimetic design stages (taken from Lenau 2009).

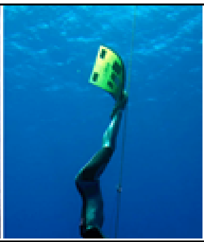
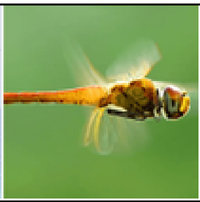
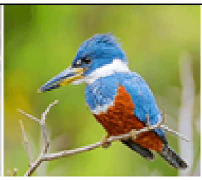
In short, biomimicry is a design that is biologically inspired by nature. This design is an emerging but rapidly growing area of design research. Biologically inspired design also uses similarities to biological systems to develop solutions to engineering problems. Biologically inspired design is gaining importance as a pervasive movement in design for environmentally friendly sustainable development (Helms, Vattam, Goem 2009).

Table 1. Examples of designs inspired by nature

Water cube, Pekin	 URL-3	 URL-4
Qatar Cactus Office	  URL-5,6	 URL-7
Sydney Opera house	  URL-8,9	 URL-10
Esplanade Tiyatrosu, Singapur	  URL-11,12	 URL-11
Science and Technology building,Florida Polytechnic University	  URL-13,14	 URL-15
HIVE desiged by Arda Ülgay (personal work)	  URL-16	 URL-17

Many of the design examples inspired by nature reveal details that were not considered until then. They are mostly innovative projects. In biomimicry-based designs, nature's efforts to create the best system using the least resources are imitated. Nature is the basis of biomimicry and sustainable designs can be made by imitating the flawless functioning of nature. We can say that the main reason for the recent widespread use of biomimicry, which we encounter in the history of science and art, is related to the effort to use the world's natural resources efficiently. The process, powered by nature, enables people to produce environmentally friendly projects. The design of some high-speed trains in Japan was also inspired by the thin beaks of Kingfisher birds, thus reducing the noise generated as the speed of the train increased (URL-18) (Tablo 2).

Table 2. Some designs and information designed with inspiration from nature (URL-19).

Due to its agility and easy movement in the sea, the tails of the fish are used in the pallet designs.	
Shark tail and fins design	 
With its flight style and balance system, helicopter companies were inspired by dragonflies in their designs.	
Helicopter and Dragonfly	 
An engineer named Eiji Nakatsu, who designed Japan's high-speed trains, designed it. The designer noticed the method in heron birds to make the train go faster and applied it to the high-speed train. It has been determined that the beaks of these birds, which can dive very fast from the sky to the water, increase the speed. It is also known that Eiji Nakatsu is an ornithologist.	
Fast Train and Heron Birds	 

Concorde aircraft, a British-French co-production, which managed to exceed the speed of sound, made its first flight test in 1969. Their design was inspired by dolphins' noses. The reason for the design approach is that the air reduces the friction on the outer surface. Inspired by this feature of dolphins whose tail fin serves as an engine on the surface of the water, the engineers placed the Concorde's engines at the rear. Production of these aircraft ceased in 2003.

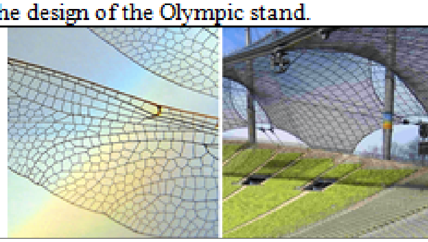
Concorde plane and dolphin

These plants are attached to the clothes of a Swiss engineer Georges de Mestral. When Mestral sees that it is not easy to separate his clothes from this plant, he immediately gets an idea and decides to use it in the clothing industry. It forms the same docking system and Velcro tapes are now used on astronaut clothing. Therefore, its design is inspired by this plant.

Velcro Band and Burdock

It has wings with a thickness of 1 / 3000th of a millimeter. Despite being so thin, it draws attention with its durability. The reason why it is durable is that its wings consist of nearly a thousand compartments. Thanks to these compartments, there are no tears while flying. The roof of the Munich Olympic stadium was built in the same way. Therefore, he was influenced by this in the design of the Olympic stand.

Munich Olympic Stadium and Dragonfly Wings



3. BIOMIMETRY and FURNITURE DESIGN

Biomimetry has been involved in many of the design professional disciplines. In furniture design, which is an indispensable part of design, there are many examples inspired by nature.

The emergence of the need for ecological furniture started to be seen from the 16th century with the start of environmental pollution industrialization. During these years, there were great developments in medical science, industry and agriculture. These developments directly affected the world population (Yaralel, Aytar Sever 2019).

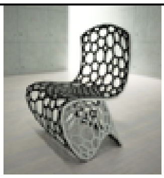
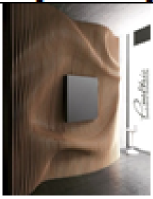
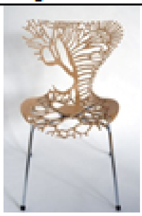
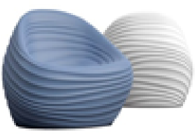
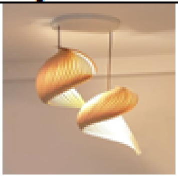
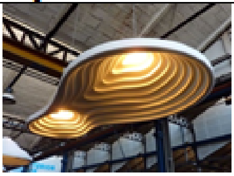
Energy, which is used in many areas from industry to transportation, also has an important share in the furniture sector. Because the natural balance is disrupted. Therefore, the rapid consumption of natural resources and the unconscious use of energy increase the importance of the concept of sustainability in design (Güneş, Demirarslan 2020).

In the world, the population brought along urbanization, and the increasing population has increased with the growth of cities on a scale. In order to meet these needs, the rate of production in industrial and agricultural areas has increased. In this cause and effect relationship that triggers each other, more production has brought along unavoidable environmental pollution. The development of new materials along with industrial production has been an impressive factor in furniture design. Designers, who are in an original search, have started to draw attention with various experimental studies they have done (Yaralel, Aytar Sever 2019).

The unavoidable increase in the world population and the destruction and destruction that occurred in nature as a result, caused an increase in environmentalist communities, especially in developed countries. The increasing importance of environmentally friendly design has led to a departure from traditional value judgments and the emergence of a new design concept. Many designers have shaped this process with the furniture they have created (Yaralel, Aytar Sever 2019).

Biomimetry is a type of approach used in these design results. This design, which aims to be inspired by nature, has taken its place in many furniture designsMany pictures of furniture designs in the table have been studied, read and inspired concepts have been written according to this information (Table 3).

Table 3.Biomimetry and furniture design examples

 URL-20	 URL-21	 URL-22
Inspiration:honeycomb	Inspiration: honeycomb	Inspiration:topography
 URL-23	 URL-24	 URL-25
Inspiration:topography	Inspiration: topography	Inspiration:topography
 URL-26	 URL-27	 URL-28
Inspiration: tree	Inspiration: butterfly	Inspiration: butterfly
 URL-29	 URL-30	 URL-31
Inspiration: seashell	Inspiration: seashell	Inspiration:leaf texturE
 URL-32	 URL-33	 URL-34
Inspiration: tree	Inspiration: sea	Inspiration: wave
 URL-35	 URL-36	 URL-37
Inspiration: leaf	Inspiration: topography	Inspiration: leaf

4. CONCLUSION AND RECOMMENDATIONS

In this study, “biomimetry” approach has been examined. As explained in the study, this approach has taken its place in many professional disciplines. The results obtained as a result of the study are listed as follows.

Nature is one of the most beautiful instructional science branches.

-Design starts in nature.

-The answers to many problems that need to be solved today actually exist in nature.

For this reason, the biggest source of inspiration for designers is “nature”.

- The most beautiful solutions to nature, which is exposed to collapse due to urbanization and many problems, are again through nature.

-The best solutions to problems are found in nature. because these solutions do not destroy nature, on the contrary, contribute to its ecological cycle.

Each example given within the scope of the study constitutes an example for the work to be done. The most basic common point of all people in the universe is nature. The most basic solution is still in nature. Finding a solution that nature provides and imitating it will be among the best results in the studies to be done. While contributing to the ecological cycle, it will also satisfy people aesthetically.

REFERENCES

Akyol, D., Gülpınar Sekban, D. Ü. (2019). Developıng Urban Desıgn Strategy Proposal In A Spatıal Defınıtıon Coverıng Alsancak Aand Konak Square In Konak Dıstrıct Of İzmir.The Journal of International Social Research 12(68):521-53.

Bekar, M., Gülpınar Sekban, D. U, Acar, C. (2018a). Planting along area sides of highway, Trabzon coastal case, Turkey. *Journal of Balkan Ecology*, *21*(4), 443-463.

Çelikel, S. B., Uçar, S. (2020). Biyomimikri: doğayla uyumlu yeni bir tasarım modeli. Humanities Sciences, 15(2), 51-61.

Gülpınar SekbaN, D. Ü. G., Bekar, M. (2019). Konutlar İçin Açık Alan Alternatifi; Yeşil Çatı. Akademik Sosyal Araştırmalar Dergisi, 7(87), pp. 355-362

Helms, M., Vattam, S. S., Goel, A. K. (2009). Biologically Inspired Design: Process and Products. Design Studies, 30(5), 606-622.

Tohum, N. (2011). Sürdürülebilir Peyzaj Tasarım Aracı Olarak Yeşil Çatılar. İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsi Yüksek Lisans Tezi.

Lenau, T. A. (2009). Biomimetics as a design methodology-possibilities and challenges. In DS 58-5: Proceedings of ICED 09, the 17th International Conference on Engineering Design, Vol. 5, Design Methods and Tools (pt. 1), Palo Alto, CA, USA, 24.-27.08. 2009, pp. 121-132.

Mansuroğlu, S. (2002). Akdeniz Üniversitesi Öğrencilerinin Serbest Zaman Özellikleri ve Dış Mekan Rekreasyon Eğilimlerinin Belirlenmesi. Medıterranean Agrıcultural Scıences, 15(2), 53-62.

Bekar, M., Gülpınar Sekban, D. Ü., Acar, C. (2018). Trabzon Sera Gölü'nün Rekreasyon Potansiyelinin Kullanıcı İstekleri Doğrultusunda Belirlenmesi. Akademik Sosyal Araştırmalar Dergisi, cilt.6, pp.349-359.

Surat, H., Surat, B. Z., Özdemir, M. (2014). Korunan alanların rekreasyonel kullanımı ve yerel halkın farkındalığı: Borçka Karagöl Tabiat Parkı örneği. II. Ulusal Akdeniz Orman ve Çevre Sempozyumu "Akdeniz ormanlarının geleceği: Sürdürülebilir Toplum Ve Çevre, 22-24.

Gülpınar Sekban, D. U. , Bekar, M., Acar, C. (2019). Evaluatıon Of Sustaınabılıty Potentıal Accordıng To Cıttaslow Crıterıa In Turkey/Trabzon. *Fresenıus Envıronmental Bulletın*, *28*(7), 5435-5446.

Avin, G. M., SELÇUK, S. A. (2019). Mimari Tasarımda Biyomimetik Yaklaşımlar: Pavyonlar Üzerine Bir Araştırma. *Online Journal of Art and Design*, *7*(2).

Yararel, B.,Aytar Sever, İ. (2019). Ekolojik Mobilya Tasarım Süreci Üzerine Bir İnceleme. *Online Journal of Art and Design*, *7*(5).

Güneş, S., Demirarslan, D. Sürdürülebilirlik Ve Mobilya Tasarımında Çevreci Yaklaşımlar. *Uluslararası İnsan Ve Sanat Araştırmaları Dergisi*, *5*(6), 81-99.

URL-1, Doğadan gelen mühendislik, Biyomimikri https://www.gazetebilkent.com/dogadan-gelen-muhendislik-biyomimikri/ (access: 20.12.2020)

URL-2, https://biomimicry.org/what-is-biomimicry/(access: 20.12.2020)

URL-3, http://architectuul.com/architecture/view_image/water-cube/4520(access: 20.12.2020)

URL-4, https://www.decogergi.com/su-damlasi-resimleri/(access: 20.12.2020)

URL-5, https://tr.pinterest.com/pin/572942383829141150/(access: 20.12.2020)

URL-6, https://tr.pinterest.com/pin/458804280761539558/(access: 20.12.2020)

URL-7, https://tr.pinterest.com/pin/305259680975234424/(access: 20.12.2020)

URL-8, https://tr.pinterest.com/pin/61572719895178472/(access: 20.12.2020)

URL-9, https://tr.pinterest.com/pin/675188169114542472/(access: 20.12.2020)

URL-10, https://tr.pinterest.com/pin/624241198341171482/(access: 20.12.2020)

URL-11, https://tr.pinterest.com/pin/378020962476327949/(access: 20.12.2020)

URL-12, https://tr.pinterest.com/pin/762726886869105681/(access: 20.12.2020)

URL-13, https://tr.pinterest.com/pin/603975000002271629/(access: 20.12.2020)

URL- 14, https://tr.pinterest.com/pin/661466882519766O1/(access: 20.12.2020)

URL-15, https://tr.pinterest.com/pin/77546424820431025/(access: 20.12.2020)

URL-16, https://www.behance.net/gallery/13727489/Hive-Playground(access: 20.12.2020)

URL-17,http://www.piramithaber.com/yasam/arilar-peteklerini-neden-altigen-yaparlar-h22078.html(access: 20.12.2020)

URL-18, Doğadan İlham Alan Tasarım Stratejisi: "Biyomimikri" Nedir?, https://blog.burotime.com/dogadan-ilham-alan-tasarim-stratejisi-biyomimikri-nedir/(access: 20.12.2020)

URL-19, https://www.haberbilimteknoloji.com/2017/08/28/8001/(access: 20.12.2020)

URL-20, https://tr.pinterest.com/pin/56646907791727029/(access: 20.12.2020)

URL-21, https://tr.pinterest.com/pin/5207355795255172/(access: 20.12.2020)

URL-22, https://tr.pinterest.com/pin/687502699347020475/(access: 20.12.2020)

URL-23, https://tr.pinterest.com/pin/760686193298913453/(access: 20.12.2020)

URL-24,https://tr.pinterest.com/pin/636626097302982227/(access: 20.12.2020)

URL-25, https://tr.pinterest.com/pin/796644621567644384/(access: 20.12.2020)

URL-26, https://tr.pinterest.com/pin/223350462747919039/(access: 20.12.2020)

URL-27, https://tr.pinterest.com/pin/197736239862403623/(access: 20.12.2020)

URL-28, https://tr.pinterest.com/pin/468374430001124448/(access: 20.12.2020)

URL,29, https://tr.pinterest.com/pin/732820170613274728/(access: 20.12.2020)

URL-30, https://tr.pinterest.com/pin/411797959681849881/(access: 20.12.2020)

URL-31, https://tr.pinterest.com/pin/767934173941627455/(access: 20.12.2020)

URL-32, https://tr.pinterest.com/pin/5207355794596585/(access: 20.12.2020)

URL-33, https://tr.pinterest.com/pin/632685447648259228/(access: 20.12.2020)

URL-34, https://tr.pinterest.com/pin/6931321988960360(access: 20.12.2020)

URL,35, https://tr.pinterest.com/pin/460985711855805206/(access: 20.12.2020)

URL-36, https://tr.pinterest.com/pin/323766660702276233/(access: 20.12.2020)

URL-37, https://tr.pinterest.com/pin/70509550404403587/(access: 20.12.2020)

Chapter 17

CONCEPTUAL CONTENT OF THEME PARK

***Neşe YÜCESOY*[1]**

***Aysun ÇELIK ÇANGA*[2]**

1 Bursa Metropolitan Municipality, Osmangazi-BURSA, TÜRKİYE
2 Doç. Dr. Bursa Uludag University, Faculty of Agriculture, Department of Landscape Architecture, 16110 , Nilüfer-Bursa, TÜRKİYE, aysuncelik@uludag.edu.tr

INTRODUCTION

Open spaces are a balance element as they help the mass-space adjustment in the physical structures of cities. Green spaces are areas that allow people to have fun and relax and thus develop and strengthen social relations between people. These areas are; park, playground, recreation area, promenade, playground, picnic area, entertainment and coastal areas. On the metropolitan scale; The fair, zoological and botanical gardens and regional parks are also considered as green areas. Urban open and green areas are; They are open spaces surrounded by buildings in cities, connecting urban events and allowing everyone to benefit.

Parks of great social importance in urban areas; It is one of the most used and most important green areas, which reduces the troubles and stress of the city people, allows them to rest, get fresh air and engage in different activities (Kesim ve ark. 2006). Parks, which have the characteristics of urban elements and social spaces, are focal points in establishing a green space system in the city, ensuring the continuity of this system, reflecting the urban culture and establishing urban communication, and are divided into various classes according to their functions, service areas and locations. These classifications determine the contribution of the parks to the quality of urban life by making them according to the properties of the parks such as service quality, facilities, landscape value, accessibility and aesthetic value (Emür ve Onsekiz 2007, Bektaş 2010). Parks according to their scales; It is grouped as Regional Park, City Park, Neighborhood Park, Neighborhood Park (Arkun 2006, Bektaş 2010).

<u>Regional park</u>

These parks are areas that serve the needs of a wide area, can vary in size and location, are 50 ha and at least 100 ha for 1000 people and are aimed to be reached in approximately one hour. Regional parks, which are a part of the physical planning of the country or region, are open to development or can provide sustainability within itself depending on the condition of the area where they are located. Various passive and active recreation facilities are provided in the park area that serve the needs of that region (Gold 1980, Özkır 2007). Forest-woodland areas, regional parks, national parks, nature hiking trails, climbing etc. Camping areas suitable for active and passive activities are included in this group.

<u>Urban park</u>

City parks should be located in the center of the city or in places close to the center so that the citizens can easily reach them. In case city parks cannot be located in or near the city center, they are placed near or even outside the city limits. Although 100-400 ha is preferred in terms of size in urban parks, it should be at least 40 ha. In different words; Urban parks are recommended for a size of 12 ha for every 1000 people and serve a 30-minute transport distance by car for a population of 50,000-100,000 people. With the increasing number of buildings, important functions are assigned to urban parks in the establishment of human-nature relationship (Kızılaslan 2007, Gold 1980, Özkır 2007). The city parks, which are included in the urban open green space systematic, should be located at the focal points of the city in order to protect the ecological balance of the city and meet the recreation needs of the citizens, and include facilities and facilities to meet the active-passive recreation needs of people of all age groups (Ertekin 1992, Özkır 2007). The service area of urban parks is the entire city community and it is considered as the main recreation area in terms of recreation (Çelik ve Bobat 2007). Parks such as urban parks, urban forests, zoos, botanical gardens, historical gardens, art parks, amusement parks, which have a large variety of reinforcement areas, are parks that serve on an urban scale.

District park

They are parks serving the district-scale population of a city. They include natural areas, picnic areas, sports fields, playgrounds, etc. 1 ha of area is recommended for every 1000 people and their size can vary between 8-40 ha. Service areas are between 0.8-4.8 km. Public transportation axes or places close to these axes are recommended in the location of these parks (Gold 1980, Özkır 2007).

Neighborhood park

Neighborhood parks are areas that can be reached within walking distance within the boundaries of the neighborhood and should be planned to focus on the users of that neighborhood. Various active and passive recreation opportunities are provided in the park area, which allows people to socialize. Thus, this area can be made a center for education, recreation and cultural activities (Gold 1980, Özkır 2007).

One of the important parks in the park system is the theme parks that are the subject of this study.

THEME PARKS

Theme park; They are parks that require a serious understanding of planning, design and management where fantasy and fun are combined, reflect dreams and use different control methods to strengthen social identity with these reflections (Zukin 1991, Deniz 2002, Topaloğlu 2007). According to Wylson and Wylson (1994), theme parks; They are places that are founded on scientific, cultural and historical objects that a museum can undertake and where these objects are animated with their real identities by focusing around a main subject (Dalkılıç 2007). Areas characterized as isolated from the city and integrated with the surrounding nature and landscape are defined as theme parks (Asensio 2000, Deniz 2002, Topaloğlu 2007). Theme parks are important city-scale parks with immersive, entertaining, educational and completely satisfactory features based on a specific theme. A theme park can appeal to all age groups, as well as activities that address only a certain age group in line with its theme.

Theme parks are parks that perform a wide variety of functions. According to this;

- Provides urban identity formation
- Contribute to the promotion of the country
- It provides people with an unusual recreation opportunity
- It allows people to engage in activities that are impossible to experience
- It provides the strengthening of social relations by bringing people of different cultural and socio-economic backgrounds together
- Contributes to tourism and economic development accordingly
- Supports the conservation and sustainability of unique natural and cultural areas
- Contributes to education and social awareness in line with the theme
- Contributes to the formation of planned cities with its positive effects on the urban open green space and organization
- Contributes to urban ecology by creating open space corridors

(Yücesoy, ve Çelik Çanga 2019).

The planning, design, implementation and operation stages of the theme park are necessarily carried out by coordinated information exchange between disciplines.

Theme parks are among the parks aiming to provide endless fun and pleasure. Theme parks are tools that reveal existing values and transfer them to future generations. They contribute to the development of urban culture. For this reason, regional natural and cultural landscape characteristics are definitely taken into consideration in the design of theme parks. Landscape planning and design criteria of theme parks are determined according to the theme type.

Natural, cultural, demographic, social and economic factors are prioritized while creating activity areas in theme parks where there are activity areas where people of all ages and all educational levels can experience different emotions. Public participation in the planning and design process is ensured, their satisfaction is monitored and taken into account in site management. Decisions are made in line with the needs and expectations of the visitors in these areas with touristic attraction.

Theme parks are always open to innovations that come with technology. It includes activities that challenge the imagination of people, it has qualities that are far from ordinary and increase the attractiveness of the city. All kinds of reinforcement elements in these parks are original design products, the plant material also includes endemic species as well as exotic plants.

THEME PARK TYPES

In addition to making the natural or cultural landscape features very similar to their original identities, theme parks can also be established in the form of the animation of a completely imaginary theme. Although it is not possible to make a limitation on theme park types, in this study the park themes are discussed in the following headings and conceptual contents are created.

Education theme parks

They are thematic parks with scientific, educational and recreational functions. Educational theme parks around the world are mainly aimed at introducing plant and animal species, and are practices that are open air museums or plant collections. Their planning and management is different from many other park types. The establishment location of these theme parks should be far from urban pressure and urban development. Since there is a constant development and change, there should not be any obstacles around it. There are herbarium, laboratory, library and exhibition halls in order to fully fulfill its educational and research purposes. In educational theme parks, borders are under protection and entrances and exits are controlled. Zoos, botanical gardens, medicinal and aromatic plants garden, arboretums, garden exhibitions are the most important educational theme parks.

Zoos

They are urban recreation areas designed for animals of different geographic origins to live in conditions close to their natural habitats, separated from visitors by natural and artificial barriers, and their behavior can be easily observed by the audience (Tudge 1992, Civelek 1999).

Botanical gardens

The focal point of the studies is to reveal the situation that the plant species in the world face with the threat of extinction, to protect the plant diversity, to ensure the continuity of the habitats and biological diversity in the world, and to make research and investigations on botany (Hepcan and Özkan 2005, Bektaş 2010). These are thematic parks where experts raise awareness about how to consume medicinal and aromatic plants, which aim to raise awareness of people about healthy living, and at the same time, where such plants are grown, exhibited and sold.

Arboretums

Living tree museums with predominant educational and didactic functions are where as many woody plants as possible in an ecology are grown. The plant collections are scientifically and technically studied and monitored continuously. Arboretum management is organized with the aim of exchanging seeds, plants and information with other similar organizations and has a complete documentation of the plant collection.

Garden exhibitions

They are thematic open green areas that introduce the natural and cultural landscape features of various countries.

Climate themed parks

Climatic conditions that can and cannot be experienced in a region, heating, cooling, ventilation, etc. These are closed areas that allow the experience of unnatural climates for a region by changing them with air conditioning processes such as.

Geography themed parks

These are open and closed areas where the unique natural and cultural landscape features of a country are introduced, protected, kept alive and different geographical features can be created.

Recreation and entertainment theme parks

Amusement-adventure parks can be described as parks with exciting activities that push the limits of imagination (Topaloğlu 2007). The construction of amusement parks started in the 1550s years ago. When it was first established in Europe, such places were called pleasure gardens and these gardens were filled with games, music and entertainment tools. Later, some political problems caused many gardens to be closed in the 1700s. However, Bakken, located in the north of Copenhagen, has survived since 1580 (Akgül 2002, Topaloğlu 2007). Examples of recreation and entertainment theme parks are Disneyland and water parks.

Story, fairy tale, mythology theme parks

They are parks based on a world of images and forms that combine cartoon characters, cartoon architecture with the food market. These parks become more attractive with music (Öztürk 2003, Topaloğlu 2007). These are parks where elements such as popular stories, fairy tales, mythology cartoon characters are emphasized as a theme. Keloğlan, Hacivat Karagöz, Nasreddin Hodja, Noah's Ark, Uranus are likely to be the themes of the Story, Tale, Mythology Theme Parks.

Ages theme parks

Today, they are parks that allow to experience the past and the future. Parks, the theme of which is the past, also allow the preservation of historical environments. Past time parks, future parks are examples of era theme parks

Art theme parks

These are parks that allow artistic products to be exhibited and watched well and effectively. Sculpture parks, such as Miniatürk, are art-themed.

Hobby theme parks

They are open or closed areas that have been established and put into use with all kinds of equipment and spaces for people who cannot find the opportunity to perform their hobbies in their daily life.

Natural life theme parks

These are open areas where the flora and fauna characteristics specific to a region are highlighted and protected and sustained.

Special narrated parks

When evaluated within the framework of the theme park definition, they are smaller-scale parks and are small-scale thematic areas within neighborhoods, districts and city parks. Such as dry stone gardens, rock gardens.

RESULT

One of the most important features that make cities livable is the open spaces that cities have. Park areas, which are included in the open space systematic, help to increase the life quality of individuals in the urban texture. Theme parks, which provide active and passive recreation opportunities and where all kinds of activities are shaped around a theme, are discussed in this study with their conceptual content.

According to this; Theme parks are not only a recreation area within the urban open and green space systems, they have a wide range of goals with their aspects that promote, protect, ensure the continuity of the natural and cultural landscape, strengthen the urban identity, are important in the tourism sector, entertain people and give a wide variety of emotions. is a parking concept.

REFERENCES

Akgül, E. 2002. Tema Parkları. *Yüksek Lisans Ödevi (yayımlanmamış),* AÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Ankara.

Arkun, A. K. 2006. Ankara-Eryaman Yerleşkesi Yakın Çevresinde Tasarlanan Son Dönem Parklarının Tasarım Özelliklerinin Belirlenmesi. *Yüksek Lisans Tezi*, AÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Ankara.

Asensio, P.2000. The World of Contemporary. Italy. 456s.

Bektaş, A. 2010. Bursa İli Kent Parklarının, Reşat Oyal Kültürparkı, Soğanlı Botanik Parkı Ve Merinos Parkı Örneklerinde Peyzaj Tasarım Kriterlerine Göre İncelenmesi. *Yüksek Lisans Tezi,* SÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Konya.

Civelek, S. 1999. Hayvanat Bahçeleri Üzerine Bir Araştırma – Mekansal Farklılığın Ziyaretçi Algısına Etkileri. *Yüksek Lisans Tezi*, KTÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Trabzon.

Çelik, A., Bobat, A., 2007. Kocaeli *SEKA* Kent Parkı'nın Alan Kullanımı ye Peyzajının İrdelenmesi. Kırsal Çevre Yıllığı. Kırsal Çevre ve Ormancılık Sorunları Araştırma Derneği, 68-80.

Dalkılıç, E. 2007. Eğlence Parklarının Tarihsel Gelişimi Ve Planlama Kriterleri. *Yüksek Lisans Tezi*, AÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Ankara.

Deniz, G. 2002. Temalı Park ve Bahçelerin Planlama-Tasarım İlkeleri. *Yüksek Lisans Tezi (yayımlanmamış)*, AÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Ankara.

Emür, S., H., Onsekiz D. 2007. Kentsel Yaşam Kalitesi Bileşenleri Arasında Açık ve Yeşil Alanların Önemi – Kayseri/Kocasinan İlçesi Park Alanları Analizi, *Erciyes Üniversitesi SBE Dergisi,* (22):367-396.

Ertekin, N. 1992. Yeşil Alan Olarak İzmir İçin Önemi Olan Kültürparkın Bitki Varlığının Saptanması, Korunması ve Geliştirilmesi Üzerine Araştırmalar. *Yüksek Lisans Tezi*, EÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, İzmir.

Gold, S. M. 1980. Recreation Planning and Design. Mc Graw Hill. U.S.A.

Hepcan, Ç., Özkan, B. 2005. Botanik Bahçelerinin Kentsel Dıs Mekanlar Olarak Kullanıcılara Sunduğu Olanakların Belirlenmesi, *Ege Üni, Ziraat Fakültesi Dergisi* 42(3):159-170.

Kesim, G.A., Demir, Z., Kutay, E., Örnekçi, S., Yerli, Ö.2006. Yeni Düzce Yerleşiminde Bir Parkın Fonksiyonel Açıdan İrdelenmesi. Düzce *Üniversitesi, Orman Fakültesi Ormancılık Dergisi.* 2, 1.

Kızılaslan, S. 2007. Trabzon Kenti Park ve Bahçelerinin Peyzaj Tasarım Kriterleri Açısından İncelenmesi. *Yüksek Lisans Tezi,* AÜ Fen Bilimleri Enstitüsü Peyzaj Mimarlığı Anabilim Dalı, Ankara.

Özkır, A. 2007. Kent Parkları Yönetim Modelinin Geliştirilmesi. *Doktora Tezi*. Ankara Üni, Ankara.

Öztürk, H. 2003. Eğlence ve Kültür Temelı Parkların İncelenmesi. *Yüksek Lisans Ödevi (yayımlanmamış)*, AÜ Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Ankara.

Topaloğlu, S. 2007. Ankara Harikalar Diyarı Kent Parkı'nın Tema Park Kavramı Kapsamında İrdelenmesi. *Yüksek Lisans Tezi*, Zonguldak Karaelmas Üni Fen Bilimleri Enstitüsü, Peyzaj Mimarlığı Anabilim Dalı, Zonguldak.

Tudge, C. 1992. Last Animal at the Zoo: How Mass Extinetion Can Be Stopped. Oxford University Press, Oxford.

Wlyson, P., Wlyson, A. 1994. Theme Parks, Leisure Centres, Zoos and Aquaria. Longman Group UK Limited, New York.

Yücesoy, N., Çelik Çanga, A., 2019. Tema Parkları Ve Bursa Odaklı Park Temalarının Belirlenmesi Üzerine Bir Araştırma. Bursa Uludağ Üniversitesi Ziraat Fakültesi Dergisi. 33 (2), 249-263.

Zukin, S. 1991. Landscapes of Power From Detroit to Disney World. p. 55–49–232.