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Alternative Architecture Practices

An Analysis of System Designs for Sustainable Urban Agriculture: Recommendations for İstanbul Bostans

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Atılan her tohum "kurda, kuşa, aşa" olsun.

Abstract

Urban agricultural areas encompass different typologies based on their prioritized outputs, which include access to healthy food, relation to alternative economic models, employment opportunities, role as a meeting space for different social groups, and contribution to physical and mental health. These differences should be designed with a holistic perspective within the common food production framework. Otherwise, the designs and systems reliant on external input will subsequently become dysfunctional and collapse due to the long-term lack of sustainability and resilience.

However, the current situation in the bostans of Istanbul shows that, customarily, the urban agricultural designs and management decisions solely responding to food production-related needs without regard to sustainability criteria continue to be considered successful. Particularly the bostans designed by local authorities are observed to incorporate standard designs and operating models without taking notice of different needs. Furthermore, in the literature review conducted, it is noteworthy that the emphasis is put on the importance of agriculture for "sustainable cities" rather than the sustainability of urban agricultural areas.

Therefore, the research aims to propose recommendations for improving the current condition of the determined bostan examples in Istanbul following analyses through economic, ecological, and social sustainability perspectives and for planning design and operating models suited to different typologies in the future bostans. Fine examples from around the world were examined for these recommendations that can be conceived as instructions in a manual. Field visits conducted in the past ten years and the preliminary research have concluded that the existing urban agricultural areas are insufficient in number and scale, and the local authorities and users do not pursue sustainable systems. Furthermore, three urban agricultural areas were selected as examples of different typologies

to expand the research; and recommendations were proposed following analyses of their current conditions, space use, structures, management, users, and production outputs.
The examples are as follows:

- Commercial Bostan: Yedikule Bostans
- Neighbourhood Bostan: Kuzguncuk Bostan
- Sponsored Bostan: Akmerkez Terasta Tarım Project

The analyses demonstrated that although the recommendations varied for different typologies in examining design criteria, producing solutions for soil infertility and drought was prioritized, as food production was the common ground for all.

Key Words: Urban agriculture, bostan, productive landscape, community, design, sustainability, permaculture

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Özet

Kentsel tarım alanları çıktı ürünlerinin önem sıralamasına göre farklı tipolojileri barındırmaktadır. Sağlıklı gıdaya erişim, alternatif ekonomik modellerle ilişkiler, iş imkanları, farklı sosyal grupların karşılaşma mekanı rolü, beden ve ruh sağlığına katkısı çıktılar olarak düşünülebilir. Bu farklılıkların bütüncül bir sistem tasarımı bakış açısıyla tasarlanması gerekmektedir. Yoksa gelecek parametresiyle birlikte sürekli dışarıdan girdiye ihtiyaç duyan bu alan tasarımları ve sistemler sürdürülebilir olmadıklarından işlemez hale gelirler ve çökerler.

Ancak görünen odur ki kentsel tarımda halen geçmişten gelen pratikle gıda üretimi ile ilgili ihtiyaçların karşılandığı tasarımlar ve yönetim şekilleri günümüzde sürdürülebilirlik kriterleri dikkate alınmadan başarılı kabul edilmektedir. Yapılan literatür taramalarında kentsel tarım alanlarının sürdürülebilirliğinden çok kentsel tarımın sürdürülebilir kentler için önemine odaklanıldığı görülmüştür. Bir diğer başlıkta farklı tipolojilere göre kentsel tarım alanlarının sürdürülebilirlik kriterlerinin önem sıralamasının değişmesidir.

Bu nedenle araştırmanın amacı ekonomik, ekolojik ve sosyal sürdürülebilirlik bakış açısıyla mevcut kentsel tarım alanlarını iyileştirmek, yeni alan tasarımlarında ise farklı tipolojilere uygun sistemler tasarlamak adına öneriler ortaya koymaktır.

Bir rehberin adımları olarak düşünülebilecek bu öneriler için öncelikle dünyadaki iyi örnekler incelenmiştir. İstanbul sınırları içerisinde son 10 yıldır gerçekleştirilen saha ziyaretlerinde ve bilgi toplanılan ön araştırmalar sonucunda mevcut kentsel tarım alanları sayılarının ve ölçeklerinin yetersiz olduğu, yerel yönetimlerin ve kullanıcıların sürdürülebilir sistemlere odaklanmadığı belirlenmiştir. Araştırmanın derinleşmesi için farklı tipolojilerde örnek üç kentsel tarım alanı seçilerek mevcut durumları, alan kullanımları, yapıları, yönetim şekilleri, kullanıcıları ve üretimleri üzerinden

analizler yapılmış ve öneriler sunulmuştur. Bunlar:
Ticari Bostan: Yedikule Bostanları
Topluluk Bostanı: Kuzguncuk Bostanı
Sponsorlu Bostan: Akmerkez Terasta Tarım Projesi
Tasarım kriterleri incelenirken farklı tipolojiler için öneriler çeşitlense de hepsinin ortak noktasının gıda üretimi olması nedeniyle toprağın verimsizleşmesi ve kuraklık sorununa çözüm üretmek ilk sırayı almıştır. İkinci sırada yerel yönetimlerin bakış açılarının değişmesi, kanunlar ve teşviklerle destekte bulunmalarının gerekliliği görülmüştür.

Anahtar Kelimeler: Kentsel tarım, bostan, üretken peyzaj, topluluk, tasarım, sürdürülebilirlik, permakültür.

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Introduction

People with different profiles establish urban agriculture areas in Istanbul for different purposes. The structural differences affect their operation and the end products. For example, while some urban farms prioritize trading profit, others focus on community building, education, or providing food for the nuclear family.

Despite the abovementioned differences, achieving sustainability and resilience in the *bostan* areas is a common concern. Considering the necessary conditions for sustainability, an urban farmer unable to profit, a community garden unable to build its community, or an untended institutional garden inappropriately cultivated will eventually fail to persist for various reasons. Furthermore, resilience entails the persistence of established systems when faced with a threat, the flexibility and adaptability to change, and tackling the risks by transforming any planning and operation that inhibits this capacity in present conditions or future projections.

The economic, ecological, and social sustainability criteria can guide these areas in managing their processes. However, the crucial point here is to recognize the differences between the urban agriculture areas and the necessity for catering to their different needs.

The observations I have gathered in projects as a designer and volunteer in urban farming areas since 2013 conclude that the design processes of these areas are not handled with a holistic approach. The design, community building, and sustainability layers that are supposed to reflect the authenticity of each area are applied as a template. For example, the municipalities identify any urban agriculture area as a "*Permaculture garden*" if it contains raised vegetable beds and uses local seeds. However, as long as the layers mentioned above are concerned, whether the area needs raised beds should be questioned; it should produce soil from compost and aim to establish a seed library instead of importing seeds. Focusing on establishing a system rather than a facade will provide the solution. Urban agriculture areas in sustainable city designs can serve the whole only if the areas are also sustainable.

1 As a landscape and permaculture designer, I have been conducting field research on urban agriculture areas since 2014. The 'Bostan Stories' research conducted in collaboration with 66 collectives provided an opportunity to interview the *bostancıs* and users. Between 2014 and 2020, I worked in the 'Initiative for Protecting the Yedikule Bostans' organizing team and the 'Lettuce Festival' as a Slow Food Fikir Sahibi Damaklar volunteer. In addition, I continue to experience food production in school environments thanks to the social initiative the 'School Bostans' I founded. In these practices and observations, I place the utmost importance on the prioritization of sustainability in urban agricultural areas, starting from site selection. In this study, I aim to research the possibilities of achieving this.

This research aims to create holistic design criteria for different urban agriculture areas to achieve sustainability. It also searches for answers to such questions as: What are different interrelational patterns between different types of urban agriculture areas and economic, ecological, and social sustainability criteria? What common issues should be considered when determining the holistic design criteria despite the differences in urban agriculture areas? In terms of sustainability, what other networks should urban agriculture areas interact with outside their boundaries? Can a guide compliant with different types be prepared for improving the existing urban agriculture areas with a sustainable perspective and determining the design criteria for the new ones?

Gaining opinions and knowledge through prior observations and experiences working in the bostans have been instrumental for this thesis as a research method. Primarily, a literature review has been conducted. News articles, interviews, reports, visual or written documents, documentaries, and outputs of semi-structured interviews with individuals engaged in the bostans in different ways have supported the research. The recommendations section has benefitted from good examples and insights from professionals and individuals working on these subjects.

The primary problem encountered during the research is the incoherent use of terminology in the literature. Neither in Turkish nor in English can definite and coherent names be found for different types of urban agriculture areas, and their definitions are confused. Therefore, an attempt to resolve the confusion around terminology is as follows:

Urban agriculture areas that obtain commercial profit from food production are referred to as ‘Commercial Bostan.’

Urban agriculture areas that bring different people and groups together for a specific reason or socializing are referred to as ‘Community Bostan.’

Urban agriculture areas established and funded by corporate companies to produce social benefits are referred to as ‘Sponsored Bostan.’

Another terminology problem is the lack of an English counterpart for the word ‘bostan.’ The word ‘bostan,’ integral to Istanbul’s urban agriculture culture, loses meaning when translated as ‘garden.’ Therefore, the thesis uses the original term ‘bostan.’ The definition of bostan and whether the selected area represents a bostan emerges as another problem. Consequently, the research refers to the bostans with the names given by their users. However, it does so by paying regard to the type proposed following

the analyses in the sustainability recommendations.

This study examines three active urban agriculture areas in different scales located in different parts of Istanbul used for different purposes by different people between 2021-2023. These are the ‘Yedikule Bostans’ as an example of a commercial bostan, the ‘Kuzguncuk Bostan’ as an example of a community bostan, and the ‘Akmerkez Terasta Tarım Project’ as an example of a sponsored bostan. The examples are examined in terms of different sustainability layers. The areas are considered working spaces, and spatial designs, structures, and usage analyses are applied accordingly. Finally, the recommendations are put forward in response to the needs, sustainability, and design filters.

Types of urban agriculture and sustainability

01

The urban phenomenon emerges with the transition to settled life. Until recently, it was argued that the invention of agriculture led to a sedentary lifestyle; however, the excavations in Diyarbakır's Körnik Tepe and Şanlıurfa's Karahan Tepe in 2021 show the opposite. The inseparable relationship between city and agriculture built 12,500 ago persists in our time.[2]

Agricultural areas within or in the city's surroundings may change and transform in scale, function, and value. At specific periods, agriculture is associated with the rural and avoided, while at others, it is praised for contributing to the city's self-sufficiency.

The urban city concept cannot be limited to physical elements. The Turkish words '*medeniyet*' and '*şehir*' - medeni- are known to be derived from the Arabic root "*me-de-ne"*. Its Latin equivalent is "*civilization*" related to "*civitas*" city and "*civilic*" citizen. According to the urban scientist Ruşen Keleş, society is the most important element that constitutes the city. Following a certain level of development, individuals can only form the cities by becoming ethical and diverse communities.[3] Architect Cengiz Bektaş's statement, ''The city is where the human is the most human." supports the definition above.[4] Accordingly, defining Urban Agriculture in light of the city, agriculture, and societal elements will be accurate.

Throughout its history, different definitions of urban agriculture have focused on food production. The contemporary content of the urban agriculture concept has been formed with community gardens stretching out into the city in the USA in the 1970s.[5]

According to the definition made by "The Community Food Security Coalition's Urban Agriculture Committee", "Urban Agriculture areas encompass growing, distribution, and marketing activities related to urban practices within the city. In a broader context, the definition includes the improvement of societal relations, ecological sustenance, field assessment planning, safe food supply, agricultural food, and commercial networks, and the preservation of urban agriculture areas."[6] The 'Continuous Productive Urban Landscape' definition incorporating urban agriculture areas was introduced in the

2 For detailed information, see https: //www.arkeolojikhaber.com/haber-kortiktepede-tarim-oncesi-yerlesik-yasam-tespit-edildi-4334/

3 Keleş, "Kent ve Kültür Üzerine", p. 12-15,

4 Bektaş, "Kenti Savunmak, Kentli Olmak", p. 94.

5 Hodgson, K., Campbell, M.C. and Bailkey, M., "Urban Agriculture: Growing Healthy, Sustainable Places".

6 Rasouli, "The Role of Urban Agriculture in Sustainable Urban", p.15.

2008 'European Forum for Architectural Policies.' The idea put forward by the Bohn&Viljoen architect group is based on utilizing urban landscape and agriculture to reduce the city's ecological footprint.[7]

Never have in history, urban agriculture area types come in such a wide range of names and content as they do today. Commercial bostan, community bostan, sponsored bostan, allotment bostan, hobby bostan, neighborhood bostan, school bostan, rooftop bostan, balcony bostan, and urban farms are examples of different names given to urban agriculture areas. This diversity stems from the city's and the citizens' needs, different scales and ownerships, missions, operations, and long-term plans. In addition, providing solutions for certain global issues, such as climate crisis, ecological destruction, and access to healthy food, adds to the importance of urban agriculture.

The combination of the 'Sustainability' concept, first used by the United Nations Environment and Development Commission in 1987, and the urban city concept brought about the topic of designing sustainable cities. Exploiting natural resources as if they were infinite through building cities and rapidly growing industrialization caused climate change and global warming and negatively impacted urban ecology. In addition, the increase in city population density led to an increase in the economic and social inequality causing urban poverty. Consequently, sustainable city models were designed to propose solutions to the problems it brings along. Among them are ecologic,

Figure 1. Where are gardening and agriculture allowed in New York City?[8]

slow, and green cities, of which "urban agriculture" is an essential constituent. However, the integration of agriculture into the urban fabric is needed to be accelerated in urban planning and development. New York City Urban Agriculture Project can be examined as an application example in terms of

7 Yürük, "Üretken Peyzajın Ketli Hali", p.36.

8 For Illustrative Purposes Only. Prepared by NYC Department of City Planning. Urban Design Office. June 2018.

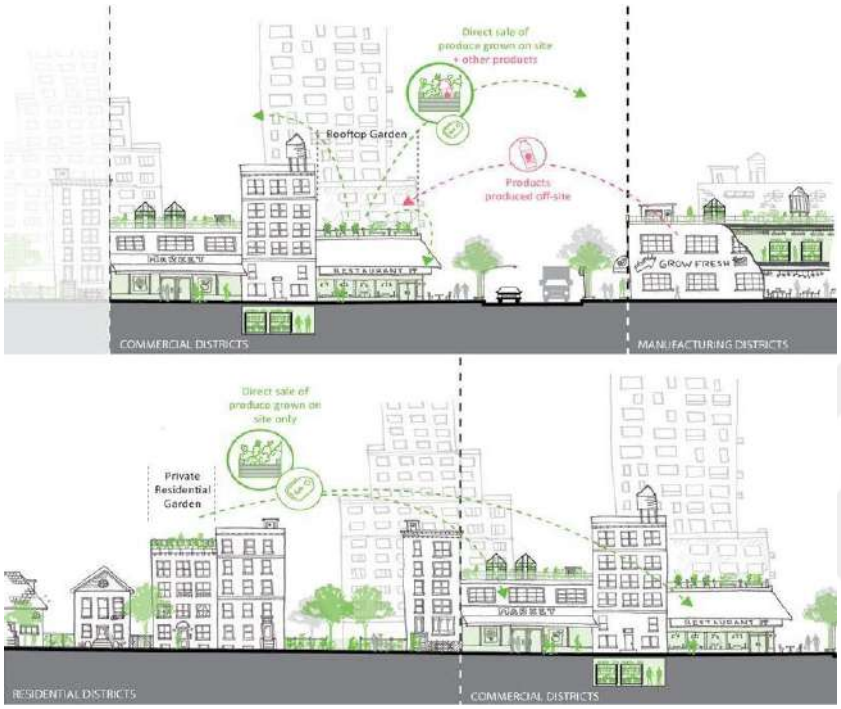


Figure 2. Sales schemes NYC Urban Agriculture (NYC Urban Design Office. June 2018.)

commercial and urban planning.[9] All topics have been designed and applied, including where to use different agriculture types, sales of the produce, and business opportunities.[10] (Figure 1-2)

Urban agriculture is essential for sustainable cities; nevertheless, it must also ensure its own sustainability within the city and its surroundings. Only then can its benefits persist in the long term. It requires an accurate and holistic design for the urban agricultural areas to be built as self-sufficient systems rather than ones that need constant input.[11]

Sustainable system designs will reinforce the city's sustainability, providing economic, ecological, and social benefits such as enhancing biodiversity, access to good, clean, and fair food, nutritious food safety, prevention of heat islands, social integration, and will create employment opportunities.

1.1. Types of urban agriculture

The population density has risen to 50% from 15%, with a global increase in the urban population density at the end of the 20th century, which denotes a rise in urban population from 1.5 billion to 6 billion. This increase is

9 https: //www.nyc.gov/site/agriculture/about/about-urban-agriculture.page

10 Vitale, "Urban Horticultural and Aquaponics", p.4.

11 Sorduk, B.2010 The role of urban agriculture for sustainable urban development, the case of Istanbul metropolitan area Master's Degree Thesis ITU

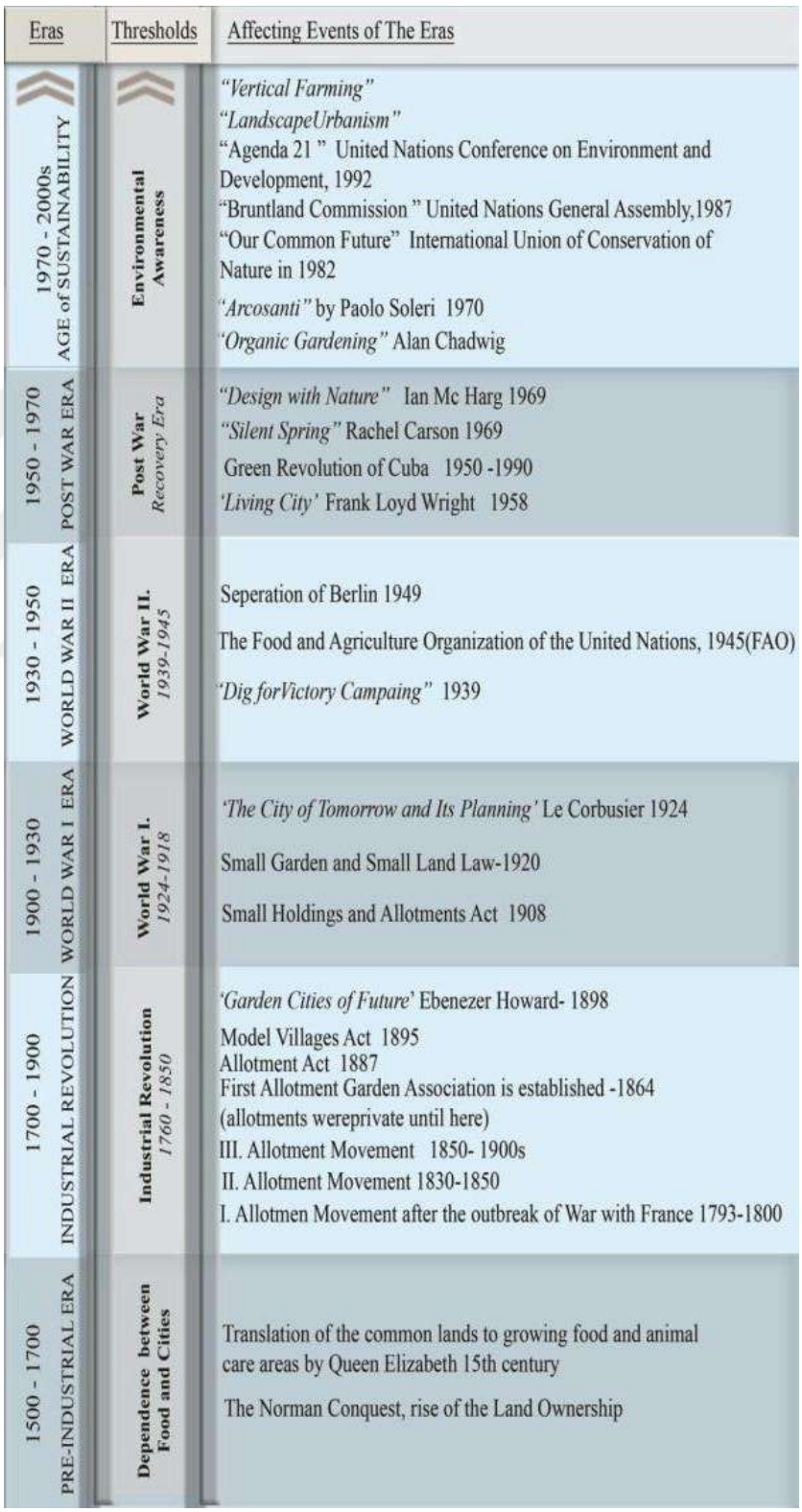


Figure 3. Diagram of Thresholds of UA through history. (Melis Akyol, 2011)[12]

12 For detailed information, see Akyol, "Evolution Of Urban Agriculture Concept", p.15-36.

Figure 4. (Left) Colony Eden in Germany, 1893, Anarchy and self-help, 1871- 1918, (Right) Kahramanmaraş Metropolitan Municipality Hobby Gardens, 2016[16]

expected to reach 60% by 2025.[13] Considering this inclination, it is crucial that a city provides quality and sustainable living, ensuring food access and safety.

At this point, urban agriculture should not be considered solely as food production. Local systems that serve different processes within and in the surroundings of the city, such as processing and distribution of the produce, and recycling, are vital elements of urban agriculture. In addition, dissemination of the prosumer[14] concept through alternative economic models and distribution networks constitutes the framework of these systems.

Throughout the history of urban agriculture, the visibility of its relationship with the city is observed to overlap with certain thresholds in world history, including the industrial revolution, wars, disasters, ecological problems, and the COVID-19 pandemic in our recent history. (Figure 3)

The relationship between the urban agricultural areas emerging in these historical thresholds and the contemporary urban cultural types is noteworthy. For example, allotment gardens[15] first emerged in the 1500s with the concept of property in England. Before then, in rural lands, people produced and shared collectively without the concept of property, and in the city, they could cultivate the vacant areas owned by the queen by permission. “Schreber Movement” is an allotment garden movement that began in Germany in 1864. It begins with the land leased by a school principal for the children affected by the difficult working and living conditions the urban working-class face. The movement promoted allotment gardens in the country, with families joining their children soon after. The German government supported the allotment gardens integrated into the houses. It partially aimed to have the working-class people spend their free time in their gardens and relax after intense working conditions, thus living without devoting time to politics. (Figure 4)

13 Deelstra and Girardet, “Urban agriculture and sustainable cities”, p. 43.

14 Prosumer: A new direct, active, and trust-based relationship between the producer and consumer that supports local producers, searches for a solution for their problems supports the production process, experiences production activity, though on small scales, through the support it provides, and takes responsibility for its own food from the land to the plate.

15 Allotment gardens are urban agricultural types where a plot is divided into parcels and leases its right to use for a designated period.

16 https: //www.marasmanset.com/hobi-bahceleri-hareketlendi accessed on 10.03.2023

Today, in 2023, allotment gardens in Germany consist of well-managed, sustainable examples.[17] Prinzessinnengarten is an excellent example of those. The community garden that began in 2009 in Berlin continues in two different locations today. These areas are observed to spread, with their communities adopting an organized work manner based on association, initiative, and voluntariness. In Turkey, allotment gardens prepared for the urbanites by local authorities within their boundaries can be examples of these types. The usage of these areas is restricted to specific rules prepared by the municipality. The users must comply with them. Compared to the examples in Germany, they are areas solely designed for people to have a good time, away from self-sustainability and holding a community.

A second threshold example is the "Victory Gardens" established during and after wars. These gardens found in the USA, Canada, Germany, and England began with the states calling for all convenient areas in the city to be transformed into agricultural lands regardless of their scales. The projects were highly supported by the states not only for production purposes but also for alleviating the psychological effects of the war, lifting the morale of the people, and reducing the pressure on the farmers.

The areas used for "Guerilla Gardening" today resemble victory gardens. Guerilla gardening is an urban agriculture type organized by activist communities aiming to convert all areas suitable for food production in the city into agricultural areas. The most famous example is the "Green Guerillas" community founded by Liz Christy. The Liz Christy Garden, which was converted into an urban agricultural area after cleaning out the rubble, is protected by New York City.

The main difference is that guerilla garden is an activism-based agricultural movement conducted without governmental support, occasionally illegally. The most famous method is the seed bombs, which transform areas inaccessible due to fences and walls.[18](Figure 5)

"Food production" is the common ground for the different types of agricultural lands within or in the surroundings of the city to cater to these needs. This common ground serves the city and the citizens regardless of their scales, produce diversity, systems, the networks they interact with, and stakeholders.

Each resource examined for the research on the types of agricultural areas is observed to explain these types differently, which creates terminological chaos.

17 For detailed information, see https: //www.visitberlin.de/en/urban-gardening-berlin

18 Round balls developed by farmer and philosopher Masanobu Fukuoka prepared by mixing seeds, clay, and compost. They are used in areas that are difficult to access.

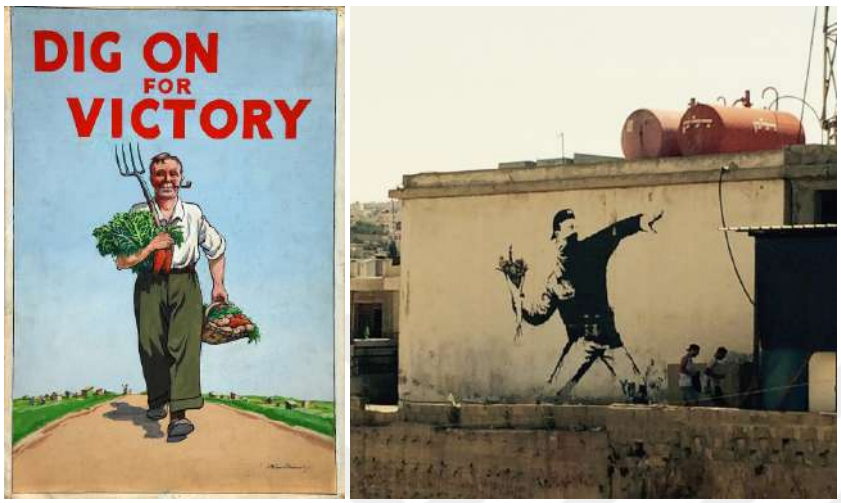


Figure 5. (Left)The British "Dig on for Victory" poster by Peter Fraser.[19] (Right) The Flower Thrower, 2003 stencil mural in Beit Sahour in the West Bank by the graffiti artist Banksy.

The categorizations in the samples obtained from different researches may be named differently based on their scale, location, property, and produce. (Figure 6-7-8-9-10)

Type of urban agriculture	Organisation	Approximate production area per unit	Main crops and animal produce
Productive house (indoor) private	Private	2 to 20 m^2 per house	mostly vegetables, herbs, and fruits
Productive roof (flat) private	Private	20 to 50 m^2 per house	mostly vegetables, herbs, and fruits
Productive roof (flat), aquaponics	Private	20 to 50 m^2 per house	vegetables and fish
Kitchen gardens	Private	50 to 300 m^2 per house	potatoes, vegetables, herbs, and fruits
Allotment gardens	Private	complex 5,000 to 20,000 m^2	potatoes, vegetables, herbs, and fruits
Community gardens, open field	Collective	400 to 10,000 m^2	potatoes, vegetables, herbs, and fruits
Community gardens, glass house	Collective	200 to 5,000 m^2	vegetables, herbs, and fruits
Edible green amenities	Public	400 to 10,000 m^2	fruits and nuts
Roof gardens aquaponics	Professional	500 to 1,500 m^2	vegetables and fish
Professional horticulture, open field	Professional	5,000 to 40,000 m^2	potatoes, vegetables, herbs, and fruits
Professional horticulture, glass house	Professional	5,000 to 10,000 m^2	vegetables, herbs, and fruits
Professional hydroponics	Professional	1,500 to 10,000 m^2	vegetables, herbs, fruits, and fish
Urban farm	Professional	300,000 to 800,000 m^2	combination of meat, potatoes, vegetables
Green infrastructure farm	Professional	300,000 to 1,200,000 m^2	combination of meat, wheat, vegetables

Figure 6. Spatial types of urban agriculture with average surface and crop types

This causes confusion in reading and comparing literature. Thus, in order to create a common language, 'Urban Agricultural Types' are defined

19 "https: //en.wikipedia.org/wiki/Victory_garden" accessed in 03.03.2023

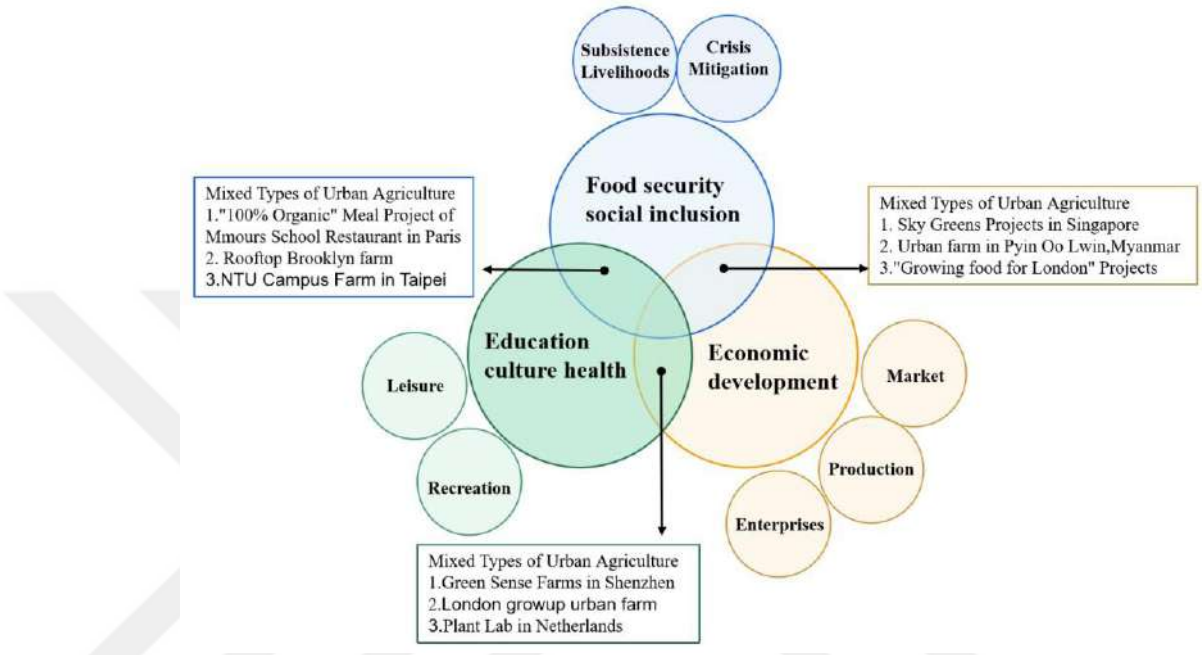
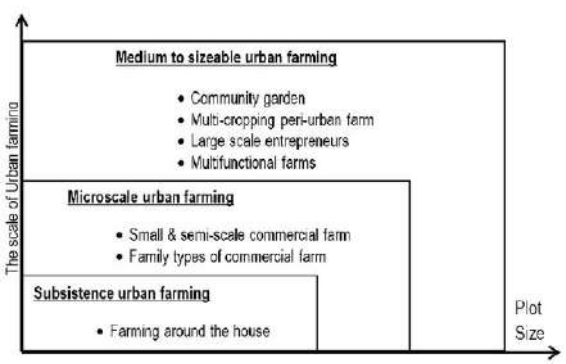


Figure 7. Typology of urban agriculture practices..[20]



Type of urban agriculture	Main characteristics
Home gardens	• Affiliated with individual households • Not institutionally embedded
Allotments (also referred to as family gardens)	• Plots for individual use, e.g. for the non-commercial production of food, usually in specific complexes • Institutionally embedded in acts and planning law
Self-harvest gardens	• Plots that have been pre-tilled by farmers, and are individually tended by urban residents who grow their own vegetables • Leases, usually for a season
Community gardens	• Volunteer-led gardens for communal use • Often as interim use concepts on brownfield or infill sites; no institutional backing
Intercultural gardens	• A special type of community garden with the aim of fostering integration
Therapeutic gardens	• Often affiliated with psychotherapy institutions • Doing gardening and experiencing the garden may have a healing effect on patients
School gardens	• Usually affiliated to schools • The aim is to teach children about how to grow, process and prepare food, and about the environment

Figure 8. (Left) Different types of urban agriculture, and their main characteristics[21] (Right) Scales of the Urban Agriculture Production System (Source: RUAF, (2016); Noseir, (2014))

20 Zhou,Wei and Zhou," How Does Urban Farming Benefit Participants?."p. 5.

21 Specht, Schimichowski, Fox-Kämper, "Multifunctional Urban Landscapes," p. 5.

Figure 9. Urban Agriculture Typologyies. (Urban Agriculture Europe, 2016.)[22]

Figure 10. Typologies and nomenclatures for Building-Integrated Agriculture.[23]

as follows:

1. Bostans Recognized As Cultural Heritage and Continue Production

Small-scale establishments that continue production, preserving the areas and knowledge passed on to them.

2. Commercial Bostans

Family establishments that produce food within the city, making a living out of it, generally without the ownership of the area.

3. Urban Farms

Family establishments in the surrounding city, where families live off farming and carry out animal husbandry practices.

4. Community Bostans

Bostans that consist of participants from different locations congre-

22 Lohrberg, "Urban Agriculture Europe".

23 Buehler, and Junge," Global Trends and Current Status of Commercial Urban", p. 2.

gating around a common mission, such as protecting an area.

5. Neighborhood Bostans

Community bostans that are established by residents of a neighborhood.

6. Schooll Bostans

Bostans integrated into private or public school gardens.

7. University Bostans

Bostans that are established within university premises by student clubs and employees of a university.

8. Allotment Bostans Owned by Local Authorities

Bostans whose right of use is given to residents designated by a draw for a certain period by local authorities.

9. Allotment Bostans Owned by Private Sector

Bostans that are owned by private individuals and institutions and comprise areas and services rented for a certain period.

10. Corporate Bostans

Bostans that are established for corporate firm employees.

11. Sponsored Bostans

Semi-corporate bostans whose space and needs are provided by a sponsor.

12. Home Bostans

Bostans that are established by individuals in their house/apartment gardens.[24]

13. Guerilla Bostans

Bostans that are occupied by the citizens and converted from parks, safety islands, and vacant lots near their homes.

14. Productive and Edible Landscape

Areas and strategies that are created by local authorities, transforming the urban landscape within their administrative area.

15. Bostans Integrated Into Buildings

15.a. Rooftop Bostans

Converting vacant rooftops into bostans

15.b. Indoor Bostans

Bostans that are designed with LEDs used for indoor plant growth

15.c. Vertical Bostans

Bostans that are installed along exterior or interior vertical supports of buildings

24 Today, home bostans are among the marketing strategies for housing sales.

15.d. Bostans Incorporating Hydroponic Systems

Vertical bostans where growth media is water

15.e. Bostans Incorporating Aquaponic Systems

Bostans, where growth media is water and supported by fish manure

The majority of urban agricultural areas do not fall under a single category. For example, a 'Rooftop Garden' may incorporate vertical bostans and water-aided agriculture. It may include urban beekeeping. It may be sponsored. It may have a voluntary community. The production output may be shared among volunteers, thus supporting an alternative economy. Volunteers may start new bostans in their homes or vacant lots in their neighborhoods by utilizing the experience and knowledge they gain here.

One of the most well-known rooftop farm examples is Brooklyn Grange Farm. (Figure 11) Brooklyn Grange was established in New York City in 2010. Today it has the world's largest rooftop farms in three different locations. It promotes sustainable living in the city by expanding the accessibility of local and healthy food for the communities residing in New York City.

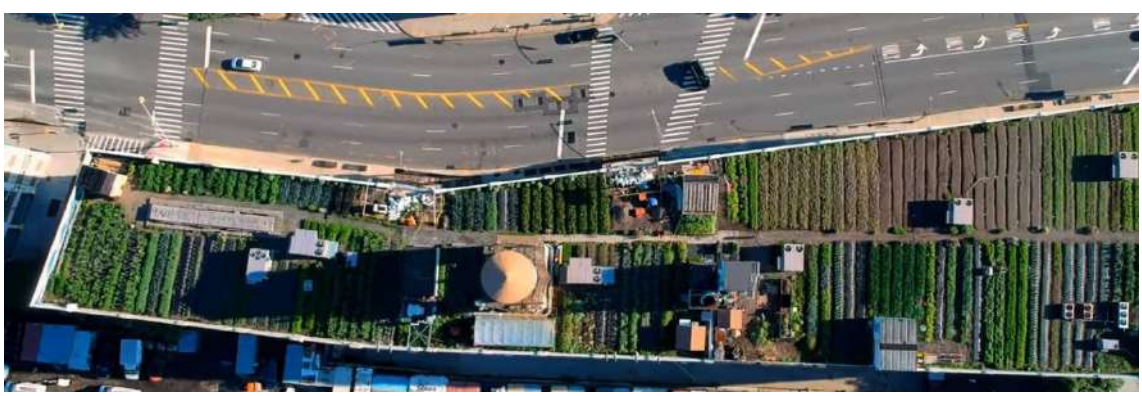


Figure 11. Brooklyn Grange Farm [25]

The gradual depletion of lands in the cities diversified urban agricultural spaces and types. Building-integrated spaces and methods can be examples of that. The building owned by Pasona Group in Tokyo was revised by Kono Designs and converted into an urban farm that allows farming practices in its internal spaces and external structure.[26] (Figure 12)

Some urban agricultural areas are not restricted to areas with agricultural purposes. Some projects, such as the Schoolyard Project, began to transform children's eating habits at schools and expanded with a holistic perspective. The project centering around bostans, school kitchens, and lunchrooms, emphasizes not only food production but also the value of being

25 https: //www.brooklyngrangefarm.com/

26 https: //www.dezeen.com/2013/09/12/pasona-urban-farm-by-kono-designs/

Figure 12. Pasona Urban Farm. (https: //konodesigns.com/pasona-tokyo-headquarters/)

a community, academic knowledge, nutrition, and responsibility. The founder of this long-running project which celebrated its 25th year in 2023, is the chef and food activist Alice Waters.[27]

27 https: //edibleschoolyard.org/about-us

1.2. Urban Agriculture and Sustainability Criteria

"We do not inherit the Earth from our ancestors;
we borrow it from our children."

Although the word 'Sustainability' officially emerged in 1987 in 'Our Common Future' by Brutland Commission for the first time, it is apparent from the Native American proverb quoted above, which embodies this concept, that it is actually not quite new. The concept defined by the Our Common Future report as "*Meeting the needs of the present without compromising the ability of future generations to meet their own needs*", aims to prevent the exploitation of natural resources as if they were infinite and calls us to account for the transfer of these resources to the younger generations. The "United Nations Conference on Environment and Development" held in Rio de Janeiro in 1992 was an important step in the prudent management of the environment, determining a series of objectives that would manage the economic and environmental activities of the nations cooperatively. One of the most important products of the conference, Agenda 21, introduces the most comprehensive sustainable development-based action plan hitherto designed at the national and international levels.

The triple bottom line (TBL) concept is an economic theory developed by the economist and environmentalist John Elkington in 1997, introduced along with the topic of sustainable development. The theory suggests that two more pillars, including social and ecological concerns, should be added to the pillar showing profit and loss in accounting frameworks. Elkington argues that ecological, social, and economic sustainability cannot be achieved separately at a desired level unless the three pillars reach the base level simultaneously. As of 2007, the United Nations ratified the TBL as the urban and community accounting standard. Moreover, nowadays, a future-oriented approach is suggested with a fourth bottom line in order to separate sustainable development and sustainability concerns.

The Earth Summit in 2005 structured the three pillars of sustainability as environmental, social, and economic. These concepts have been included in the work produced by urban development and design professions and their future predictions. The necessity of urban agriculture for sustainable

cities was first defined in 1996 at the United Nations Conference of Human Settlements, Habitat II, held in Istanbul. “Urban Agriculture” was a relatively novel term popularized in defining the production, processing, and distribution of food and other products through urban and peri-urban plant breeding and animal husbandry. The conference underlined that urban agriculture is one of the top-ranking solutions to reducing urban footprint with its food safety and logistics. It was also approved that the integration of novel urban agricultural methods into the urban environment will reinforce sustainability, utilizing the numerous advantages and services it may provide the cities.[28]

The benefits urban agriculture provides for cities’ sustainability and the urbanites’ living include education, urban planning, economic growth, recreational activities, health, food safety, environmental issues, the use of natural resources, mitigation of climate change, and social interactions. (Figure 13)

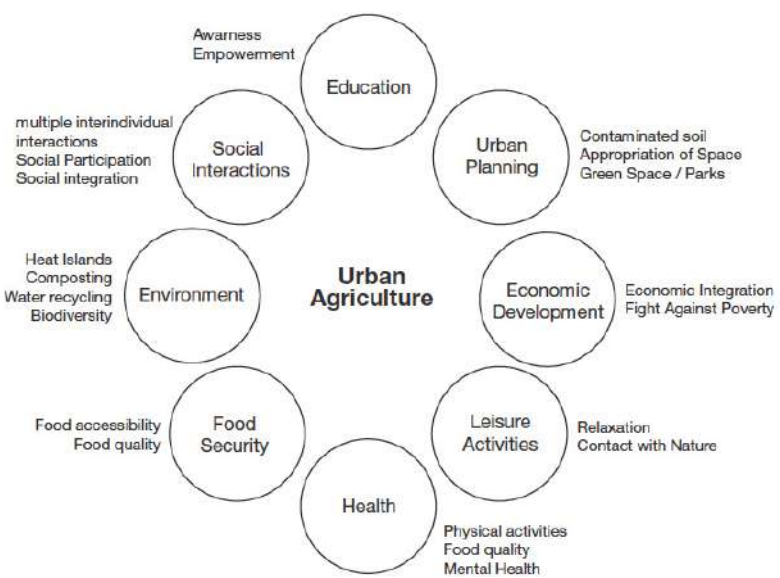


Figure 13. Different areas of Urban Agriculture activities related to economic, social, and environmental development (Source: Duchemin et al., 2009, p.44).

However, for the urban agricultural areas to be able to provide these benefits, they, themselves, are required to be primarily sustainable. Consequently, they will support the city’s sustainability as a reflection of their own.

We can summarize the three main sustainable criteria identified with urban agriculture as “economic profitability, social welfare, and environmental health”.[29]

It should be noted that based on the priorities of the urban agricultural type, the order of the criteria may be changed.

28 Lorna Michael Butler, Dale M. Maronek, “Urban and Agricultural Communities” p.

29 Krishnan, Krishnan, S., Nandwani, D., Smith, G., & Kankarta. “Sustainable Urban Sustainable Agriculture”, p.327)

The abstracts compiled from various expert opinions in the study conducted by Doğan[30] were tabulated. The suitable criteria can be chosen in the table. (Figure 14) Nevertheless, this categorization does not encompass all titles due to the different dynamics encountered along the processes and time. In such events, the concept of resilient[31] and sustainable urban agricultural areas should be preferred.

One of the design methods where urban agricultural areas incorporate sustainable systems is the science of permaculture design. One of the founders of permaculture David Holmgren defines permaculture as "Consciously designed landscapes which mimic the patterns and relationships found in nature while yielding an abundance of food, fiber, and energy for provision of local needs. People, their buildings, and how they organize themselves are central to permaculture. Thus the permaculture vision of permanent (sustainable) agriculture has evolved to one of permanent (sustainable) culture."

Through permaculture designer and educator Iraz Candaş's perspective, the relationship between permaculture and sustainability can be explained as "Permaculture is a design science based on ethics, which aims to create sustainable (or "restorative" in the new world) human settlements. According to permaculture, a system is sustainable as long as it generates energy no fewer than required for its lifetime maintenance and renewal at the end of its life."[32] Three ethical rules and the related design criteria are central to the permaculture design based on these foundations. (Figure 16)

Frameworks	Indicators		
	Economic	Social	Environmental
Vasquez-Moreno & Cordova	• harvest composition, volume, losses • seasonality of production • surplus volumes and destinations • costs (including employees), income obtained (primary/secondary), investments • scale of production, factors promoting or hindering scale increases	• the number of people benefitted • whether it provided food security and/or food quality • the nature and interactions with others through urban agriculture	• crop diversity • crop rotation and soil management • waste management • water sources • organic production • types/use of agrochemicals • knowledge of alternative /traditional agricultural practices/inputs.
Azunre et al.	• fulltime employment, • employment for women, • income generation, • savings and expenditure • tax revenue	• educational functions, • civic engagement, • safety and security, • gender equality and social equity, • health benefits, • recreation and technology and innovation promotion.	• management of emissions, • water management, • waste management, • energy efficiency • organic farming
Dielemen	• employment and income generation • availability and types of markets • new markets being created • poverty reduced • economic value generated	• citizen's participation • gender equity • citizen involvement • intercultural communication • communal self-reliance • capacity building and knowledge transfer	• usage of wastes and water • impacts on the city's ecology • urban soil improvement by composting • waste management • using rainwater for irrigation • purification of air • lowering average temperature
Foeken et al.	through sales of crops, animals and animal products • indirect income through saving on food costs • Family labor • for labors in urban gardens and on farms • for suppliers of inputs • for transporters of produce • for traders of produce • for extension officers	producing household • sales of produce to other urban dwellers • donations to neighbors and relatives in town	of urban agriculture on the urban environment and willingness to take the environment into account • practice organic farming • abstain from use of polluted water for irrigation • prevention of erosion • proper management of livestock waste • practice recycling
Clerino & Fargue-Lelièvre	• Number of jobs, types of contracts, local jobs • Added value of the goods and services produced • Sales channels, labels, and traceability • Sources of revenue • Redistribution to collaborators and stakeholders: • Weights of grants and subsidies: • Project continuity: • Project leader's status:	• Partners on territory Local network of suppliers, involvement in networks, exchange of equipment, link with rural agriculture • Link with inhabitants • Knowledge sharing and education • Working conditions and inclusion • Risk management, health and security • Governance transparency and management • Improvement of local living conditions	• Cropped biodiversity • Non-cultivated biodiversity • Resources-efficient process • Resources consumption • Resource recycling • Local pollution identification and technical adaptation

Figure 14. Summary of Sustainability Assessment Frameworks of Urban Agriculture (Doğan, 2022)

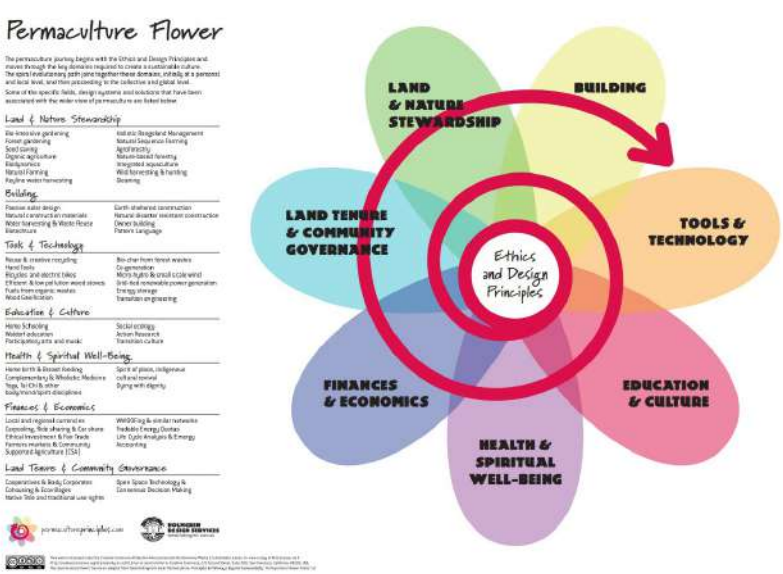


Figure 15. Ethical values and design principles of permaculture design science for a sustainable living culture. "Permaculture Flower". (https: //holmgren.com.au/permaculture/about-permaculture/)

30 Doğa, "Assessing The Sustainability Of Urban Agriculture" ,p 68-70.

31 Resilience means the capacity for solving one's own problems, where the dynamics rapidly get organized against unpredictable threats and dangers and solve the problem.

32 Candaş, Permakültür: "Yapmak'la İlgili Düşünmek", 2017.

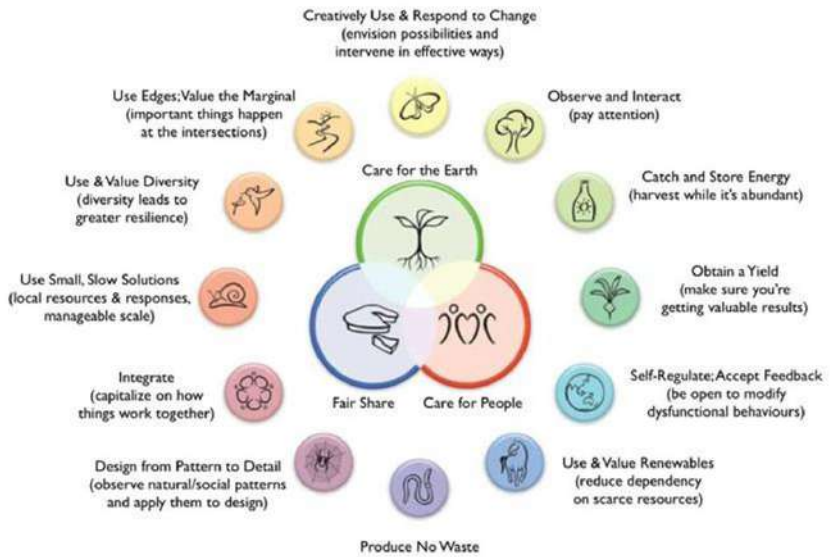


Figure 16. Permaculture design principles. (https: // permaculturepriciples.com/permaculture-principles/)

Urban agriculture in istanbul: The use of space and the structures' relationship with the sustainability criteria

02

An examination of Istanbul's urban agricultural traces reveals data not only important for Turkey but also for world urban agriculture history. The uninterrupted continuity of the 1500-year-old agricultural past of the Yedikule Bostans until today separates Istanbul's urban agricultural history from other examples.[33]

The details as to the existence of urban agricultural areas in Istanbul are first encountered in the Eastern Roman Empire "Theodosian Code" published in 438. An examination of 'Geoponika', the Byzantine encyclopedia of agriculture compiled from ancient Roman and Greek manuscripts prepared by Konstantin VII Porfirogennetos in 10 AD for a practical objective, offers detailed information on agricultural activity and crop diversity in the region.[34] It is concluded that Istanbul has accommodated a variety of urban agriculture with its contents, methods, and resources throughout its history from Eastern Rome to Ottoman Empire.

According to Nurhan Atasoy, *"The notion in Ancient Rome that being engaged with farming and gardening is an honorable activity continued in the Byzantine. The Byzantines were much more interested in agriculture, garden culture, and nature than their contemporaries in the Western world. The names of many regions in Constantinople are related to certain gardens and plants; in the Ottomans as well: names of places such as Bostancı, Fenerbahçe, Yeşilköy, Bahçeköy, Bahçekapı, Çınardibi, Çamlıca, Ihlamur, Fulya, Dolmabahçe, Çubuklu; names of people such as Selvi, Sümbül, Çiğdem, Nilüfer, Yasemin, Müge, Gül, Lale, Menekşe, Nergis…"*[35]

Certain subtitles emerge when analyzing the importance of bostan practices in Eastern Roman Istanbul. As an Orthodox capital, one of these subtitles is the monastery bostans. The resources known as 'Typikon', where every monastery's rules and rituals are scripted, offer information about the

33 White, Shopov,& Ostovich, "An archaeology of sustenance: the endangered market gardens of Istanbul",(2015), p.29-38.

34 Geoponika comprises a rich content including agricultural production, growing vegetables, fruits, flowers, beekeeping, wine growing methods, olive tree growth and olive oil extraction methods, storage of fruits and vegetables, and ornamental plant arrangements. Koç, "Bizans Tarımının El kitabı ya da İlk Tarım Ansiklopedisi: Geoponika",p. 47-57

35 Atasoy, "İstanbul Bahçeleri", p. 534

bostans and crop diversity. The quote from the Imrahor Mosque (St John Studios Monastery) typikon: 'It should be known that from Eastertide until All Saints, we eat two cooked dishes— garden vegetables and legumes with olive oil. We also eat fish, cheese, and eggs; we drink three [measures of wine] at midday and three in the evening."[36] gives us clues about the vegetables growing in the garden included in the diets of monastery monks.

The structures in the walled areas of the monastery and the presence of various gardens are noteworthy. When scrutinizing the Pammakaristos Monastery (Fethiye Mosque) engraving, we encounter different sections such as medicinal herbs, flowers, and vegetable gardens. (Figure 17)

Figure 17. An engraving showing the state of Pammakaristis Monastery (Fethiye Mosque) when it was used as a patriarchate after the conquest of Istanbul (S. Schweiger, p. 118)

Sopov and Han's essay on urban agricultural land use and their transformations between the 15th and 18th centuries researches the sizes and owners of the bostan areas, the topography of their location, their relationship with the water resources, and the vegetable and fruit species growing. One of the research outputs is that the Langa Bostans, the largest bostan of the time, established on the fertile soil composed of the Lykos Creek alluvia, disappeared due to the increase in its value as it was close to the city center. The same research concludes that these bostans contained structures such as rooms for gardeners, haylofts, staples, water wheels, and water wells; sufficient capital is required to build these structures.[37]

It is possible to see the details of Langa Bostans in the 16th-century Istanbul pictures of Matrakçı Nasuh. Its borders are drawn in the middle of a yellow ground with two flowering trees within the square-shaped fortification walls; a flowering tree and two bostan wells are drawn in a smaller green square ground. (Figure 18)

36 Gazioğlu, "Bizans Manastır Sistemi"

37 Shopov and Han, "Osmanlı Istanbul'unda Kent Içi Tarımsal", p. 34-38.

Figure 18. (Left) Matrakçı Nasuh İstanbul Depiction (Right) Detail of the Langa Bostan (designed by Habibe Bektaşoğlu)

In the Ottoman period Istanbul, palace gardens and the private gardens (hasbahçe) built by the sultans also contained bostans. A document from the 19th century lists the fruits and vegetables grown in the gardens of Beylerbeti and Topkapı Palaces as summer squash, green beans, eggplant, purslane, fresh grape leaves, asparagus, strawberry, lemon, spearmint, fresh grapes, celery, turnip, fresh broad beans, and fresh plums. Only some palace bostans built in the 19th century, such as Beylerbeyi, Yıldız, and Çırağan, have somewhat preserved their old characteristics. Many palaces in the Bosphorus have lost their "backyards" containing the fruit and vegetable gardens on the hillsides called the 'mountain area.'[38]

In the research on the bostans' design details and structures, the prediction that follows as 'In Schweigger's drawing, we see a building with jerkinhead to the left of the gate at the seaside; this must be the bostancı rooms.' in Nurhan Atasoy's text describing the Karabali garden, is a rare image of the structures. (Figure 19)

Figure 19. Karabali garden, Schweigge source: https: // www.doaks.org/resources/middle-east-garden traditions/ catalogue/C118

38 IBID. p. 549

Evliya Çelebi's statements on the existence of 500 tree grafters affirm the expansion of the urban agricultural lands within the city and the increase in production in the mid-17th century.[39]

Regardless of the high numbers, Evliya Çelebi's account is an important resource that indicates reasonably active agricultural activity and crop diversity in the city. His narrations include the different fruits produced in the garden, such as pear, pomegranate, apricot, and fig) and the variety of certain fruit species. For example, we learn from Evliya Çebeli that a variety of peaches such as dilberan, papa, sultânî, cânî, baba, derrâki, çelebi, cüce grew in Istanbul on the day.[40]

According to the research conducted by Shopov, the 1735 Ottoman archives record 344 bostans in the city.[41] In the Istanbul Encyclopedia, Reşat Ekrem Koçu underlines that Istanbul had the bostans growing the most beautiful vegetables through centuries and explains that these bostans were not only in the surroundings of the city but also in the walled city area to a large extent. Furthermore, the newspaper reports can be found about the canneries increasing their capacity to solve the surplus issue due to insufficient demand for the produce with the decrease in Istanbul's population after the second world war.[42]

The foundation books of account record the bostans and gardens adjacent to the külliye complexes, lodges, madrasas, and mosques built in the 16th century. A portion of the income necessary for the sustainability of these complexes was obtained by leasing the bostans. They were not considered separately from the mosque courtyard and the burial areas (hazîre). (Figure 20-left) They are encountered especially in the constructions of religious structures as a hallmark of the architectural understanding of the period. For example, according to the accounting records of the Süleymaniye Külliyesi, built by the Ottoman architect Mimar Sinan, adjacent to the mosque and the türbe-i şerif was a garden. As recorded by the 1585/6 accounting book published by Lütfi Barkan, a scholar of the Republican period in Turkey, the fruit and flower garden in the back and the front of the Suleymaniye Mosque provided an income for the külliye complex. These gardens were used as a graveyard or cobbled in the subsequent periods.[43] The only remaining example demonstrating the mosque and bostan relationship is Piyale Paşa Mosque. (Figure 20 - right) The Piyale Paşa Bostan was registered as an immovable cultural heritage by the 2nd İstanbul Cultural Heritage Protection Board with the initiatives of The Turkish Archeologists Association's Istanbul branch and

39 Zilli, "Evliyâ Çelebi Seyahatnâmesi"p.263.

40 IBID s.300.

41 Shopov, Han, "Osmanlı Istanbul'unda Kent Içi Tarımsal", P. 34-3

42 Günçıkan, "Semt bostanı betona yenildi', s. 15.

43 Shopov, Han, 'İstanbul, Beyoğlu, Kasımpaşa Klâsik Dönem', p. 3-5

Figure 20. (Left) The bostan in front of the Hekimoğlu Ali Paşa Mosque(1734-35), early 20th century, Atatürk Library Archive (Right)Piyalepaşa Bostan 2020 Source: https: //basakgazetesi.com/haber/ozel-istanbulun-gobeginde-5-asirlik-bostan-86347.html

Beyoğlu Urban Defense in 2015, for it was understood that the bostans were the revenues of the Piyale Paşa Mosque and the külliye complex and that they were the last surviving examples of bostans that provide an income to the foundations for expenses of the mosque.[44]

In his account of the 'Bostan' article, Reşat Ekrem Koçu mentions the expansion of the bostans throughout the city as follows: *"Be it located in Nefs-i Istanbul or the surroundings of the great city, the famous bostans will be referred with their own names in the encyclopedia; outside of Nefs-i Istanbul Üsküdar, Erenköy, Cadde Bostanı, İçerenköy, Bostancı, Küçükyalı, Maltepe, Kartal, Yakacık, and other villages of the vicinage; Beylerbeyi, Çengelköyü, Çubuklu, Paşabağçesi, Beykoz, in Boğaziçi and the villages behind them; in the Rumelian side Büyükdere, Sarıyar, Kefeli village, Bağçeköyü; in the surroundings of Haliç, outskirts of Kasımpaşa; in the surroundings of Eyyup, Râmi, Topkapu Maltepesi, outer Topkapu, Bakırköyü, Yeşilköy, Küçükcekmece, and others further away within the boundaries of the İstanbul Province had the largest bostans overwhelming Istanbul with fruits and vegetables available in summer and winter."*[45]

In 1958, in the map published by Ekrem Hakkı Ayverdi as the "19th Century Map of Istanbul", the sections were determined, and bostan areas were colored and calculated irrespective of the meadows. (Figure 21)

44 Kıran, "Yedikule Bostanları", p. 25

45 Koçu, "İstanbul Ansiklopedisi ", p. 2971-2973.

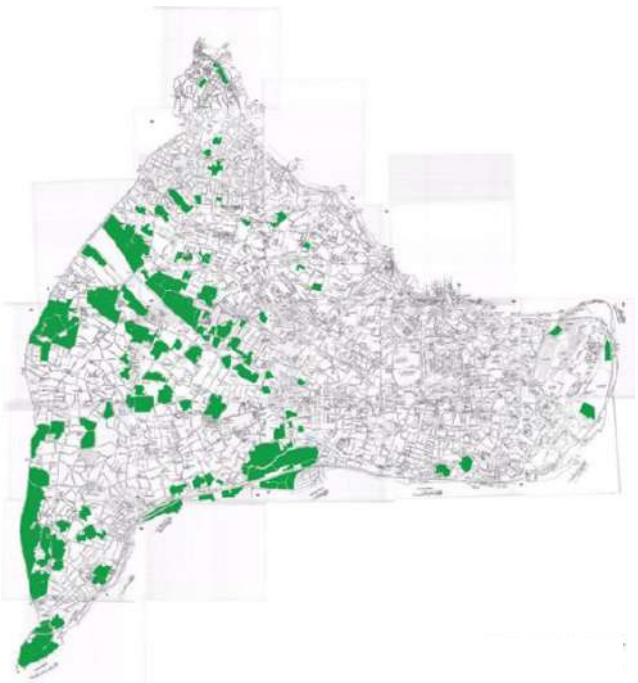


Figure 21. Sketch of locations of recorded market gardens.

Throughout history, the bostans that produced food utilizing the microclimate and sea transportation alternatives existed along the Bosphorus line in Istanbul. Unfortunately, only a few small-scaled bostans among them remain. (Figure 22)

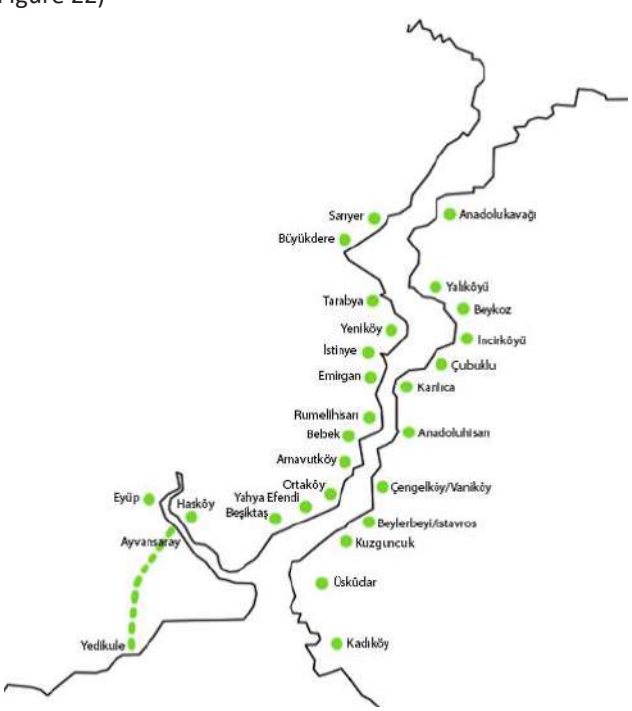


Figure 22. Bostan areas organized by Seda Özen Bilgili, of "İstanbul Map in 19th Century", published by Ekrem Hakkı Ayverdi in 1958.

For the sustainability of the Istanbul bostans scattered around a vast area, which solely focused on food production in the past, natural resources are of utmost importance. Fertile lands, water resources, and the use of topography are the principal resources. Today's problems, including the devaluation of the bostancılık vocation, heavy development threats, restrictions by law, sanctions by the metropolitan municipality law, arid lands, climate crisis, and draught, were not among the problems of the day.

When the use of bostans and their needs today are examined, examples of different types of bostans that cannot be explained with a single bostan concept emerge. For the sustainability of each type, different economic, ecological, and social requirements can be considered.

The "Gezi Bostans" established with a guerilla practice in different points of Istanbul, where people used to gather, attributed various functions, and took action to protect the areas, can be an example of "Community Bostans." Some of these bostans were redesigned as allotment bostans by their municipalities after they lost their communities and turned into vacant lots. İmrahor bostan is an example of that. (Figure 23)

Figure 23. (Left) Imrahor Bostan after the design of Üsküdar Municipality. (Üsküdar Municipality Archive 2020) (Right) Seedling activities in Imrahor Bostan of Doğancılar Forum members. (Sunay, S., 14),

Although Cihangir's Roma Bostans, Beyoğlu's last green space, faced development threats by different institutions at different times, it was preserved, transforming into a community bostan. (Figure 24) The Roma Bostan was transformed into a fruit garden with food forest planning. Public awareness was raised with the trees growing and the community that was built; thus, a strategy to protect the area was created.[46] People gathering around a certain objective constitute the foundation of the sustainability of a community bostan.

The hobby gardens started by local authorities within the district boundaries and the allotment bostans introduced as bostans in recent years

46 Food Forest: (Edible) Food forests are inspired by the forests in nature. It consists of edible plants trying to mimic the natural ecosystems and patterns. Its aim to create more liveable environments not only for humans but also for animals, insects, and fungi.

Figure 24. Roma Bostan, images of 2015 and 2018. (Roma Bostan Archive 2022)

have increased. In these bostans, the plots designated by the municipality are divided into small parcels and leased, paid or unpaid, to the citizens for certain periods. Every municipality manages these areas according to its own rules. The Kadıköy Municipality introduced the 'Kadıköy Bostans' project in 2021 and opened the Moda Bostan, Fenerbahçe Bostan (Figure 25), Göztepe Bostan, and Acıbadem Bostan to use. (Figure 26) Citizens residing within

Figure 25. Fenerbahçe Bostan (Kadıköy Municipality Archive 2022)

Figure 26. Acıbadem Bostan. (Dilek Yürük, 2023)

the boundaries of Kadıköy Municipality apply to these areas that grant six months of free use; the users are designated by draw.[47] The municipality provides the area's maintenance, soil enhancement, seedling, seed, water, and

47 For detailed information, see Kadıköy Belediyesi, "Kadıköy Bostan Nedir?"

manure supply. The social and economic sustainability of these bostans is prioritized. It is of utmost significance that the urban farms/commercial bostans primarily aiming at productivity, and profit persist in such districts as Gümüşdere and Beykoz. (Figure 27) The primary production-oriented points

Figure 27. Production areas and greenhouses in the Gümüşdere district. (İslam Yakut 2021)

of the no city without agriculture motto are these areas. The producers we can define as urban farmers or bostancıs usually consist of small family establishments. Economic and ecological sustainability is crucial for the urban farmer to continue production. Permission for the structures required for production (production greenhouse, storage etc.), arrangement of the sales areas, and promotions are important. Within the scope of law no. 6360, the villages within the boundaries of the metropolitan city were abolished and evolved into neighborhoods. Certain rules, such as the prohibition of the use of manure within metropolitan city boundaries, have made agricultural activities difficult. As a solution to such problems, the concept of the rural neighborhood has been developed.[48] The IMM provides free vegetable seedlings for NRF-registered farmers.

Not only different typologies but also the emergencies and disasters, such as the pandemic, are closely related to the urban agricultural areas and their sustainability. The COVID-19 pandemic affected Istanbul as much as the world, creating problems in agriculture along with "transportation, tourism, and education".[49] Restrictions to the entrance to and exit from the city with the quarantine largely affected the food logistics.[50] Certain challenges were faced In densely populated areas in accessing affordable, fresh, and nutritious food.[51] The main reason is that cities like Istanbul depend on imported food.

48 For detailed information, see Kılıç, İpek, "Kırsal Mahalle Büyükşehirlerde Tekrar Köye Dönüş mü?"

49 Akın, Çelen, Çelen ve Karagöz, 2020, s. 907T

50 İstanbul Metropolitan Municipality Transportation Management Center "Suspension of the entrance to/exit from Istanbul has been extended for 15 days" modified April 17, 2022

51 Lal,2020, p. 872

The increase in food prices before the pandemic and facing the reality of being unable to access fresh fruits and vegetables raised the Istanbulites' awareness of the importance of urban agriculture. People's interest in growing vegetables and salad greens in their homes increased, and some even tried it. Many corporate firms incorporated the topic of urban agriculture in the workshops determined by the home-office employees' demands.[52] These attempts were not restricted to food production. They produced a secondary benefit that fostered a connection between the urbanites and producers-farmers and their labor, which led them to question their consumption preferences with the labor-value equilibrium. The Istanbulites tried becoming a prosumer rather than just consumers.

The consequences of the 1999 earthquake and the food problem that may be faced in a possible earthquake scenario address the necessity for urban agriculture as one of the most important solutions. When the roads become dysfunctional and covered with rubble, one of the most vital needs will be accessing clean and healthy food until things return to normal. Istanbul's capacity to access its own food within its boundaries is crucial for the recovery after the earthquake. Hence, it is essential to improve local resources, especially agriculture, before these disasters occur.[53]

Urban agricultural areas also comprise vacant lots within the city. In the plans, these areas are designated as assembly areas in case of an earthquake disaster. The Kuzguncuk Bostan is one of the assembly areas of the Kuzguncuk neighborhood in the list published by the Üsküdar Municipality in 2020 as "Üsküdar Disaster and Emergency Assembly Areas."

Like many other bostans in Istanbul, the Kuzguncuk Bostan and İsmail Paşa Bostans are examples of urban agricultural areas designated as disaster assembly areas, which were converted into playgrounds, parking lots, and sports areas and later faced development threats. The areas face challenges concerning their sustainability with complaints about unhygienic appearance and safety issues as their use is under the initiative of the neighborhood residents without the control of a local authority. The "Moda Bostan," partially converted to a bostan by the residents, used as an area to feed stray animals and walk their pets in Kadıköy Caferağa, is another example going through similar processes. The area was declared an assembly area by the municipality to remain intact as an open space to be available in the event of a disaster; however, in the ensuing years, new projects have been produced for this area.[54] (Figure 28) Now the 'Kadıköy Bostans' as introduced by the Kadıköy

52 Personally, as an educator, I organized online workshops for employees of various corporate companies on "Urban Gardening", "Permaculture at Home', and 'No Waste and Composting".

53 Logistics Association, "İstanbul İli Afet Lojistik Planı Kılavuzu", 31/01/2013, p.90 The aid provided from outside Istanbul will not be sufficient in proportion to the population. Therefore, Istanbul must have the capacity to provide for itself. A major portion of Istanbul's daily needs is transported from outside, overland (especially staple food). The flow should continue through alternative ways, in case the roads close and entrance to the city is restricted. Alternative plans are required, especially to enable transportation by sea and air. For long-term and large-scale disasters, local resources should be created, and their use should be promoted (especially in agriculture).

54 For detailed information, see Kuyumcuyan, "Deprem Toplanma Alanında Yapılaşmaya Karşı", p. 102-10

Figure 28. The boundaries of Moda Bostan (Kadıköy Municipality Archive 2021)

Municipality, is a project area whose entrance is restricted with fences, and its connection with Moda bostan street has been cut due to security reasons. In today's conditions, it continues as a municipal allotment bostan, under normal circumstances, to be used as a temporary refuge in disaster times. However, no amendment was carried out to respond to a disaster refuge area's needs.

A recent discussion on this topic is calling the areas like the Yedikule Bostans and Piyale Paşa Bostans, persisting in the city with its bostancıs and production only as "bostan".

The concern is the confusion that may be created by calling the hobby gardens introduced as a municipal project 'bostans,' and the Yedikule and Piyale Paşa bostans may be perceived as hobby gardens by the people who are not informed about them.

The Istanbul Urban Bostans Working Group underlines the topic that *"The bostans today face the threat of being erased from the city's memory with the municipalities' 'hobby gardening' projects, which is defined as 'ecological gentrification' in the literature."*

The thesis aims to introduce and draw attention to the problems caused by the discrepancy and misuse in the terminology. Nevertheless, as stated before, the names attributed to them by their owners and users were used to define the urban agricultural areas in the examples presented in the thesis. (the Yedikule Bostan, Kuzguncuk Bostan, and Terasta Tarım Project.) In addition, the word 'bostan' was decided to be used in Turkish while defining the areas producing vegetables regardless of their scale and content, as it better emphasizes the narration. Therefore, 'bostan' was used instead of the word 'garden' in examples from Turkey.

A second misuse is related to the science of permaculture design science. The areas designed with this design science must be sustainable and set an ecologically prudent roadmap. Nevertheless, most projects describe themselves as 'permaculture gardens or designed per the permaculture principles"[55] Yet, an examination of the applications employed in these areas shows that the systems are inadequate and unsustainable. Therefore, these bostans that only show a modal similarity to a sustainable permaculture area with the raised vegetable beds, herb spiral, and mandala garden should not be defined as permaculture gardens.[56]

Considering the features of urban agricultural areas in Istanbul, the titles below have been created and exemplified as of 2023. (The author participated in some examples as a volunteer, user, or professional employee.)

1. Commercial Bostans Recognized As Cultural Heritage and Continue Production
   - 1.a. Yedikule Bostans
   - 1.b. Piyalepaşa Bostan
2. Urban Farms
3. Farming activities that are present in the districts located in the immediate surroundings of Istanbul, such as Çatalca, Beylikdüzü, Silivri, Sarıyer (Gümüşdere), Şile, Beykoz, Eyüp, Arnavutköy, Pendik
4. Community Bostans
   - 4.a. Roma Bostan
   - 4.b. Neighborhood Bostans
   - 4.c. Kuzguncuk Bostan
   - 4.d. Şenay and Gülsuman Community Bostan
5. School Bostans
   - 5.a. Enka Bostan
   - 5.b. Çitlembik Kindergarden Bostan
6. University Bostans
   - 6.a. Tarlataban
   - 6.b. Bahçeşehir University Gastronomy Department Bostan (BAU Farm) (Figure 29)

55 The announcement of IMM Directorate of Urban and Regional Planning about the "Moda Bostan": The 2.2-decare area has been transformed into a permaculture garden after necessary planting, pruning, and general maintenance using all-natural material. The bostan comprises vegetable gardens, fruit trees, workshop areas, and activity areas where films and documentaries will be screened

56 For detailed information, see Mollison, "Introduction to Permaculture"

Figure 29. Bahçeşehir University Gastronomy Department Bostan (BAU Farm), (Dilek Yürük, 2022)

7. Allotment Bostans Owned by Local Authorities

   7.a. Istanbul Metropolitan Municipality - People's Bostans Project

   7.b. Kadıköy Municipality - Kadıköy Bostans Project Göztepe, Fenerbahçe, Acıbadem, Fenerbahçe

   7.c. Üsküdar Municipality - Kuzguncuk, İmrahor

   7.d. Beykoz Municipality – Çubuklu Hobby Bostan

   7.e. Küçükçekmece, Sancaktepe Belediyelerin kendi sınırları içerisinde farklı mahallelerde kurdukları bostanlar (Figure 30-31)

Figure 30. Küçükçekmece Municipality (Atakent) (Küçükçekmece Archive, 2016)

Figure 31. Sancaktepe Municipality Hobby Bostan (Sancaktepe Municipality Archive 2021)

8. Allotment Bostans Owned by Private Sector

8.a. Komşu Köy (Figure 32)

Figure 32. Komşuköy (First Agrivoltaic with Enerjisa partnership) (Komşuköy Archive 2023)

9. Sponsored Bostans

10. Akmerkez Terasta Tarım Project Posthane Bostan

11. House/Housing Estate Bostans

Allocation of various-scaled areas in the house yards, balconies, and windows for food production, the recent application of transformation of the garden landscape in the house estates into bostans for the homeowners, which is used as a marketing strategy for housing sales. (Figure 33)

Figure 33. Murat Doğan's 3 square meter balcony farm with plants and animals. (Zeynep Kılıç 2016)

* Bahçetepe İstanbul Project Hobby Gardens (Figure 34)

Figure 34. Bahçetepe İstanbul Project Hobby Bostans. (Toki Archive 2016)

12. Guerilla Bostans

Examples that are converted from parks, safety islands, and vacant lots near their homes.

13. Bostans Integrated Into Buildings

13.a. Rooftop Bostans

13.b. Indoor Bostans

EK BİÇ YE İÇ (Figure 35)

Plant Factory

Figure 35. EK BİÇ YE İÇ Gumuşsuyu, Indoor, Vertical Hydroponic and Aquoponic System Bostan. (Batuhan Olguner, 2023).

13.c. Vertical Bostans (Figure 36)

Figure 36. (Left) Vertical Hydroponic System in the greenhouse, Vertical. (Esra Bilgin, 2022)
(Right) Vertical Hydroponic System Bostan, Hope Alkazar. (Nida Demir, 2023)

14. Productive and Edible Landscape

The use of fruit trees in the landscape and arrangements with aromatic plants. Recognizing and preserving the existing bostan areas as part of the cultural and productive landscape. Transformation of urban furniture into production areas.

14.a. Commune Action Gardens[57] (Figure 37

Figure 37. (Left) Common-action Gardens I, 3rd International Biennial of Architecture, Antalya 2015, (Right) Common-action Gardens II, Beşiktaş International Garden-Flower Festival, İstanbul 2016. (Fulya Akipek)

2.1. Commercial Bostan - Yedikule Bostans

The area defined as the Yedikule Bostans today stretches along the Land Walls of Istanbul in a straight line between Yedikule and Topkapi. Although several various-scale bostans that fall outside the line in Zeytinburnu and Fatih districts and the immediate surroundings of the walls are known by their specific names, e.g., Kilise Bostanı, they are defined as part of the Yedikule Bostans in the protection activities. The scope of this research is limited to the bostans included in the study area produced by İnanç Kıran in his thesis (2021).[58] (Figure 38) They are selected with respect to their continuing relationship with the walls since the Byzantine era, the use of the same lands as bostans, and the ancient agricultural knowledge that is still in practice through bostancılık vocation.

Aleksandar Shopov, who received his Ph.D. from Harvard University with his thesis titled Between the Pen and the Fields: Books on Farming, Changing Land Regimes, and Urban Agriculture in the Ottoman Eastern Mediterranean ca. 1500-1700, focuses on Ottoman agricultural technology in his research; also a member of the Initiative for Preserving the Historical Yedikule Bostans, claims that some bostans precede the Yedikule Bostans; however, a majority of them have been converted to landscapes or recreation areas designed with aesthetic concerns. Therefore Yedikule is distinct from them in that agricultural production in the city continues today. Moreover, the water used in irrigation is still supplied from the water wells built during the Ottoman period.[59]

57 For detailed information, see Akipek, "Common-action Gardens," 1421-1438

58 Kıran, "İstanbul Kara Surları" p.29.

59 White, Shopov & Ostovich, "An archaeology of sustenance: the endangered market gardens of Istanbul", (2015), p.29-38.

Figure 38. The borders Yedikule Bostans research area[58] (Edited by the author)

Therefore, protecting the bostans, which are integral to the UNESCO World Heritage-listed Land Walls, is significant for world cultural heritage as much as for Turkey. The combination of their history and their distinctive field patterns constitute one of the most notable examples of the cultural landscape. (Figure 39)

Figure 39. Patterns created by soil preparation methods in the Yedikule Bostans[64]

The oldest record of the Yedikule Bostans dates back to 422 AD. During the construction of the walls, Eastern Roman Emperor Theodosius II (401-405) stated in the 'Theodosian Code' written in 438 that the walls would pass through the bostans, and yet the ground floors of the fortification towers would be reserved for storing farm equipment and harvest.[60]

According to Yıldız Salman from the Initiative for Preserving the Historical Yedikule Bostans, this indicates that bostans precede the walls, and the walls were, in a sense, entrusted to the farmers.[61]

The Byzantine agriculture handbook written in 10 AD by Konstantin VII Porfirogennetos provides a wide range of information, including the content of Geoponika, agricultural production, the art of plant cultivation (horticulture), wine growing, olive growing, and olive oil extraction methods, off-season storage conditions and ornamental plant arrangements. The handbook contains information about animals as well, such as beekeeping, horses, livestock breeding, and pest control.[62]

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60 Şahin, & Kahraman," Kent içi tarım uygulamalarında dünyanın en eski örneği: Yedikule Bostanları", (2021), p.346.

61 Medyascop, "İstanbul'un surları (2): Bostanlar", 202.

62 Özkan, "Bizans'ın aykırı çiçekleri"

63 Özkan, "Bizans'ın aykırı çiçekleri"

contains information about animals as well, such as beekeeping, horses, livestock breeding, and pest control.[63]

Byzantine and Ottoman documents both describe agricultural lands within the Yedikule walled city area as arable lands. Towards the end of the 16th century, agricultural areas expanded towards the Yedikule walls, and the lands were converted to agricultural production sites as a result of the apparent threat of development and an increase in population in the Yedikule walled city area.[65] Ismailpaşa Garden, shown in the J. B. Le Chevalier map of Yedikule walled city, is registered as Ismail Paşa Palace Bostan in the Surety Register dated 1786. It persisted until 2013 but lost its characteristics of a bostan after Fatih Municipality filled it with rubble; it is now used as a parking lot. (Figure 40)

Figure 40. (Left) An old photograph of the Land Walls taken by Guillaume Berggren; (Right) Image of the same area known as İsmail Pasha bostan, in 2013 [66]

The Yedikule Bostans, with more than 1500 years of history, remained of importance after the city became the Ottoman capital. While in the Byzantine period, the bostans named 'Peribolos' were located between the two walls, during the Ottoman period, they expanded towards the external walls and the moats due to the gradual decrease in the importance of the walls' defensive function. (Figure 41-42)

Since the 1970s, due to several pressuring factors such as increasing population; immigration; zoning, and development, a significant portion of the bostans have been destroyed; only the ones between Mevlanakapi and Yedikule (Altinkapi) within and adjacent to the Land Walls survive. As of 2023, urban agriculture is practiced in 31 bostans extending over approximately 20-decare land.[67] An investigation of the property owners of these areas reveals that 49% of them are property of Istanbul Metropolitan Municipality (IMM); 19% are of private foundations, 9% of the treasury, 7% of individuals, 4% of neighborhood municipality of Fatih, 4% of IMM-Treasury partnership, 3% of IMM-Individual partnership and 1% of Private Foundation-IMM.[68] The bostancıs working in public bostans with such a diverse distribution of prop-

64 Shopov, Han, "Urban agricultural land use and its transformations in Ottoman Istanbul: Yedikule gardens", p. 34-38.

65 Bostan Hikayeleri, "Yedikule Bostanları", 2017.

66 (Left)Öger, Zeynep ve Gülru Tanman (ed.), 2007, Sur, Kemer, Kubbe: Osmanlı Fotoğrafçılarının Gözüyle Bizans İstanbul, Pera Müzesi, İstanbul, 122-123, (Right) 'Yedikule Bostanları' son erişim 10 Eylül 2022, https: // yedikulebostanlari.tumblr.com/post/56512273907

67 Kıran, "İstanbul Kara Surları" p. 29.

68 See, Kıran, "İstanbul Kara Surları", p. 150-159.

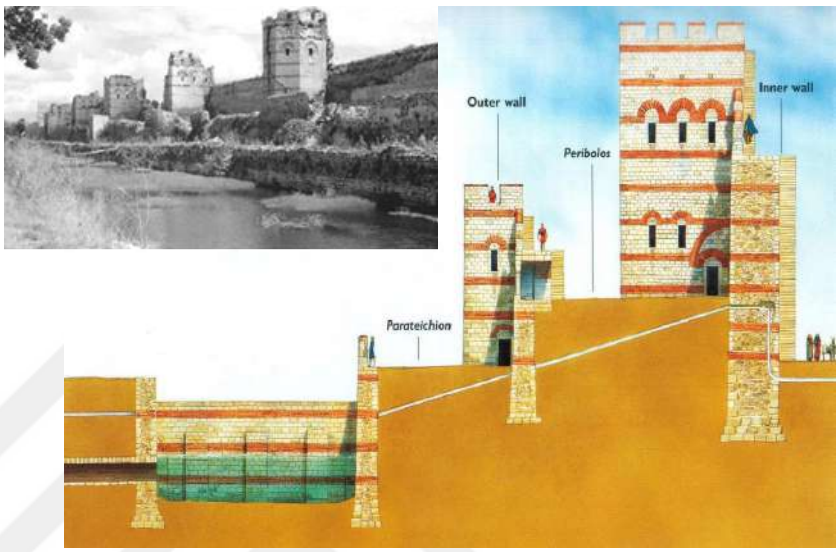

Figure 41. Architectural Structure of the İstanbul Land Walls and the image of moats filled with water.[69]

Figure 42. The area between the main and front walls, the immediate surrounding of the external wall, and the moats converted to bostans. (Cangül, C.,2008)

erty ownership are defined as 'occupants' before the law. They pay a toll (adequate pay) to the Real Estate Management Department of Metropolitan Municipality to continue production. The ones working in areas belonging to a foundation or an individual pay rent to the foundation or the individual. One main obstacle for gardeners to invest in long-term plans is the concern about being regarded as an occupant by the state and the fear of an abrupt eviction from their production areas. This fear has been justified by the destruction and interference carried out by the municipality since 2013.[70] Therefore, the bostancıs demand to sign a lease agreement with the Treasury and become an official lessee to acquire legal assurance for their properties before the public. When the producers do not own the production areas, it poses problems for urban agricultural practices and harms the financial

69 Turnbull, "The Walls of Constantinople AD 324-1453" (Left), Hendeklerin fotoğrafı page 12, (Right) Surun mimari yapısının şekli p. 31.

70 To follow the ongoing process since 2013, see "Yedikule Bostanları", access date 3 October 2022, https: //yedikulebostanlari.tumblr.com/

sustainability of the bostans. The most recent case is the destruction of the bostans located between the internal and the external walls (peribolos) in 2022, on the grounds of transforming them into walkways under the restoration and landscaping project of the land walls, launched by IMM (Istanbul Metropolitan Municipality) in 2021.[71] (Figure 43)

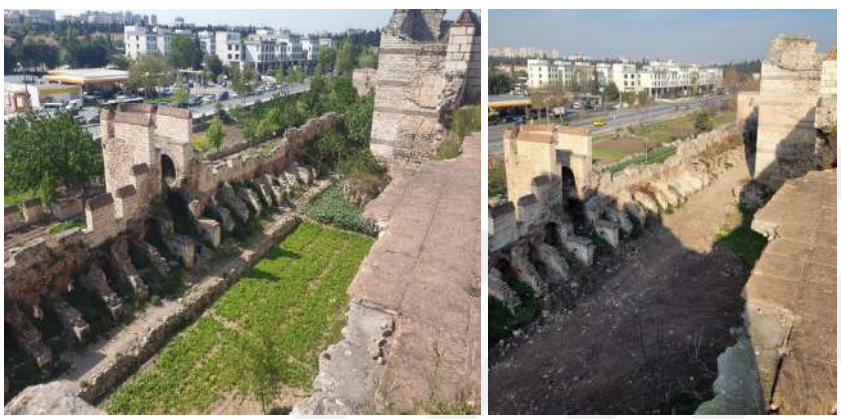

Figure 43. Peribolos area (left) used as an agricultural area (right) after the restoration. (Yedikule Bostans Initiative 2022)

Existing conditions do not allow the bostancıs of Yedikule to become registered at the National Registry of Farmers (NRF) since the bostans cannot be legally leased from the treasury. As a result, they cannot benefit from governmental support such as agricultural credit, insurance, and subsidies. Considering the damages caused by natural disasters resulting from the climate crisis, deprivation from the benefits of the NRF system poses a severe challenge to the bostancıs of Yedikule. For example, it was the harvest season in the Yedikule Bostans after the hailstorm disaster hit Istanbul on July 27, 2017, flooding and harming all the vegetables and greens. (Figure 44)

Figure 44. The damage in the Yedikule Bostans after the hailstorm disaster in 2017.[72]

71 See also Aksoy, Altınsay, and Kafadar, 2023.

72 The photograph was taken by the bostancı Özkan Öktem, on July 27, 2017, in his bostan.

After such situations, production continues by removing all damaged products from the field and replanting vegetables suitable to the seasonal calendar. The bostancıs themselves compensate for all damage.

Generally, the family members (female and male, old and young) work alongside the bostancıs. When an additional labor force is required, laborers get hired outside the family. These laborers are mainly selected from Syrian and Afghan refugees, regarded as low-cost labor today. The undervaluation of the bostancılık vocation discourages the younger generation from protecting the vocation and the production areas. Rather than practicing bostancılık, they prefer to work as a security guard or a taxi driver, which signifies the gradual disappearance of ancient knowledge.

The plantation and irrigation methods known as tahta and tava (maşula) are also a part of Istanbul's urban agricultural memory, which earned the Yedikule Bostans its place in the World Cultural Heritage list. These areas, remaining from the Byzantine era, prepared with physical labor, resemble a field art. (Figure 45)

F**igure 45.** (Left) Bostancıs preparing the tavlas for planting (Right). Close-up image of tavas and water channels.[73]

Tava is preferred between May and October as it provides efficient water use. To prepare the tava, firstly, the bostan is divided into strips, measuring 2-3 meters in width and 10-15 meters in length, each called a 'tahta'. Secondly, they are divided into smaller segments called tava. The soil is prepared into a chessboard-like pattern by the bostancı. The tava surface should be prepared with utmost elaboration so that when the water enters the tava, it is equally distributed, and each plant receives the same amount of water.[74] Vegetables benefit from the sunlight perfectly within the tava; its edges, around 10 cm high, protect the plants from the surface wind and retain the moisture taken away by the wind, thus saving water.[75] The dimensions of a

73 Bostan Hikayeleri, "Yedikule Bostanları", 2017.

74 Kıran, "İstanbul Kara Surları", p. 201-207.

75 Kaldjian,"Urban Food Security", p.

tavla may vary depending on the bostancı. Each tava line has the same crop species.

Tava is not prepared for every plant in winter but only for what the bostancıs call a 'permanent product', such as parsley, chard, and black cabbage. The bostan is prepared into tahtas for the other crops. The tahta length may vary between 2-3 meters. It is divided into straight, graded strips parallel to each other, generally breaking the field into rectangular strips per the field borders. (Figure 46)

Figure 46. Examples of bostans where the tahtas are prepared horizontally and vertically in winter.[76]

Water pumped from the bostan well flows into the area between two tahtas on both sides, or it is introduced from above. Certain bostans employ the sprinkler irrigation method to irrigate the tahtas. The tava rows are bisected with a rope, whereas the tahta rows remain in a straight line.[77]

These special field arrangements and irrigation methods (i.e., terraces, tavas, and tahtas) observed in the bostans have been preserved and developed since the Byzantine era until our time through experience and transfer, creating the collective memory. With its agriculture-based economy, the Ottoman Empire aimed to modernize production techniques with agriculture schools and promote novel irrigation systems. The water wheels are recognized as the surviving traces of agricultural development in the 19th century.[78] (Figure 47) In the Yedikule Bostans, the water for the tava systems irrigated with surface irrigation had long been drawn with "water wheels."

Water drawn with human and animal-powered water wheels is stored in cisterns and released into the tahtas between the tavas. The bostancı opens the tava for irrigation and waits until it fills with water. Afterward, the

76 (Left) Capa, 1946, (Right) Sébah & Joaillier

77 Kıran, "İstanbul Kara Surları", p. 201-207

78 Shopov and Han, "Osmanlı Istanbul'unda Kent Içi Tarımsal", p. 34-38.

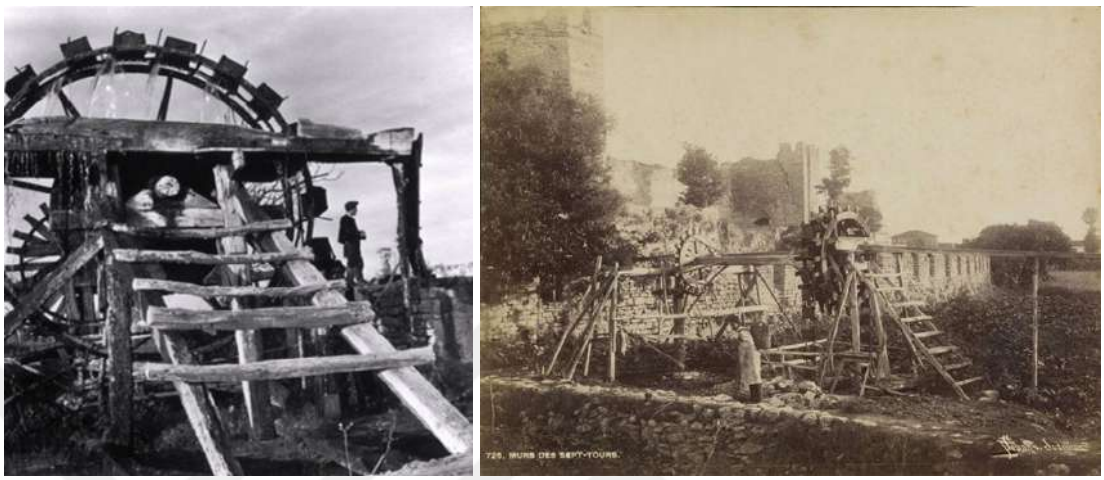

Figure 47. (Left) Bostan water wheel (Right) Bostans within the Land Walls moat near Belgradkapı and water draw system.[79]

open part is closed with soil, and the water flows into the other tavas. The process repeats until the entire field is irrigated.

These plantation and irrigation methods are still in use in the Yedikule Bostans. The historic wells continue to be the water resources of the area. (Figure 48) However, fossil fuel-powered water pumps have replaced water

Figure 48. (Left) Example of wells and pools still in use in the Yedikule Bostans; (Right) Stone water well.[80]

wheels. Irrigation occurs with the water pumped from the well flowing into the channels. Certain bostancıs have established a combined use by integrating sequential planting and sprinkling methods in the field. The drip/subsurface irrigation methods are not used in the bostans. In addition, these areas should be evaluated with different concerns and parameters from other bostans due to their distinctive characteristics as a cultural heritage site since any production method change may have different consequences.

Arif Bilgin states that many documents he examines in his research titled Market Gardens of Istanbul in the Ottoman Times (An Attempt of Introduction) emphasize the water wells and the water wheels. In contrast, few mention the bostan pools, which are recognized as part of the irrigation system.

79 The author took the photographs in 2020.

80 (Left) Bahar Aykan, 2017.(Right) İnanç Kıran, 2021.

Therefore, he argues that not every bostan possessed a pool; probably due to their high cost, only the wealthy proprietors' bostans would have the pools to wash the vegetables in.[81]

Today every bostan contains a washing pool. The pools are filled with water drawn from the wells. Harvested produce sit in the pools, especially leafy greens and muddy vegetables, to maintain their freshness and look clean until they are taken to the market, or the buyer arrives. Afterward, they are put in boxes and prepared for sale. (Figure 49)

Figure 49. (Left) The washing pools used for washing and preparing vegetables for sale.[82]
(Right) A bostancı washing chards to prepare them for sale.[83]

As mentioned in Geoponika, chicory and green salad plants were among the plants grown in the surroundings of the Constantinople walls. The lists in the resource also included dill, cabbage, kohlrabi, cress, leek, chard, radish, beetroot, turnip, and onion, which are well known today, and some others that are less common in European cuisines, such as chard root, fenugreek, Swedish turnip, mangold root, rape, orache, parsnip, hedge mustard, common rue, savory and Jewish mallow.[84]

The plants produced in the Yedikule Bostans today differ from the wide range of abovelisted seasonal vegetables and greens that were grown in the Yedikule Bostans in the past. Perennial plants such as artichoke, corn, and cauliflower which can only be harvested once per year, are no longer preferred due to economic concerns. Nowadays, bostancıs prefer fast-growing annual weeds instead, such as parsley, coriander, cress, and rocket, that can be harvested multiple times per season. [85]

Field visit observations and archival research reveal that depending on the season, 15-20 kinds of vegetables are grown in the Yedikule Bostans. The produce comprises scallion, radish, leek, spinach, romaine, rocket, spearmint, lettuce, red radish, purslane, coriander, cress, parsley, chard, thyme, sorrel, basil, dill, black cabbage, tomato, pepper, eggplant, and cucumber.

81 Bilgin, "Osmanlı Dönemi Osmanlı bostanları", p. 86-97.

82 Habertürk, "Yedikule Bostanları".

83 (Left) İklim Adaleti 2016, (Right) Habertürk 2017

84 Koder, "Cuisine and Dining in Byzantium," p. 430.

85 This economy-based strategy is the main reason why the 'Yedikule lettuce,' which takes its name from the bostans, is no longer produced. The Yedikule lettuce is sown in winter, January-February, and grows in about three months. Regular lettuce takes 21 days to 1 month to grow enough for harvest. The Yedikule lettuce requires three times more space and labor than regular lettuce, which makes it impossible to find a buyer in time and causes the bostancıs to give up on planting this produce. Another example of that is artichoke.

The bostans are considered polyculture[86] agriculture areas due to the practice of intercropping[87] used in planting these crops. The main advantages include the enhancement of biodiversity, benefitting from the permaculture method defined as 'companion planting'[88], and maximizing the yield within the minimum space. The bostancıs aim to minimize the risks that may stem from the sales channels or unpredicted climatic factors by employing multiple and simultaneous cropping methods. Agricultural strategies such as alternate cropping and a gradual approach to sowing and harvesting ensure production continuity and spread the harvest period across a whole season. The following year the crop plots are rotated in the plantation plan. A chart demonstrating the space use and crop diversity has been modeled after a bostan across the Yedikule bostans near 10. Yıl Street as an example of polyculture agriculture. (Figure 50) The chart includes the greenhouse, well, storage, and shed marked as structures in the bostan, along with the beehives. In March 2020 (during the pandemic), the bostan was rented by the neighborhood municipality of Fatih and transformed into a hobby garden named 'Yedikule Garden' for elementary school children to benefit.[90] (Figure 51) The municipality aimed to create space for children to experience sustainable agriculture in the city, albeit it led to the destruction of the historical landscape due to neglecting the possibility of achieving this aim in compliance with the original plan. Due to this transformation, one Yedikule bostan with its polyculture agriculture and its manager, the bostancı, could not reach our time.

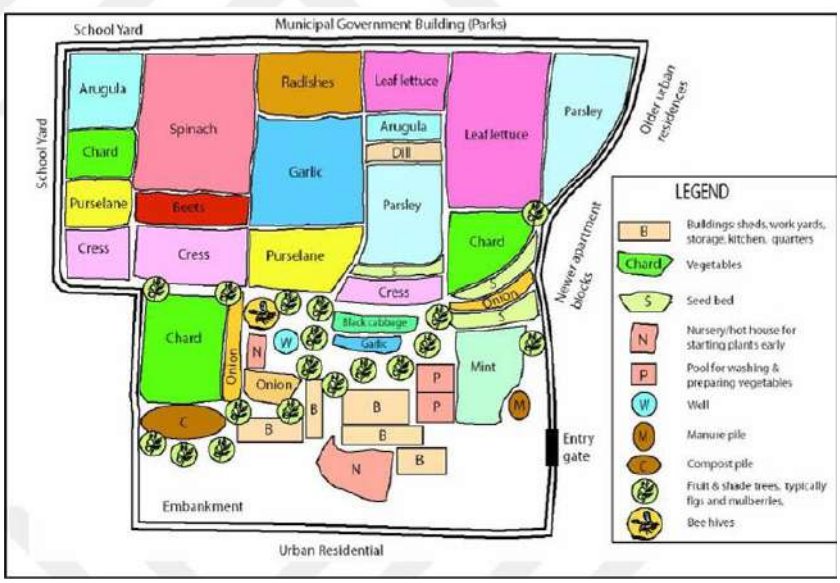

Figure 50. A model for the use of space and product diversity in the Yedikule Bostans.[89]

86 Polyculture: An agricultural practice in which multiple kinds of crops are planted in the same space at the same time. Among its many benefits are ensuring maximum efficiency from minimum space, improvement of biodiversity, and plants supporting each other.

87 Intercropping: The practice of growing two or more crops in proximity. **88** Companion plants: Different plants growing together for mutual benefit. A gardening method that uses the 'synergistic properties' found in nature aiming to prepare a suitable planting space to promote cooperation between the plants in order to achieve optimum health and viability. Corn, beans, and zucchini are excellent examples of companion plants.

89 Kaldjian, "Istanbul's Bostans", p. 284-304.

90 İstanbul Bostanları Çalışma Grubu, "Tarım Yapan Kent İstanbul", p. 19.

Figure 51. Production areas and the greenhouse in the Yedikule Bostans.(Fatih Municipality Archive)

As much as the variety of produce, the sales channels have also changed over time. In the Byzantine and Ottoman periods, the Yedikule bostans were valued and even protected under certain laws as they contributed significantly to feeding the city and its self-sufficiency. In the Ottoman period, vegetables gathered from the bostans and the villages near the palace in the Anatolian and Rumeli side of Istanbul were taken to the wholesale vegetable market -sebzehane- by the farmers.[91] The produce was first selected to be distributed to the vegetable sellers in the city.

Throughout their history, the bostans have not only served as a production area. By the 1930s, these areas were the meeting points for the Istanbulites to socialize and spend quality time. They would swarm the bostans, especially in spring during the harvest of the chunky and fatty Yedikule lettuce, which took its name from the Yedikule bostans it grew in, to select their lettuce and even to eat them.[92] The details of the news article give an account of Ahmet Yilmaz, a columnist for Akşam newspaper, and his friend's visit to the Yedikule bostans with his friend to eat lettuce and describe how the Yedikule bostans were used back in the day.

'The two first choose the most popular bostan of Yedikule. They ask the Albanian gardener for a straw mat to sit on. 'Coarse or thin?' he asks, and our guys reply: the thin one. They bring the mat and spread it under the mulberry tree. Chunky pieces of mulberries lay all around, impossible to resist. They are served 'four spiky cucumbers', cut into four pieces, and salted. Hikmet Feridun proposes as if he struck upon something: I strongly recommend you eat mulberry and young cucumber side by side! They lie down on the mat after their bellies are full. Our writer starts looking around and says it is time for some journalism: There is apparent segregation in place -harem- selam-

91 Türkiye Diyanet Foundation Encyclopedia "Matbah-ı Âmire "article.

92 Akcura," The lettuces have become modernized too; they don't grow bellies anymore.', 2022

93 Feridun, "Bir bostan âlemi", 1930

94 (Left) Gökhan Akcura Archive; (Right) Slow Food Fikir Sahibi Damaklar Archive

95 (Left) Tuğçe Yılmaz 2023, (Right) Taken by the author in 2023.

in the Yedikule bostans. Men entertain themselves in the mulberry garden on the right side of the bostan wheel and women on the left.'[93]

'Lettuce Festival' was organized by the Slow Food Fikir Sahibi Damaklar convivium between 2015-2018, inspired by the festive bostan gatherings where people would gather to harvest with the bostancı while enjoying the food, drinks, and music. The festival aimed to reconnect the Yedikule bostans and the urbanites, remind its value and promote their visibility. (Figure 52)

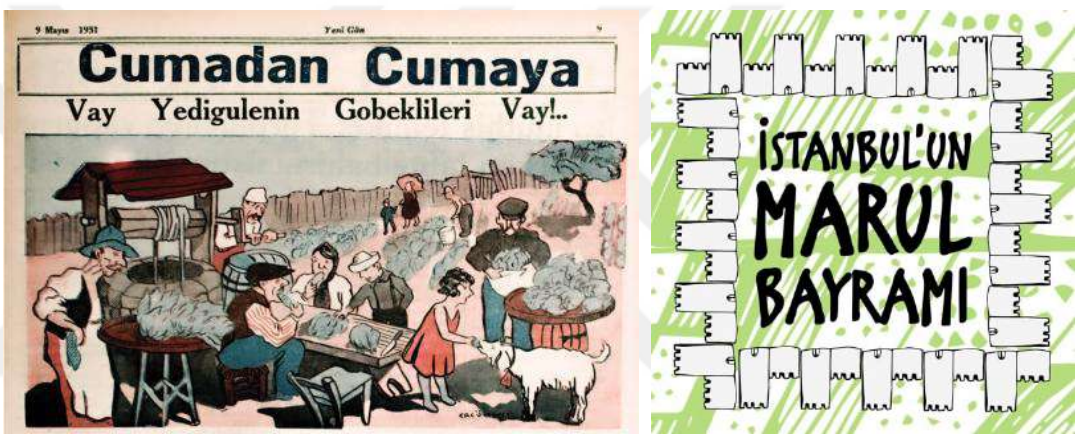

Figure 52. (Left) People eating lettuce in the Yedikule Bostans in the comics page, "Cumadan Cumaya", of Yeni Gün newspaper, 1931; (Right) Slow Food FSD Lettuce Festival poster, 2015 [94]

An examination of the customer profiles that ensure the bostans' financial integrity shows that stallholders, supermarkets, and catering companies rank at the top of the list. They prefer bostans specifically to buy certain produce, such as salad greens, which may be problematic when transported from a distant location. The bostancıs are not entitled to direct sale of their own produce as they are not registered at the NRF. Some bostancıs sell their produce in the nearby neighborhood markets where they own stalls. While during the research, some have been observed to open small stalls where their bostans intersect the 10. Yıl Street. (Figure 53)

Figure 53. Examples of vegetable stalls near 10. Yıl Street.[95]

Since 2013, a small portion of the bostan produce can reach the consumer directly thanks to the consumer-producer networks established through connections built with the bostans and the bostancıs by nongovernmental organizations such as DURTUK, Slow Food Fikir Sahibi Damaklar, and the Ancient Yedikule Bostans Initiative. However, this system does not hold a considerable trading volume to ensure the economic sustainability of the bostancıs. Whereas the Yedikule Bostans could meet the needs of the Istanbulites who desire to buy fresh seasonal vegetables and greens.

The spatial challenges here restrict the accessibility of the bostan for the daily visitors who would like to shop or visit. The biggest challenge is the absence of a parking lot on the 10. Yıl Street. The bostancıs and the customers can only park on the pavements to load or unload their cars. To be able to park on the pavements, they removed the border stones and implemented specific solutions to eliminate the elevation difference. They built concrete roads for the hauling vehicles to enter the bostans. (Figure 54) The bostancıs damage their bostans in their attempts to generate their own solutions.

Figure 54. The relationship between the bostans and 10. Yıl Street. (Left) The vehicle road made by pouring concrete between the bostan and the street. (Dilek Yuruk, 2022); (Right) BOSTANITY, 2014.

The sheds and the storages are the primary issues of the structural arrangements in the bostan areas, as these structures are necessary for the work activity in the bostans. (Figure 55) The contemporary bostancıs have used wood and brick to build the sheds and storages, resulting in functional yet unaesthetic structures. These 15-20 square meter sheds provide for everybody's vital needs working in the bostan such as resting, eating and toilet. It also functions as a sleeping place for whoever stays over to watch the bostan.

Figure 55. The relationship between the structures of the bostan. (Atlas Magazine ,Tolga Sezgin, 2016)

Adjacent to the sheds are pergola areas. In summer, the bostancıs begin working with the sunrise (around 4: 00-5: 00 am). They pause at noon until the sun loses strength, rest in the sheds or the pergolas, and complete other tasks. (Figure 56)

Figure 56. Pergola. (Oda Projesi 2009)

They resume working around 5: 00-6: 00 pm after the sun starts fading. In winter, working hours may change depending on the weather conditions. Therefore, the presence of the sheds is essential for the bostancıs. However, Fatih Municipality destroyed these structures on January 13, 2016, because they caused 'visual pollution'. (Figure 57) The bostancıs rebuilt sheds and storages in the most remote part of the bostan, smaller than the old ones suited for their needs, in the most hidden parts of the bostans. Although the municipality ignores them for the time being, these structures do not possess the features to function properly.

Figure 57. Fatih Municipality demolishing a bostancı shed in Yedikule in 2016.[96] (Photography by Uygar Bulut) Example of a shed rebuilt after the demolition. (Bahar Aykan, 2017)

Human-powered tools such as a pickaxe, hoe, fork, self-propelled sowing machine, and concrete roller are used in the bostan instead of the mechanic tools and machines used in conventional agriculture. The only fossil-fuel-powered tool used is the hoeing machine. Sowing and planting are done with physical strength. The tools and equipment should be protected from climatic conditions and kept indoors for security reasons. (Figure 58)

Figure 58. (Left) Traditional farming tools used by the bostancıs: pickaxe, fork, rake, adze, and self-propelled sowing machine. (Right) Rolling stone made of a heavy material used for firming the soil before and after the sowing process.[97]

Nowadays, storage spaces are built out of wood and bricks. Whereas in the past, an edict in the Theodosian Code, 422, granted proprietors the ground floors of the fortification towers to store agricultural products and tools.[98] (Figure 59) According to Aslıhan Demirtaş, they were responsible for protecting and maintaining the fortification walls in return for this grant.[99] These room-like spaces continue to function as a storage for vegetable boxes in certain bostans. A number of them provide shelter for the homeless to stay overnight. Bostan areas may potentially become insecure places during the night. Thus, the municipality closed the rooms in the remote parts of the area with metal bars to prevent trespass. The bostancıs rely on dogs and laborers staying in the bostan as a precaution against burglary.

96 See also https: //www.mimarizm.com/haberler/gundem/yedikule-bostanlari-nda-yikima-baslandi_124646.

97 Aykani, Başyurt,' 'Green Space' to Tradition", p.282

98 Ricci," Intangible Cultural Heritage in Istanbul", p.67..

99 Kılınç, "Aslıhan Demirtaş: İstanbul'un 1600 yıllık biricik", https: //www.sivilsayfalar.org/2017/05/31/aslihan-demirtas-istanbulun-1600-yillik-biricik-kentsel-tarim-gelenegi-var-yedikule-bostanlari/

Figure 59. (Left) Fortification walls used as storage by some bostancıs. (Right) Examples of storage structures in bostan areas.[100]

Numerous lawsuits are encountered when the history of the Ottoman period Yedikule bostans is examined. Arif Bilgin argues that the Yedikule bostans were not surrounded by separators, based on the fact that the lawsuits often resulted from a dispute about small cattle entering the bostan and damaging the crop.[101] Currently, the bostans are separated from the road with red robin hedges in certain areas. In areas where the restoration of the walls continues in 2023, 10. Yıl side of the bostans is closed with temporary boards providing information about the ongoing project. During the field visit, it was also observed that some bostancıs had enclosed their bostans with wire fences and doors to prevent trespassing. (Figure 60)

Figure 60. Examples of fences and doors encountered in certain bostans.[102]

The relationship between the bostans and animals is not limited to damage as recorded by the old lawsuits. The documents also described that the bostans contained beehives, hen houses, and cattle sheds. The manure of cattle within and around the bostans is especially a good source for the bostans.

100 (Left) The photograph belongs to the author 2023; (Right) Oda Project 2009.

101 Bilgin,"Osmanlı Dönemi İstanbul Bostanları", p. 89.

102 (Left) BİA Haber Merkezi, 2015; (Right) Dilek Yürük, 2022.

Contemporary bostancıs still prefer to use animal manure to increase the fertility of the land. However, supplying or using animal manure becomes more difficult with the prohibition of husbandry. Bringing, using, and storing the manure is one of the major problems for the bostans. Furthermore, transporting the manure out of the town produces a carbon footprint.

In his research, Arif Bilgi claims that dairy products occupied an important place in Istanbul's cuisine as husbandry was carried out extensively in the city. He mentions that some of the numerous bostans scattered across the city were engaged in husbandry and dairy farming.[103] Certain documents referring to structures used in yogurt production, yogurt churns, buckets, and pots support the abovementioned findings.[104]

The bostan adjacent to the Yedikule Elementary School on 10. Yıl Street across the Yedikule Bostans is known to have contained beehives before being demolished in 2019.[105] Today, animals related to the bostans no longer play a significant role in the production system. Some bostancıs raise chickens solely to benefit from their eggs and meat.

Sustainable seeds are as important as animals in creating sustainable agricultural systems. The bostancıs use their own local (sustainable) seeds for production in the bostans.

Some examples are rocket, parsley, coriander, cress, purslane, dill, tomato, and lettuce. The seeds are directly put inside the tavas; following germination and sprouting cycles, the plants continue to grow in the same spot until they are mature enough to harvest. Some plants are separated out to be saved as seeds for the next year, so they are not harvested but left to complete their life cycle and produce seeds, enabling the bostancı to grow the same crop repeatedly. However, these seeds should be kept under suitable conditions to maintain vitality. The seeds are stored in the storage spaces in the bostans.

Some seeds are directly settled in the tavas they grow in, while others are required to germinate and sprout in viols inside the greenhouses. The seedlings are then removed from the viols and transplanted to the plots they will grow. The reason is to endow the seeds with the necessary conditions in the greenhouses and grow healthier seedlings. (Figure 61)

Cabbage lettuce, lettuce, white cabbage, tomato, pepper, and eggplant are examples of these plants. For instance, the germination of the tomato grown in summer should start in March in Istanbul's conditions. However, the temperature in March does not allow it in open spaces. Therefore,

103 Bilgin," Xvıı. Yüzyılın Ortalarında İstanbul'daki Gıda Esnafı"'

104 Bilgin,"Osmanlı Dönemi İstanbul Bostanları", p. 89.

105 Beehives can be seen in Kiraz Özdoğan's field photographs taken in 2018 ('Tarım Yapan Kent İstanbul Bugünden Yarına Müşterek Hayatlar', İstanbul Bostanları Çalışma Grubu, p. 20, Figure 2)

Figure 61. Greenhouses used in the Yedikule Bostans until 2016.[106]

a portion of the greenhouses in the bostans is used for sprouting. Summer and winter plants of different kinds are sprouted inside these spaces. When the time is right, the seedlings are transplanted outdoors, in the bostan, to complete their cycle. The greenhouses are also necessary for the growing method called 'early maturing produce'. While tomatoes can only be grown outdoors in May if the temperature is suitable, the greenhouses allow them to germinate in January-February, sprout in March, and prepare for harvest in June to go on the food market. Since the tomatoes take 2-2,5 months to harvest. The tomatoes grown in the greenhouse are harvested in June, while the ones planted outdoors yield in July-August. Thus, the harvest period is prolonged with the outdoor harvest after the greenhouse cycle ends with the early maturing produce.

For a long time, the bostancıs of Yedikule used the greenhouses to produce seedlings and grow the early maturing summer produce. However, the greenhouses were demolished alongside the sheds and storage on January 13, 2023, by the municipality of Fatih. The bostancıs could not rearrange the greenhouses as no new decision was issued after the demolition. The absence of greenhouses poses a serious obstacle to growing the early maturing summer produce and producing seedlings from seed in the Yedikule bostans.

106 (Left) Anadolu Agency, 2016. (Right) Tolga Sezgin, 2015.

Recommendations

The Yedikule Bostans should reclaim its status where it is given the value it deserves as it was in the past, becomes visible, and preserve its existence protected by the law. There is no alternative way to protect the bostans and the bostancıs from eventually disappearing. Any legal impediment for the bostancıs to be regarded as occupants should be removed, and they should be entitled to be registered at the national registry of farmers. Implementing this will contribute to the bostancıs' economic sustainability, allowing them to benefit from their legal rights as a farmer and sell the produce directly or deliver to the wholesale market.

Only if they are granted legal assurance will the bostancıs be encouraged to make long-term plans and investments. They will be able to inspire the next generations by protecting their lands and gaining economic empowerment. Only under such circumstances will the young potential bostancıs in the families be able to include the bostancılık vocation among other alternatives.

Projects designed in different periods by Fatih and Istanbul Metropolitan Municipality for converting the Yedikule bostans into a recreation area and agricultural park do not reflect the original identity of the Yedikule Bostans and offer monotonous landscape designs with aesthetic concerns, which is also defined as 'ecologic gentrification'. A different design strategy should be developed for the Yedikule Bostans, which does not interfere with its agricultural lands and prioritizes the cultural landscape created by the tahta and tava systems and the crop diversity. Therefore, applicable design decisions will be produced with the provision of a team of professionals from different backgrounds who have done years of research on the bostans and the culture they convey, and the engagement of the citizens of Istanbul in these processes with a deliberative and holistic approach will produce.

It is crucial to establish the 'Yedikule Bostans Research Institute' in close proximity to the area with the aim that the ancient agricultural information as to the agricultural methods practiced in the bostans, irrigation methods, and producing seed and crop is not only confined within the circle of individuals working in the bostan but gets transferred to the future generations. It is recommended to serve as a place to conduct research, an archive, and a seed library, where the bostancıs play an active role within

the institute, creating content and contributing to its operation. Establishing the 'Bostancı School' under the institute is essential for the bostancılık vocation to reclaim the value it deserves by combining theory and practice.[107] Designating the old bostan areas deprived of their characteristics through certain interferences, such as Ismail Paşa Bostan, as practice sites and their reinstatement will help reestablish the declining bostans.

Revisions are required for the shed, storage, and greenhouse spaces, with designs that will fulfill the needs and offer appropriate materials, dimensions, and visibility. These structures are indispensable for the bostans. It is predicted that the requirement to be affiliated with the 'Yedikule Gardeners' Association' to establish and benefit from a collectively used modern greenhouse for seedling production will reinforce collective production and increase the number of members.

The bostans should also include greenhouses for early maturing produce based on a designated square meter in compliance with a shared design approach. The reproduction of certain products, such as the Yedikule lettuce that are no longer produced due to the bostancıs' economic concerns, can only be promoted with purchase-guaranteed agreements. Therefore it will ensure the accessibility and sustainability of these products, which are included in the cultural memory of Istanbul. This is also necessary for biodiversity. The consumer and the producer will collectively participate in the production process through the guaranteed purchase agreements. Municipalities and non-governmental organizations can administer these partnerships.

It is recommended that animals are re-incorporated into the system in order to create sustainable agricultural systems. In the nearest possible location, a designated space should be established to be used collectively for the bostans depending on sheep and goat manure. Shared spaces can be established for producing compost and vermicompost. A composting unit that recycles the city's waste can be built near the Yedikule Bostans in cooperation with the municipality, and the compost can be used in the bostans. Its efficiency can be increased by engaging the locals in the process.

Small sales plots along with the appropriate road and parking lot planning must be created near the bostan areas for the bostancıs to sell their products directly. After the accessibility issue is resolved, the aim should be to ensure that people spend time in these spaces as they did in the past and reconnect them with food production within the city.

107 Halkalı Agricultural Academy in Istanbul was the only school to offer agricultural education in Turkey for a long time. The school preserved its status for many years as a pioneer in the spread of contemporary agricultural methods and equipment in the Ottoman Empire as well as producing educators and bureaucrats in the field of agriculture, besides offering veterinary and forestry education at times. Therefore, its graduates directed agricultural activities both in the Ottoman and Early Republican eras. History of Istanbul Volume 9 Page 169-173, last access 2012-2022 https: //istanbultarihi.ist/340-halkali-ziraat-mekteb-i-alisi The school no longer exists. In 2023, when urban agriculture is debated, it is important to incorporate an agricultural school project in Yedikule that will bring the old and the new information together.

Furthermore, it is important to allocate stalls selling produce from Yedikule organized by the Yedikule Gardeners' Association in the neighborhood markets all across Istanbul to improve the visibility of the bostans and remind the public of product diversity. These stalls can also be placed in the municipal producer markets. Permanent, functional commercial relations should be established between the bostans, food communities, and cooperative shops based in Istanbul.

2.2. Neighborhood Bostan - Kuzguncuk Bostan

The area referred to as the Kuzguncuk Bostan is located in the Kuzguncuk neighborhood in the Uskudar district of Istanbul. (Figure 62)

Figure 62. Location of the Kuzguncuk Bostan 2023. (Dilek Yürük)

The municipality of Uskudar rented the area from the General Directorate for Foundations and took the right of use. It continues with a new design and course of action agreed upon by the Kuzguncuklular (Citizens of Kuzguncuk) Association and the municipality. It can be described as a public space consisting of open green spaces with mixed-use features and agricultural hobby bostans. (Figure 63a-b)

Figure 63a. The Kuzguncuk Bostan, hobby area.

Figure 63b Kuzguncuk Bostan entrance, village square, disaster assembly area, rest area, and kids' playground area. (2015)[108]

The 17-decare area known as 'Ilia's bostan' is still alive in the memory of the Kuzguncuk neighborhood as a bostan with its bostancıs, fresh fruits and vegetables, and generations-long production. It is now called the 'Kuzguncuk Bostan', The production is carried out within small parcels conforming to allotment garden typology.

In 2013, it became a gathering spot for the neighborhood forums called the 'Gezi bostans' that began during the Gezi Resistance after it lost its function as a bostan with its bostancı's passing. The forum members and the neighborhood residents started cultivating the field again after Ilia with the 'guerilla gardening' method and producing as a community in the bostan to restore it as a living space with all its natural life and public activity, thus ensuring its continuance through production.

Following this period, during the 'Permaculture Certificate Programme' in which I participated in 2014, the Permaculture Research Institute of Turkey assigned the participants a final project requiring them to design the Kuzguncuk Bostan. Facilitated by Mustafa Bakır, then managing director of the institute and an old Kuzguncuk resident, the participants designed ethical, ecological, and sustainable alternative projects for the area aiming at building community.

Ilia's bostan consists of what we will refer to as a 'community garden' and an 'allotment garden', per the guerilla gardening[109] practice, permaculture designs, and traces of production in the implementation of the latest project.

An investigation of the bostan's history reveals that the area is depicted as 'Bostan' in the Kuzguncuk section of the 1932 Pervititch maps. (Figure 64)

The area ceased to function as a bostan and became an 'undefined space' in the middle of the neighborhood serving different purposes based on the needs and wishes of the residents, after Ilia Şoro, who was a bostancı like his father İspiro,[110] passed in 1984. (Figure 65)

108 Solidarity Architecture Book 2017, p. 83

109 Guerilla gardening: An environmental movement led by the artist Liz Christy and her friends in 1973, in New York. It is the act of reclaiming an abandoned or vacant lot, with personal or collective efforts and transforming it into a green area or a bostan without permission.

110 For detailed information about Ilia Şoro see, Özçelik, ''Bir Bostan Bir İnsan.

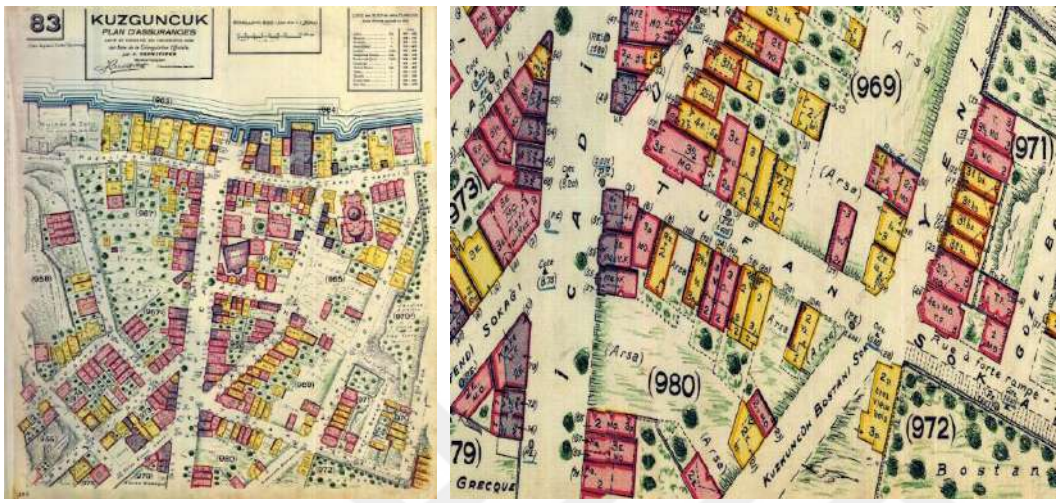

Figure 64. Pervititch Insurance Map of The Kuzguncuk, Section No: 83, 1932 (Salt Research)

Figure 65. Kuzguncuk Bostan, 1985. (Salt Research, Cengiz Bektaş Archive)

The residents of Kuzguncuk used the area for several purposes, e.g., to gather, socialize, light Hıdrellez fires, set up Ramadan tables, grow their own food and do sports. The reinvigoration of the neighborhood -community- awareness by the Kuzguncuk residents who were united to protect their green spaces following the transfer of property in 1977 and the development threat in 1986 found its place in history as a significant activist movement.[111]

The issue as to the ownership of the Kuzguncuk bostan[112] was litigated by the heirs; however, it has yet to be concluded. The event which led to the trial was the transfer of the bostan's property ownership to the General Directorate for Foundations and not to Ilia following his father İspiro Şoro's death in 1977.[113] The construction of a school building was permitted following an alteration in the bostan site plan, which had been described as a green space until 1986. The bostan was subjected to certain construction initiatives, firstly of a hospital and afterward structures with agricultural pur-

111 For Kuzguncuk Bostan's property ownership transfer and development threat processes, see Ademoğlu, ''Halkın Katlımı ve Çevresel Farkındalık".

112 See also, Örnek, "Kuzguncukta Sivil Bir Dal"

113 For detailed information about the case see, Özden, "Hrisokeramas'tan Kuzguncuk'a"

poses. The neighborhood residents were united consecutively in 1992, 2000, and 2011, physically protesting and blocking the excavators in the bostan, and preventing it from construction through legal channels. The unfolding events induced the practices of certain concepts in the neighborhood, such as resistance, being a community, pursuit of justice through becoming an association, and being neighbors.

The current situation has extended beyond local practices and served to the documentation of bostan - neighborhood memory through national and international workshops, academic studies, and collaborations with designers and sociologists from different parts of the world coming to study the processes. (Figure 66)

Figure 66. Public Design Support Kuzguncuk, Studio for Experimental Design HFBK Hamburg, Adhocracy, Istanbul Design Biennial, 2012.(Boğaçhan Dündaralp Archive)

After the area was rented to the municipality of Uskudar in 2014, the neighborhood residents gathered to make certain decisions. They designed the 'Ilia's Bostan' project led by a group of architects and designers with the motto 'the right of use' rather than 'the right of property.' The results were shared with the municipality of Uskudar, and the area was successfully transformed into a space of not only a protest-oriented neighborhood movement but also embracing participatory processes.[114] Therefore, it will be accurate to emphasize its feature as a 'community garden' while analyzing the sustainability criteria.

The 'neighborhood culture,' which was influential in the bostan struggle, was reinvigorated by a group of architects led by Cengiz Bektaş before the 1980s and later by architect Nevzat Sayın settling in the neighborhood

114 For detailed information, see 'İlya'nın Kuzguncuk Bostanı' Solidarity Architecture, page 81-96

and transforming it into a suitable living space for themselves.[115] The group's endeavors, i.e., organizing street plays and arranging the sidewalks collectively, earned Kuzguncuk a prominent place among the villages of Bosphorus. The combination of coffeehouses, bakeries, and greengroceries, which are encountered in every small village of Bosphorus with art galleries and famous architecture firms associated with city centers, created a new order.[116]

The neighborhood culture established with this transformation also referred to as 'gentrification' by certain researchers, was revived with the school project planned to be implemented in the bostan in 2010.[117] The Proposal for User Participation, prepared by the Kuzguncuklular Association to prevent development, took its final form through discussions in the neighborhood meetings. The diagram shown in Figure 67 represents an action-tool-program mind map created during the process.

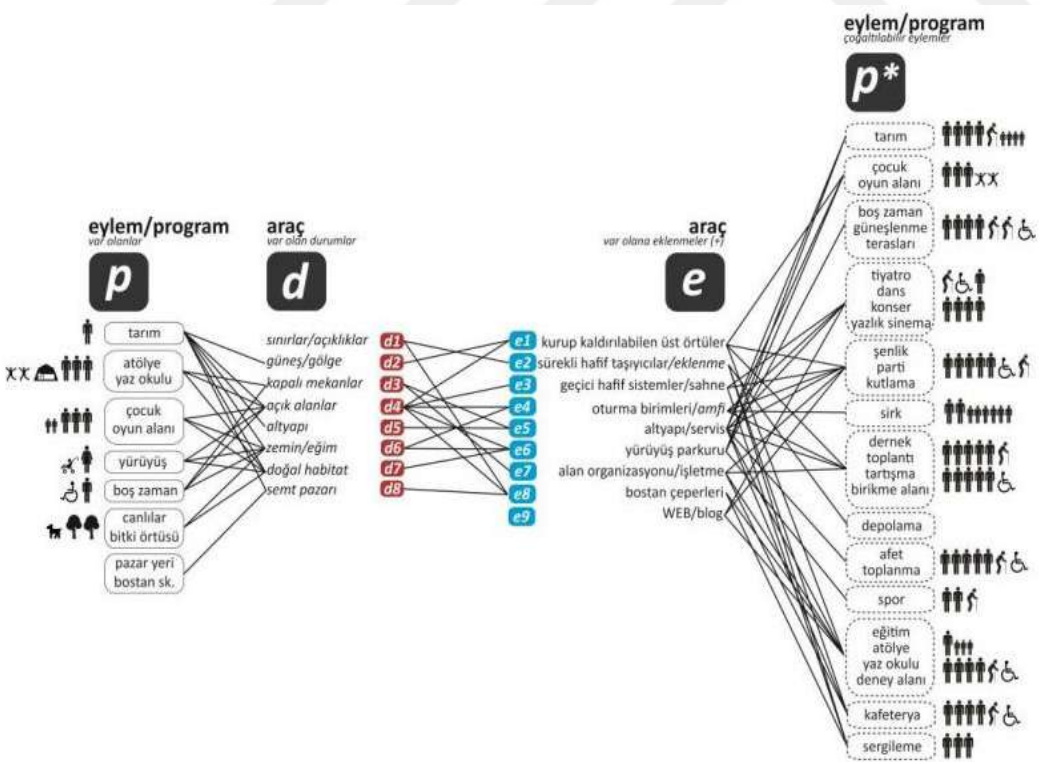

Figure 67. 'Bostana Alternatif Proje Girişimi' action/program diagram (2014) [118]

As a consequence of the process between 2010-2014, 'Ilia's Kuzguncuk Bostan' project was prepared by a voluntary group of architects living and working in Kuzguncuk after regular meetings with the Uskudar Municipality General Directorate for Parks and Gardens.[119]

115 The research reveals that including this breakdown in the 1980s, there are negative comments as much as positive ones about its transformation throughout its history made by the Kuzguncuk residents. Kuzguncuk, depicted as a Jewish village in Evliya Çebeli's Seyahatname, is one of the places where non-Muslim citizens were forced to leave their houses and their properties were confiscated during the 6-7 September events (1995). In 1960, we see an expanding Kuzguncuk due to domestic migration it received from Karadeniz, specifically from Kastamonu.

116 Bilgin, "Kuzguncuk"

117 For detailed information see 66 Kollektif, "Bostan Hikayeleri" 2, p. 10-17.

118 Ilya'nın Kuzguncuk Bostanı, Dayanışma Mimarlığı Exibition Book, p. 86.

119 IBID, p. 80-95

The project design consists of the bostan areas, village square, activity area for different types of gatherings, grass amphitheater, kids' playground, basketball court, rest (sunbath) area, on-leash dog area, library, pedestrian paths, disaster assembly area on two different levels. (Figure 68)

Figure 68. Kuzguncuk Bostan Recovery & Protection Project' called 'Ilia's Kuzguncuk Bostan' (2014).[120]

The basic principles of the project are defined as follows:

- Nature should not be harmed when all kinds of add-ons are removed.
- Natural materials should be used, not concrete.
- Walls should be improved with drywall technique, without using mortar
- Any area with the characteristics of a forest should not be interfered with.
- According to the plant inventory, the green area should be protected and enriched.

Respect for land is a sine qua non for a bostan design. Therefore, all interference should be designed to be removed overnight if needed and leave no non-recyclable traces or materials behind. In compliance with these principles, retaining walls in the parts with an elevation difference were built with the drywall technique. The stairs were made with wooden material mounted on the ground without using concrete. (Figure 69)

Similarly, the sitting units were constructed with the gabion method, following this motto.[121] Storage units were installed between the gabions in order for the users to keep their gardening tools and watering equipment. (Figure 70). However, these spaces were not sustainably used as intended,

120 IBID, page 91 Architects: Boğaçhan Dündaralp and Tülay Atabey Assistant Architects: Berna Dündaralp, Lale Ceylan Contributing Architects: Çiğdem Mahsunlar, Dilara Sezgin, Metehan Kaya, Burçin Tunç, İsmail Kocataş Stakeholders: Kuzguncuk Residents Association, Kuzguncuk Residents, Parks, and Gardens Üsküdar Municipality

121 Gabion walls are stainless steel spot-welded wire mesh cages filled with stones. They do not harm nature where they are produced. They do not have foundations. They do not leave any rubbles behind when removed.

Figure 69. In the bostan area, (Left) drywall application, (Right) wooden stairs, 2022. (Dilek Yürük)

Figure 70. (Left) Drafts for the seating and storage units to be produced with the gabion method.[123] (Right) The eating unit and the storage space below it. (Dilek Yürük,2022)

resulting from previous users leaving the units locked or damaged locks. Storage units are needed in the area.

In the documentary 'Bu Bostan Bizim' by Seyfettin Tokmak in 2019, a neighborhood resident speaking about the project phases states that they want the 'Three P's' to stay away from the bostan that will be designed in the meetings. The 'Three P's' are plastic, paper money (commerce), and politics'.[122]

The right to use 30 parcels in the bostan area was given to the Istanbul Metropolitan Municipality Art and Vocational Training Courses (ISMEK), Kuzguncuk Elementary School, and the church, the mosque, the synagogue located in Kuzguncuk by the municipality of Istanbul. In comparison, 78 parcels were reserved for Learning Centers and Academies for Children. The residents of Kuzguncuk use 86 parcels. The borders of these parcels are drawn with a design referred to as a 'raised vegetable bed'.[124]

Although the parcels are standardized, some near the borders of the area may consist of informal shapes. In order to access certain spots and cultivate, one should step on the soil. The vegetable beds prepared for wheelchair users are located in the most concealed part of the area in front of the

122 Tokmak 'Bu Bostan Bizim' Documentary 2019

123 'İlia's Kuzguncuk Bostan' Solidarity Architecture Book 2017, p. 92.

124 Raised vegetable bed: Areas surrounded with wooden frames, which provides various benefits for the production process and the user, instead of cultivating the soil with traditional methods. They are widely used in areas designed in accordance with the Permaculture Principles.

administrative building. The pathways between the parcels and the parcel heights are not suitable for the residents with disabilities to access and work.

Certain alterations have been made following user experiences. An example of that is the fence enclosing the bostan areas. Kuzguncuk bostan is a place to visit and spend time in, not only for the residents of Kuzguncuk but also for visitors from other parts of Istanbul. The increasing number of visitors, especially on the weekends, brings about certain problems. The municipality fenced off the bostan areas when the crops were picked unauthorizedly, and the agricultural areas and plants were harmed.

The fences keep the stray dogs away from the bostan areas as well. For they also have been observed to harm plants from time to time. To prevent the harm caused by animals, some bostan owners built barriers around their bostans with jute fabrics or sacks attached to the wood sticks. Besides physical harm, the contamination risk by cats excreting in the bostan areas is observed as one of the problems for growing healthy plants in various urban agriculture areas in Istanbul.(Figure 71).

Figure 71. (Left) Fencing examples built by users,2017. (Reference Bostan Hikayeleri), (Right) The view after the municipality fences the entire area, 2020. (Reference Canan Çelik)

The area does not accommodate a greenhouse for production. However, for a certain period, micro greenhouses were created in the area belonging to the municipality, with plastic covers spread over the raised vegetable beds to protect the plants against frost and frozen dew, depending on the seasonal requirements. (Figure 72).

Once we enter the bostan through the entrance door, we are welcomed by the open space. (Figure 43, the marked area) This open space comprises three areas, i.e., the village square, activity area, and disaster assembly area. It is important for this area, whose definition may change based

Figure 72. Creating micro greenhouses by covering the parcels, 2021 (Korkmaz, E.)

on need, to remain an open space that serves as a gathering place for the residents, a cinema in summer, a space for hidrellez celebrations, open-air concerts, and events organized by the municipality. (Figure 73, Open space in the Kuzguncuk Bostan.)

Figure 73. The open space in Kuzguncuk Bostan. (Bostan Hikayeleri, Kuzguncuk Episode Youtube 2017)

However, in the area primarily designed to serve as a disaster assembly and activity area, a 'Farmers' Market' has been held weekly on Saturdays since July 10, 2021, with a decision made by the Uskudar Municipality. This denotes that the open space designated with the abovementioned functions becomes unavailable on Saturdays and transforms into a defined area. The misinformation regarding the sale of 'organic produce' while describing the market, where producers from Eskişehir's Sarıcakaya district sell produce,

may be misleading to the public.[125] For, a product must be officially certified in order to be described as organic. However, products in this market are not certified. Describing this market and its produce as a 'Producers' Market' is important for the public to be informed accurately. Another issue is the distance of the area selected for such a collaboration. It is recommended that the benefit analysis is evaluated through a different perspective from calculating the carbon footprint resulting from setting this market weekly. The increase in population on Saturdays due to the market makes the use of the bostan difficult for the residents of Kuzguncuk.

Kuzguncuk Bostan is a sloping field. The level above the entrance level consists of a kids' playground, pedestrian pathways, a basketball court, and a portion of the bostan areas belonging to the municipality. The top level contains the fruit garden. The fruit garden is surrounded by a fence as well. Only municipal attendants are authorized to enter the area. Apart from that, the area has been maintained in its natural state without any interference or alteration. These areas can be accessed by following the wooden signposts placed around the area. (Figure 75).

Figure 75. (Up) signposts, (Right) Kids' Playground (Photograph Dilek Yürük 2022)

Application to the headman's office is required, following the call by the municipality and the headman's office to cultivate the parcels within the Kuzguncuk Bostan. In order to participate in the draw, one is required to reside in the Kuzguncuk neighborhood. The original and alternate members are drawn out of neighborhood residents by lot. The original member is granted the right of use for one year; the right is transferred to the first alternate member if the original member shows no activity in the area for one month.

125 The opening of the marketplace was publicly announced in the news section of the website of Üsküdar Municipality with the following text: We brought the organic village environment into the Kuzguncuk Bostan. We brought the Kuzguncuk Bostan, one of the most distinguished bostans of Turkey, and the abundance of the village lands. Organic and natural products directly brought from the garden, naturally produced by local women and farmers of Eskişehir's Sarıcakaya district is up for sale for the Istanbul citizens in the Village Market set by our municipality as of Saturday 12: 00 pm, Üsküdar Municipality, last accessed 01.01.2023, https: //www.uskudar.bel.tr/tr/main/news/organik-koy-ortamini-kuzguncuk-bostanina-tasi/2051

Unlike the hobby bostans of the Kadikoy Municipality, the users are not required to sign and be registered on the days they come in. They lose their rights if the parcels are not cultivated or look neglected. The new users do not receive training. Every individual carries out urban agricultural practices based on their own knowledge. The area does not contain a rest area where the users can spend time together. The seating units around, built with the gabion method, and the sunbathing area located at the entrance outside the parcels are used for resting. (Figure 76) There is no semi-open space in the area for rainy weather.

Figure 76. The rest (sunbath) area,2022 (Dilek Yürük)

There are certain rules for the individuals granted 'the right of use' to abide by. Plantation of any permanent seedling or seed is not allowed in the bostan. Local seeds are recommended to be used. The use of chemical fertilizers and agricultural pesticides is not allowed in production. Commercial sale of the produce is not permitted. An information board explaining the rules and another for the planting and harvest calendar can be found on the wall by the entrance door. The Kuzguncuklular Association requested to place an illustration showing the bostan's history; nevertheless, their request was denied by the municipality.

The bostan is open throughout the week for anyone to visit and tour the entire area. Municipal permission is required in order to organize an event.

The municipal attendants are present in the area during the opening hours of the bostan. They are responsible for cleaning the bostan, providing technical services, and assisting the parcel users with physical work along with the cultivation and maintenance of the municipal parcels. Their knowl-

edge of urban agriculture is based on their personal experiences. The municipal attendants use the administrative building as an office, a rest area, a kitchen, a restroom, and storage (for gardening tools). (Figure 77).

Figure 77. (Left) Entrance (Right) Administrative building used by the municipality personnel. (M, Aslan 2019)

One hundred eight parcels in the bostan were opened to the use of various institutions by the municipality, though in practice, the parcels are not used actively by these institutions; all the work in these areas, including their plantation, maintenance, and harvest, is carried out by the bostan's municipal attendants. A portion of the produce harvested in these parcels is sent to soup kitchens, while a certain amount is distributed to the public at the events organized in this area.

Certain differences in agricultural methods and plant diversity have been determined during the observation visits to the parcels used by the neighborhood residents and the municipality. Their landscaping is also completely dissimilar. In the municipal parcel, a single kind of plant is grown due to the employment of conventional agricultural methods. As mentioned above, since the institutions do not actively use the parcels they are given by the municipality, the plantation plan of the 180-parcel area is prepared by the municipal attendants considering it as a single area. This situation shows itself as monoculture agriculture in larger areas. (For example, planting only tomatoes from parcel one until parcel ten, pepper from parcel ten to parcel twenty, and eggplant from parcel twenty to parcel thirty.) In the neighborhood section, it is possible to see different plant species based on the needs

and knowledge of the parcel owner. In these parcels, which can be considered an example of polyculture agriculture, the aim is to obtain the maximum efficiency out of the minimum space by planting different compatible plants. Besides increasing efficiency, polyculture agriculture provides several advantages, such as the improvement of biodiversity and the plants supporting each other. Some users work in their parcels applying the knowledge they acquired through rural life; some use the science of permaculture design, while others work with a motivation to reconnect with the soil and food in the city and gain experience. In summer, the produce generally consists of tomato, pepper, eggplant, salad greens, strawberry, and in some parcels, corn and sunflower. In winter, they are replaced by salad greens, parsley, rocket, chard, and black cabbage. The lot is drawn in November annually. The users remove the plants and hand the parcels to their new users. As a result, they cannot grow the winter crops that are supposed to be harvested in November, December, and January. The new users miss the suitable period for planting winter vegetables as well.

Every user supplies the seeds and the seedlings by themselves. Due to the limited space and time, they cannot save the plants they grow as seeds for the next year. Therefore, it is impossible to speak of sustainability in the supply of seeds and seedlings.

The wooden parcels designed as raised vegetable beds were revised at the end of 2022. The Uskudar Municipality renews the decayed and broken beds. The fences around the bostans were also damaged and repaired during this revision process.

Taps and hoses are placed in certain parts of the area for watering. The parcels can be watered with the water carried in containers or directly with the hoses. The tap areas are always muddy as the parcels are connected with dirt pathways. The users of these parcels complain about this situation.

The absence of a specific improvement agenda for the parcels causes a yearly decline in the soil's organic matter and richness. In certain parcels, the soil structure is not suitable for productive growth.[126]

Both the bostan and the activity area are the meeting points of the neighborhood residents. The residents of different age groups, with different economic, social, and cultural backgrounds, gather in these areas to produce, exchange information and experience, celebrate, watch films, and spend time together. (Figure78)

126 I prepared this section based on my personal experiences as a parcel owner/user in the Kuzguncuk Bostan in 2021-2022 and the dialogue I established with other parcel users during this period.

Figure 78. (Left) Music event in the Kuzguncuk Bostan(M, Aslan 2019), (Right) Kids in the bostan on a rainy day (Solidarity Architecture Exhibition Book 2017 p. 80-95)

Recommendations

Soil enrichment practices should be carried out in the parcels of the Kuzguncuk bostan. The situation calls for urgent methodical solutions for conserving the area's productivity and sustainability, considering the decline in organic matter, minerals, and bacteria following every production season. The soil should be analyzed after every draw season. The areas that are regularly planted should be replenished employing various methods. In industrial agriculture, this is applied by using chemical fertilizers. Whereas the methods adopted in organic agriculture include using natural fertilizers, composting, mulching, carbon amendment, and growing plants with a high nitrogen count. For this reason, December, January, February, and March can be reserved for preparing the soil for the summer season, with soil enrichment following the draw in November to give the soil the value it deserves and produce high-efficiency vegetables. One must remember that healthy soil makes a healthy plant.

A part of the municipal area should be reserved for plants to be saved as seeds for the next year[127]. The neighborhood parcels are not ideal for these plants as their use is restricted to one year. Certain plants require more than one year to complete their life cycle and produce seeds. The seed memory will be adapted to the land, soil, and growth conditions with the plantation of the seeds produced from the plants in this bostan. The 'Kuzguncuk Bostan Library' will be able to supply itself and the other bostans around with the

127 Plants saved for seeds by allowing them to grow and complete their life cycles without being harvested, e.g., lettuce, rocket, eggplant, cucumber, and broccoli.

seeds through the exchange. A local and economically sustainable system will be established.

The different plants coexisting simultaneously in the areas cultivated by the neighborhood residents are occasionally defined as disarrayed or neglected by the visitors. In contrast, the single crop plantings in the municipal parcels are perceived as neat and well-groomed. In response to these denunciations, the municipalities feel compelled to create landscapes with aesthetic concerns. Environments should be created to inform the visitors about the cause-and-effect relationships behind this view in the areas, whose principal aim is to carry out an ecological and sustainable production with the community it builds. It is also significant that the municipalities subjected to the complaints adopt a straightforward and informative attitude.

An example is the cessation of the Fenerbahçe Community Garden by the Kadıköy Municipality due to complaints. It used to be a model for a community bostan from its design to its production between 2016- 2021, albeit it was ceased and integrated into the 'Kadıköy Bostans' project with the name of the 'Fenerbahçe Bostan' by the Kadıköy Municipality following the complaints claiming that the area in the Fenerbahçe Park 'looks neglected. After the transformation, an entire memory of experience got lost as the community was dispersed, and no archival work was done.

Building a seedling greenhouse in the area will encourage the users to start their own seedlings, allowing them to experience yet another agricultural practice, thus leading them further toward economic and ecological sustainability.

The parcel dimensions are not ergonomic, which makes the cultivation process difficult. Designing certain parcels to be child, elderly, and disability-friendly will promote inclusivity. The written content of the informative boards, the history of the bostan, and the information about the crops produced must be available in audio format for the residents and visitors with disabilities to utilize this area and feel valued and included.

Due to the annual rotation of the users in the Kuzguncuk bostan and the lack of experience exchange, which would contribute to the ensuing practices, memory can not be created. An archive work is recommended, where all the information and practical experiences are recorded. Previous users should mentor new users and share their experiences with them. Such communication will solidify the interconnections within the community.

Self-sufficiency of the bostan should be aimed by enhancing the operating mechanisms, creating a space for the researchers working on different subjects, and collaborations with Kuzguncuklular Association and the municipality in necessary cases through establishing the 'Ilia's Bostan Kuzguncuk Association.' The activities organized by the bostan can be partially funded by the bostan. For this purpose, short-season crops such as lettuce, parsley, cress, and rocket can be planted in 20 parcels in the municipal area.

The profit from the products sold in the 'Kuzguncuk Cooperative' shop will be used for the association, reinforcing the diversity of networks between the bostan and the neighborhood. The system inspired by the past examples of certain foundation, mosque, and church bostans will contribute to the financial sustainability of the bostan.

The portion of the produce harvested in the bostan should be delivered to the Kuzguncuk Elementary School to provide the children with at least one meal prepared with healthy, high nutritional value food grown in their own neighborhood. The school should be scheduled to use the bostan as an open classroom regularly.

One of the famous historical Kuzguncuk houses can be transformed into an 'Artist in Residence'[128] through the association's agency. This recommendation suggesting that the bostan-neighborhood connection will be nourished through the artwork produced or the research conducted about the bostan by the participants and during their residencies. It is not a new trend for the Kuzguncuk buildings, such as Simotas, known to have hosted collective productions in its history.

The areas neglected by the institutions in the areas reserved for the municipality should be opened to the use of neighborhood residents in order to provide benefits for more people.

A 'Compost Area' should be established in the bostan. The compost can be used as a soil amendment in the enrichment of the parcels and plays an important role in recycling the organic waste in the neighborhood.

Cold compost and vermicompost are ideal methods to be employed in this area. A compost area established with the municipality's support can be preferred as it will accelerate the process. Recycling of the neighborhood's organic waste within the neighborhood can be implemented as a pilot project.[129]

A sprinkler system can be used for irrigation during the ongoing revision process.

128 Artist-in-residence concept emerged in the early 1900s; it provides an opportunity for artists, writers, architects, scientists etc., to be hosted in an institution in return for their services, providing them with space and resources they normally would not be able to access.

129 "Soilcatcher", founded in Üsküdar, produced compost from the organic waste of the Üsküdar citizens in the basement of a building, using a compost machine. Through an open call, they distributed the compost back to the citizens, providing them with media for food production, thus contributing to a sustainable system.

Rainwater can be harvested from the roofs of the buildings adjacent to the bostan borders and accumulated in a tank within the bostan to irrigate the parcels. A system can be modeled as an ecological and economical solution

Visitors come to the Kuzguncuk Bostan from different parts of Turkey and Istanbul. Therefore, the applications in the area should present inspirational examples for the visitors to learn from.

The structure defined as the Administrative Building should be revised and transformed into a building for the bostan community. It can accommodate a conference room -suited to give presentations-, an agriculture library, storage for the seeds, a rest area, and a community kitchen. Food is always a uniting force. Creating an environment where users can cook and eat collectively will help strengthen the community. Alternative structures that do not harm the soil can be considered (e.g., a van or a container) to create an indoor space in case the administrative building is unavailable for common use.

Workshops can be organized for the community to spend more time in the area. 'Repair Cafe' workshops established by the Earth Association can be an example. They are workshops where knowledgeable community members voluntarily repair the dysfunctioning electronic devices.

A semi-closed, circular rest area near the parcels should be designed for the parcel users to protect them from the sun and rain. Areas where people sit in a 'circle', equally distanced from the center, allowing every individual to see each other, are recommended for designs that promote community building by the invisible hand.

The space defined as the village square should be restored by relocating the producers' market held within the bostan on Saturdays onto the street. As far as the continuously increasing weekend population is concerned, the density will be divided between two different points with this application.

Additionally, this area is one of the disaster assembly areas of the Kuzguncuk neighborhood. Following the earthquake disaster on February 6, 2023, the 'Earthquake Disaster Group' was established, led by the 'Kuzguncuklular Association.' In consideration of the potential Istanbul earthquake, a design group consisting of the neighborhood residents began working on certain revisions -common kitchen, compost toilet- in the design of the bostan area.

2.3. Sponsored Bostan - The Terasta Tarım Project

The Terasta Tarım Project is situated in Istanbul, Etiler, on the rooftop of the Akmerkez Shopping Mall, affiliated with Akkok Holding. The project, designed and implemented by Hasibe Akın Demir and the architecture department of Akmerkez, started as the 'Sustainable Living Spaces' pilot project in 2014-2015 and continued involving different collaborations and content. Since 2017, Akmerkez has presented this project as the first project that carries out sustainable and local agriculture on the rooftop of a shopping mall in Turkey, with the name 'Terasta Tarım'.[130] With the Terasta Tarım project, the previously disused space that held such units as heating, ventilation, and air conditioning, closed to visitors, has been transformed into a 750 m^2 permaculture bostan practice area inspired by the building-integrated rooftop farms.(Figure 79)

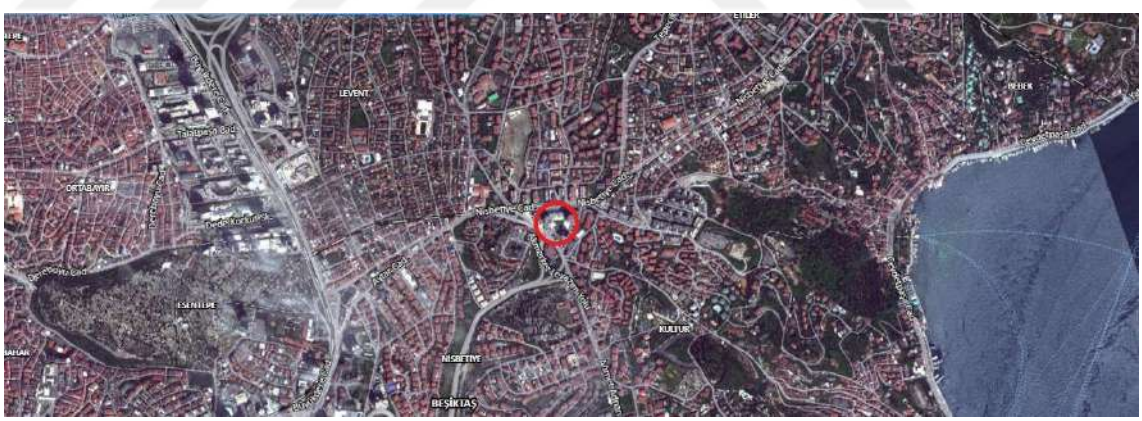

Figure 79. The red circle in the aerial photograph marks Akmerkez's location.

The property of this urban agricultural area belongs to Akkok Holding. Nevertheless, it is open for visitors to use under certain rules, given that it is a social responsibility project. The area is funded and sponsored by Akmerkez. During the literature review in English as to which urban agricultural concept the Terasta Tarım project responds to, such concepts as Company Garden and Corporation Bostan have been encountered. Notwithstanding, its mixed state, i.e., being open to voluntary activities and free workshops, besides belonging to a company, has been considered. Therefore, the project is defined with and analyzed under the concept 'Sponsored Bostan',[131] which appears to better align with the content.

130 Terasta Tarım Story, https: //www.akmerkez.com.tr/terastatarim/story

131 'Sponsored bostan' concept was proposed by the Ek Biç Ye İç founder Haro Cümbüşyan for the Terasta Tarım project. 2023

The answer to the question 'What does its sponsor earn from the Terasta Tarım area?' is significant. Receiving awards[132] constitute a part of the answer. A shopping mall associated with the consumer culture growing food on its premises and in the city center can be considered an endeavor to alter the reality of being a part of the capitalist system. The sensitive point here is the exploitation of these kinds of projects for 'Greenwashing'77 with the concept of sustainability turning into a marketing strategy. Focusing on the subjects that provide a good picture rather than the content of the project or the proper operation of the systems, can be encountered as one of the reasons for that.

Moreover, several other project-institution relationships have been encountered besides the relationship between Akmerkez and the Terasta Tarım project. For example, in the Breeam, Leed, and DGNB Green Building Certification Systems used in our country, including green rooftops and rooftop gardens, and sustainable systems in the designs are important as their output provides an advantage in getting credit scores in certain categories.

The science of permaculture design, which is the main source of inspiration for the Terasta Tarım project, guides the design, application, and maintenance processes. The aim is to show the possibility of growing food in the city and sharing their methods and experiences with the residents by establishing sustainable systems on a roof in the middle of the city.Following the permaculture design principles, the area contains an area for the compost units, a mandala area (pyramid planters), a small greenhouse for seedlings and storage, a rainwater harvesting area, a pergola as the meeting and resting space of the community, raised vegetable beds, a food forest area, a large greenhouse for production, an indoor workshop area to be used when the weather is rainy or cold, a microgreen planting area, a bokashi compost burying area, herb spirals, a vertical hydroponic system area, an 'A frame' hydroponic system area, and an aquaponic system area. (Figure 80).

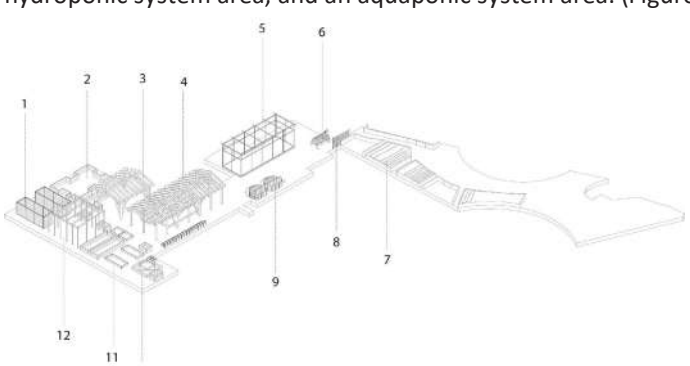

Figure 80. Terasta Tarım Area Units (EK BİÇ Ye İÇ Team Architect (Fereshteh Rostami's drawing 2023))
1. Compost Area, 2. Food Forest, 3. Pergola, 4. Big Greenhouse, 5. Workshop, 6. A frame Hydroponic System, 7. Bokashi Compost Area, 8. Vertical Hydroponic System, 9. Aquoponik System, 10. Mandala Garden, 11. Raised vegetable bed, 12. Small Greenhouse.

132 8 awards including five awards at Hermes Creativity Awards, Silver Award in the environment category for "Communication - PR Campaign of The Year" at Stevie Awards, Silver Award in the Corporate Social Responsibility category at ICSC, First Prize in the Sustainability/Operational category at Yıldız Akköklüler Awards.

The systems and the methods used in the area are described in detail on the Akmerkez website in the section allocated for the Terasta Tarım project. (Figure 81)

Figure 81. The systems in the Terasta Tarım Project area. (https: //www.akmerkez.com.tr/terastatarim#nav-2)

Chemical fertilizers and pesticides used in conventional agriculture are not used in this area. As an alternative, such methods as composting, mulching, succession planting, and companion plants are preferred to improve the soil and the plants. Rainwater, a natural resource to manage within the city from time to time, is collected from the roofs. In addition, the systems are established for the building's output to be recycled and reused as a positive input in the building, composting the waste produced by the food court.

Different production methods are also practiced in the Terasta Tarım area in addition to the traditional soil-based agriculture methods. The area accommodates aquaponic (fish-aided) and hydroponic (chemical-aided) productions, along with microgreen production in which the seedlings are harvested once they have reached 5-10 cm in height, depending on the type of seed.

More than 150 types of fruits and vegetables are harvested in the Terasta Tarım area, yielding approximately 220 kg. Through this urban agricultural production, the product carbon footprint is reduced while the nutritional value is increased.[133] The produce harvested with the Terasta Tarım Project is primarily shared with the volunteers who work in the area on Wednesdays and Fridays. Furthermore, the surplus is shared with the Akmerkez employees to increase their motivation and the area's visibility. The food produced in the area is occasionally used for catering services in the meetings and events organized here. The stall allocated in the marketplace inside the shopping mall aims at directing the guests to the rooftop agriculture area.

133 Akmerkez, "Terasta Tarım Story"

Besides aiming at food production, the volunteer program, which constitutes an important title in the project content, creates space for community practice. During the implementation of the project by the Akmerkez architect team, one of the issues placed importance on was involving the contributions of the mall employees in the project. Furthermore, the seeds brought by the employees from their hometowns were used in the first plantation. However, personal observations I made during the period I worked in the area in 2021-2023 show that the office workers, the employees of the mall, the Akmerkez management office, and the occupants of the residence, which are a part of the Akmerkez complex, do not volunteer in the project. A sense of belonging to the area is not developed.

Since 2017, the area has operated in collaboration with the social initiative Ek Biç Ye İç, following the attempts for several different means of management. While the Ek Biç Ye İç team organizes the production, maintenance, volunteer events, and courses in the area, the financial needs of the project are funded by the Akmerkez management. The volunteers assist the Ek Biç Ye İç team with the garden work on Wednesdays and Saturdays. An analysis of the characteristics of the volunteers reveals that retired or unemployed individuals residing nearby constitute the first group. The second group consists of individuals with a desire to reconnect with the soil or intending to buy a property to grow food in. Free and open workshops involving the volunteers are organized once or twice a month on urban agricultural topics per the season and nature calendar. The Terasta Tarım project has the potential to be the meeting point of different cultures and communities residing in the city and bring them together under the roof of production, thus enabling communication. Simultaneously, this potential provides an opportunity for the Akmerkez management to reach the audiences they would normally be unable to reach.

For the groups wishing to visit the area outside Wednesday and Saturday, the volunteer days, an appointment is required prior to their visit. Local authorities, schools, and corporations visit the area to gather information and inspiration for their specific needs and even take action to create their own urban agriculture areas.

Since 2021, the theoretical and practical lessons of the 'Urban Agriculture with The Chefs of the Future' course organized by Ek Biç Ye İç are hosted by the Terasta Tarım.[134]

134 Some institutions providing training are Bilgi University Gastronomy Department, USLA, and Maltepe University Gastronomy Department

Akmerkez uses the area as an alternative place to organize certain events and meetings. The space particularly attracted attention during the events in which speakers were invited to speak about urban agriculture or related topics. While crowded groups were invited to these organizations before the pandemic, the events were organized within certain rules in the open air with groups of up to 10 people during the pandemic.

One of the marketing strategies is to have different groups explore the area and bring them in to join the volunteer program by inviting social media influencers who create content on such topics as food, healthy eating, and sustainability.

The demands of other companies besides Akmerkez to use the area are responded to, paid or free of charge, and they are allowed to use the area upon the approval of the management. For example, the Terasta Tarım area was preferred for launching the printed edition of 'A Sustainable Mind' by Mercado magazine as it supported the themes of 'sustainability.'

Similarly, the 'Harvest Festival' was organized on the Akmerkez roof in the 'Triangle Terrace' area before the pandemic. It offered extensive content from healthy food to eco-friendly appliances by local producers. The organization inspired by Terasta Tarım included garden tours, harvest with the participants, and workshops.

The Terasta Tarım area is technically a rooftop bostan. Ideally, a rooftop bostan's design should be integrated into the building's construction plan during the construction process. Designing a rooftop bostan as part of a building allows the calculation of the static load it will create and the planning of such matters as insulation, wind corridors, and how the bostan will be affected by the shadows cast by the neighboring buildings. The Terasta Tarım area was added to the building 22 years after Akmerkez opened (in 1993); unfortunately, it cannot benefit from the abovementioned advantages. The Terasta Tarım area is surrounded by two 14 and 17-story office blocks and a 23-story residential building. There is a constant airflow in the area due to the wind corridors created by these blocks. The airflow harms the plants by shaking their stems while they grow. In winter, the temperature in the area is 2-3 degrees lower than that of the city due to this wind corridor. According to personal observations, the fact that the snow stays on the ground for a long time in the area is related to the low temperature. In summer, the temperature is 2-3 degrees higher than in the city due to the glass curtain wall and the reflections. The shadow cast by the blocks at different hours of the day poses

a problem for the plants regarding sun exposure. (Figure 82).

Figure 82. The areas in a green rectangle show the location of the Terasta Tarım area within the Akmerkez Complex.[135]

The process was managed by the implementation of a compatible design and material use following a series of analyses. Different green roof systems, such as intensive and extensive systems, are applied in the rooftop gardens in accordance with the plant selection and the height of growing media. Intensive rooftop garden application is preferred in the Terasta Tarım area as herbaceous plants, bushes, and trees, which require different root depths, are grown together on their floor. Intensive rooftop gardens consist of a layered structure that is conducive to plant growth and connects the area with the building.[136]

Lightweight soil is used as growing media in the raised beds inside the Terasta Tarım area. It contains materials that provide good drainage and special mixtures containing minerals that nourish the plants, which are important for rooftop gardens. Growing media constituents include lava rock, compost, broken clay tiles, leca, perlite, coconut coir, and vermicompost. However, as per the statistical calculations of the building, some areas were not covered with a growing medium in desired height. As a result, shallow-rooted plants were selected to be planted in these areas. Therefore, the importance of integrating the rooftop gardens into the buildings within the structural design phase is underlined again.

The growing medium height, the plant type, the structures in the area, and the suitable material are determined in accordance with these calculations. The area has extended with user experience along with new structures

135 The photograph was taken before the Terasta Tarım area was designed. https: //ofisraporu.com/kiralik-isyeri/akmerkez-kiralik-ofis last access 04 January 2023

136 Waldbaum, "Green Roofs for Urban Agriculture" p. 37-40.

and systems added to the design in 2015. Functions of certain structures have been altered. (Figure 83).

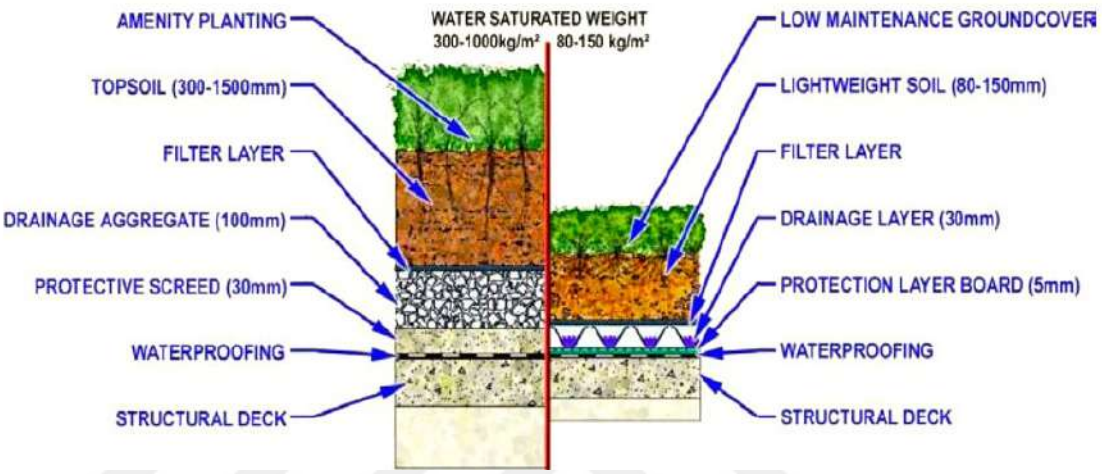

Figure 83. Conventional (Intensive) and Lightweight (Extensive) Green Roof Systems. (Source and copyright © Urbis Ltd., 2006, Adapted from images from Greenlink Küsters Ltd.)[137]

Figure 84. (Left) An airview of the 400-m² Akmerkez roof prior to the SYA Project., 2014. (Right) The layout plan of the Sustainable Living Area' created on the Akmerkez roof in 2015. (Akın, 2014)

The production greenhouse with a wooden framework was added to the Terasta Tarım area in 2017.

It is observed that winter crops can not be planted in the area in winter due to the wind and the cold weather, and the planted ones do not grow as expected. The structure, referred to as the big greenhouse, is covered with greenhouse sheeting, as it is lightweight. However, the covering is torn in the strong wind, and in spring, it is removed. This design can not be defined as sustainable. Nevertheless, the Akmerkez architect team does not recommend replacing the greenhouse framework with a lighter material due to the strong airflow in the area. Replacement of the sheeting with more durable and aesthetic material such as glass or fiberglass was not approved due to the extra weight they may place. (Figure 85).

The pergola situated in the area brings the employees and the volunteers together. Besides serving as a place for resting, eating, and socializing, it is also used for workshops and organizations. On special occasions, it wel-

137 Intensive green roof weights of 300-1000kg/m² refer to the most shallow soil depth needed for amenity ground cover or lawn grass (300mm). A soil depth conducive for successful tree growth (1500mm deep) is likely to weigh around 3300kg/m², excluding the weight and wind-loading pressure of the trees. Townshend D., Duggie A., "Study on Green Roof Application in Hong Kong" January 2007 p. 75

Figure 85. The transformation of the big greenhouse area throughout the seasons and the years. (Bottom left) The first project in 2015 does not contain a greenhouse.[138] (Top left) The greenhouse used in summer, after it was built. (Right) The greenhouse covered with sheeting in the fall. (Ek Biç Ye İç Archive)

comes guests with an elegant appearance with mobile add-ons and certain decorative touches applied. Aesthetics is a noticeable concern in the general appearance of the area and the structures. However, the permaculture designer Shaul Shaham added a small greenhouse structure n the area, which does not provide enough protection in cold and rainy weather conditions. The structure was designed as a mixed-use structure used for germination and as a gathering spot on cold and rainy days. It comprises a counter, a sink, shelves, chairs, and a table. It is also used for storing small gardening tools and seeds. In winter, the worm composting bin is kept inside the structure in order to protect it from the cold. However, the structure is not fully function-

138 https: //xxi.com.tr/i/avmde-permakultur

al or convenient due to the insufficiency of insulation and electric heating, as well as the incapability to control the difference in the night and day temperatures during seedling production. (Figure 86).

Figure 86. (Top) Small greenhouse. Exterior view, Small greenhouse structure, interior counter, and seedling production. (Bottom Left and Right) The storage area inside the small greenhouse structure. (Dilek Yürük, 2023)

The Terasta Tarım area incorporates the aquaponic and hydroponic systems, which are water-based agriculture methods referred to as vertical agriculture.[139] It is possible to use only water as a growing medium in these systems; on the other hand, media like coconut coir, leca, and perlite can support the plant roots. In hydroponic systems, nutrients are provided with special solutions mixed in the water; in contrast, in the aquaponic system, they are provided by the manure of fish integrated into the system. The area comprises three types of hydroponic systems, i.e., a vertical hydroponic system, an 'A frame' system, and an indoor hydroponic system. (Figure 87)

The area in which the composting units are situated is designed for hot and cold composting. There are six composting units measuring 1 m^3. The wooden pieces between and in front of the units are designed as remove&in-

139 For detailed information, see https: //acikders.ankara.edu.tr/course/view.php?id=1062 last accessed on 3 March 2023.The aquaponics system consists of two pools and a growing bed above the water flow between the pools. Koi fish are used in this system as they are adaptive to changes in temperature. Before winter starts, the wooden framework around the system is insulated with plastic sheeting against the cold, whereas such material is insufficient in keeping the temperature stable. A heater is installed in the water to provide a conducive environment for the fish when the temperature drops below zero.

Figure 87. The structure that accommodates the aquaponic system (Dilek Yürük 2022)

stall, to provide space for working comfortably inside the units. Each unit has a metal lid. They are preferred for being heavy, thus, resilient to the wind here. However, in the strong windstorm which lasted for two days in January 2023, one of the lids broke off and fell on the ground. Volunteer events are canceled in bad weather conditions to eliminate the risk of accidents.

Food production is carried out in the raised vegetable beds in the area. The nutrient content of their growing medium needs to be improved every year. Such alternatives as dried sheep manure and vermicompost are used in that. However, in 2017-2019 composting was attempted by using the composting units more effectively to alleviate the negative impact it may have on the budget. The training was provided for the collaborating restaurants regarding which type of waste was to be sent to the Terasta Tarım area. Nevertheless, as a consequence of the high turnover rates in the workplaces, the waste was not recycled with proper care as the new employees were not familiar with the project's content, which resulted in extra workload for the individuals working in the rooftop garden. (Figure 88) The initiations for

Figure 88. (Left) An example of the bins where the organic waste is collected. (Right) Compost Area (Dilek Yürük 2022)

creating a circular system between the Terasta Tarım project and the mall failed in composting for the abovementioned reasons. In 2021 only used coffee grounds and tea leaves were attempted to be collected, albeit, after a month, it was clearly understood that a healthy collaboration was not achieved once again. As of 2022, once a week, the organic waste from Macro Center's grocery store is delivered to the Terasta Tarım area, where it is then composted. This process continues as a demo and contributes to composting. In the cold composting system, when the unit is full, the pile is allowed to sit for at least six months to produce compost. Hence, the waste amount accepted is limited.

Two empty structures on the roof have been analyzed and maintained to be reused as an indoor workshop space and microgreen production greenhouse. There is a table available for eight people in the workshop space. It also contains an indoor hydroponic system. (Figure 89)

Figure 89. (Top Left) Microgreen production and (Top Right) Workshop structures (Bottom) The interior of the workshop structure (Dilek Yürük 2022)

These spaces somehow address the needs; however, the maintenance failed to create a convenient and functional space. Heating is a problem encountered in the workshop. An automatic watering system is needed in the micro-sprout area for the plants to be watered regularly. The plants should be watered in the absence of the caregivers as well. Particular designs encountered in the science of permaculture design can be found in the area. An example is herbal pyramids (mandala), a food production space design that allows plants with different needs to grow side by side in small space gardens. With this design, different microclimates are created within a small space. The plants are grown in different parts of the pyramid garden depending on their root length, water needs, and relationship to the sun. A small-scale model was built with the volunteers in the area. (Figure 90).

Figure 90. (Left) Herbal Pyramid Garden,(Ek Biç Ye İç Archive) (Up) Example of application with volunteers (Dilek Yürük)

The system collecting rainwater from the small greenhouse roof was designed to be introduced to the visitors. The wastewater collected from the air conditioners throughout Akmerkez is used for watering the lawn on the triangle terrace. With the design called a keyhole, every part of the raised vegetable bed can be easily reached. (Figure 91).

An open-air counter and sink are designed for the bostan area to wash hands or vegetables. There is no toilet in the area. A changing room where the employees and volunteers can change into their work clothes and lockers in which they can keep their valuable belongings do not exist. The toilets downstairs are used for these purposes.

The materials left on the roof from the construction were aimed to be upcycled and reused in the bostan. For example, pipes of various sizes used to remove the rubbles were cut and transformed into pots, and raised

Figure 91. (Left) Rainwater storage system. (Right) A raised vegetable bed model called a keyhole. (Dilek Yürük 2022)

plant beds were made out of unused lumber. Wooden pallets were used as vertical bordering elements. However, the area was refurbished in 2022, due to the deformation, corrosion, and breakage that affected a major portion of these designs applied in 2015. (Figure 92) The wooden parts of the raised beds were replaced with preservative-treated wood making them safer and more durable for outdoor conditions.

Figure 92. Examples of deformations in the field. (Dilek Yuruk 2021)

Recommendations

The Terasta Tarım area is a rooftop bostan in physical terms and a sponsored bostan in financial terms. For economic sustainability, both terms require careful planning.

Ideally, the rooftop bostan should be integrated into the building during its design phase. Planning it after the building is completed, as in the case of Akmerkez, comes with certain restrictions. Despite these restrictions, the vacant rooftops within the city hold great potential for growing food. Any projections for the Terasta Tarım area should take into account the calculations for certain factors such as the sun, temperature, and prevailing wind direction, as well as including the extreme weather events and disasters increasing with the climate change in the long-term plans by all means.

Nonfunctioning vacant rooftops hold high potential besides the areas designed for urban agriculture. Through this perspective, the roofs of public buildings, hospitals, schools, plazas, and houses can be transformed into valuable areas for the buildings they are in, their surrounding areas, and the city's ecology.

All these processes can be initiated by sponsors; however an economic cycle should be incorporated into the system with a holistic perspective while designing the process. The area should have the financial resources to survive when the sponsor company is unable to allocate a sufficient budget. In addition to the food production and volunteer project, which inspires the visitors of the Terasta Tarım area, its budget planning should be shared as a title by the marketing department leading the project. The area was designed as a social responsibility project by the Akmerkez management. It does not prioritize financial profit; on the contrary, by utilizing the various features of the area, a portion of the income obtained from the food production, the workshops and leasing it to different individuals and institutions can be used for the needs of the area in order to create a sustainable area. At the same time, a certain amount can be donated to support communities working on urban agriculture. Therefore through the financial support provided, organic ties will be established with the communities in different locations. The next step can be spreading the practices through a more methodical approach by establishing the 'Terasta Tarım' association to promote similar projects with the motivation and responsibility of being the first example. The idea of

economic sustainability will continue developing in combination with social sustainability.

It is crucial for the sponsored bostans, similar to the Terasta Tarım area, that the sponsor institution maintains a healthy relationship with the project and does not let it evolve into 'Greenwashing.' For this reason, it is recommended that the social responsibility departments cooperate with the project rather than the frequently preferred marketing departments within the institutions, which will foster cooperation and create an internal control mechanism.

An agreement should be made between the Terasta Tarım project and the workplaces producing organic waste in the shopping mall area, according to which they will bring their waste into the area. Moreover, this can be accelerated by training provided for the employees and the promotions provided to the workplaces, such as discounts on service charges. A composting machine should be purchased for the area, as the current capacity of the composting units will be insufficient with the increase in the waste volume. This machine composts the waste within 2-5 days. The output can both be used in the area and turned into a commercial product. It can be shared with the cities in need.

The structures in the area should be redesigned to be suited to mixed-use practices compatible with each other. For example, the small greenhouse can only be used for storage and seedling production. The comfort requirements of the workshop area can be improved and refurbished to serve as a resting and eating area for the workers and volunteers daily. A predetermined library, a seedling display area, and a winter garden design integrated into the workshop area can be an attraction for the employees of the Akmerkez complex to spend time.

The irrigation system, heating adjustments, lighting installation, and power supply control of the indoor hydroponics should be checked daily if they are controlled manually. A power outage may cause damage to the production systems and the plants until it gets noticed. For this reason, two persons working in Akmerkez in contact with the Ek Biç Ye İç crew are needed to replace the Ek Biç Ye İç crew in their absence to detect and quickly solve such problems. They can be selected from the technical personnel as well as the marketing department leading the project.

A second alternative is incorporating remote monitoring technologies, which allow emergency intervention.

The power resources should be replaced with alternative power resources. In order to create an experience area, biogas, generated from compost, can be used for heating the rest and workshop areas, besides alternative power resources such as the sun and wind. A pioneering approach can be adopted using new, sustainable, eco-friendly materials (e.g., algae-based building materials, solar facades, and upcycled furniture) to renovate the existing structures and new designs.

A compost toilet established in the area can allow visitors to experience yet another eco-friendly solution. Establishing compost -no water- toilets in the area is particularly important for Turkish citizens to experience, who are biased against the concept.

The Terasta Tarım project should continue participating in relative events organized within the building to have the shopping mall guests come up to explore the area.

The guests should be reminded of the interconnectedness of the external and internal spaces through sustainable events that evoke curiosity.

Individuals working and residing in the Akmerkez complex should be motivated to volunteer in the area. Primarily the individuals who are not informed about the project should be reached. Firstly, the project and the area should be introduced to the individuals affiliated with the Akmerkez complex via e-mail, text messages, and Zoom meetings; secondly, they should be invited to the event organized in the area.

A specific mobile application can be developed to allow the volunteers to observe the area on the days they cannot come in. In addition, virtual reality glasses will enable individuals physically distant from the project to tour the garden. The Ek Biç Ye İç design crew continues to work on this subject.

Conclusions and recommendations

03

The multifunction urban agricultural areas in Istanbul present from 2021 to 2023 have been analyzed in consideration of the relationship between their mission and vision.

The analyses have revealed different types of bostan definitions in terms of their spatial analysis, means of forming a community, management processes, and primary production outputs. Specific recommendations for different typologies have been proposed through a future-oriented perspective to achieve economic, ecological, and social sustainability to ensure their continuity. The evaluation of economic sustainability has not been restricted to monetary aspects and involved different economic models such as circular economy, bartering, and economy of goodness. Although the recommendation titles and the typologies may appear divergent, establishing a planet-centered design and sustainable systems is the common objective.

The recommendations in this thesis attempt to offer certain steps that can become a guide with a holistic perspective under the titles:

1. Spatial Planning
2. Management of Ecosystem Services

Therefore, the study presents recommendations concerning sustainable spatial patterns, design criteria, ecosystem services, economic operating models, and community dynamics. Since the designer's responsibility today extends beyond creating a spatial design and completing its implementation. The sustainability and resilience of the bostan are planned as a layer of the design process.

Therefore, the study presents recommendations concerning sustainable spatial patterns, design criteria, ecosystem services, economic operating models, and community dynamics. Since the designer's responsibility today extends beyond creating a spatial design and completing its implementation. The sustainability and resilience of the bostan are planned as a layer of the design process.

1. Spatial Planning

Primarily, it is recommended that the urban food system is mapped in Istanbul. The production and consumption volume can be used as input for the mapping. In planning multifunction urban agricultural areas, it is essential to deliberate on their differences and commonalities. The design criteria include their mixed use of the field, link to urban infrastructure, their place in the urban fabric based on social, economic, ecological, and historical factors, their scales, production capacity, community dynamics, the urbanites' right of use in areas with problematic property ownership, and planning layers based on ecosystem services.

Designs of urban agricultural areas use biomimicry to produce sustainable designs from space use and structure designs to material choice and community organization. The point to note here is that biomimicry should be regarded as a functional design criterion rather than a modal.

In spatial planning, alternative designs can be produced with zoning and sector analysis- one of the fundamental principles of permaculture design science. The relationship between design and energy efficiency is one of the pillars of permaculture.

Site selection is crucial for community gardens. The examples demonstrated that with a precipitous decision, the municipality might divest the community of their right to use the field after working in the same area for years. (E.g., Fenerbahçe Community Garden, Kadıköy Municipality) It is important to establish areas for the community to gather aside from the assigned parcels and include productive areas such as an orchard, greenhouse, tool shed, common kitchen, and community activity area in these gardens. Establishing an upcycling center and repair workshop, with the motto, reduce, recycle, repair, reuse, can provide for the needs of the area and the community.

Structures that are adaptive to the topography and touching the ground on a minimum level should be preferred with minimum interference with the bostans. The structures can be made using mobile and natural materials. No add-ons should harm the area when they are removed. Examples of agricultural structures in Turkey and those used by nomad communities can be further developed for the bostans. Alker, hay, and felt are suitable materials. (Figure 93-94)

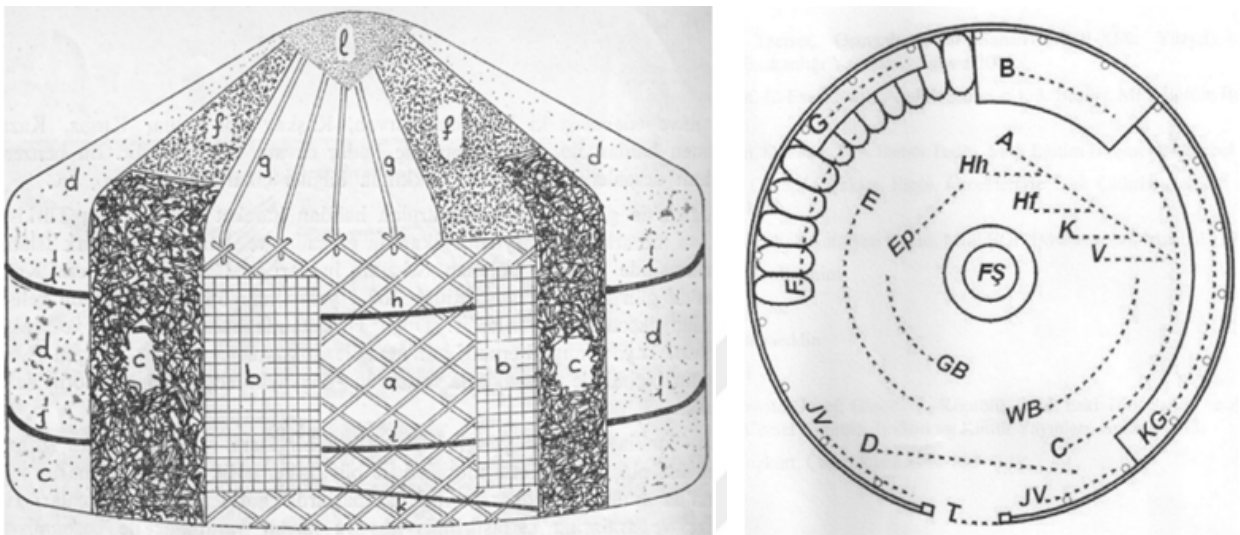

Figure 93. (Left) Elements Constituting A Yurt: a.kerege, b. çi coating, c. turdok, d. pavillion, f. üzük, g. uk, h. başkur strap or rope, i. strap or rope, j. arkan, l. Tümüldük (Diyarbekirli, 1972: 150). (Right) Interior Arrangement of an Altay Yurt: A. Family area B. Bed, C. Women's Side, D. Area for Peasants and Servants, E. Men's Side, EP. Honor Area, F. Leather Sacks, FŞ. Stove, G. Putlar, GB. Male Guests, Hh. Host, Hf. Housewife, JV. Young Animals, K. Children, KG. Kitchen T. Door, V. Relatives, WB. Female Guests (Radloff, 1956: 24).

Figure 94. Serender: Used to store and dry the food product. It is a type of building unique to the Black Sea Region. (Görele Municipality Archive, 2021)

Renewable systems, solar panels, and wind turbines can be chosen as the energy sources of the area. It is also possible to produce biogas, an output of compost production. Agrivoltaik systems consisting of solar panels are now applied and installed in agricultural areas without impeding production activity.

As much as being integrated into the construction process, agricultural areas are recommended to be used in the existing buildings. In Istanbul, areas of different scales and content can be established, starting with transforming the roofs of public buildings. Considering the insulation, sound insulation, and social benefits it provides, the municipality should pay as much attention to rooftop conversions as it offers to the open green spaces. Local administrations should establish departments around urban agriculture and

related topics and run projects. These processes must undoubtedly be operated and followed up by experts.

All interior design and urban furniture should be mobile, convertible according to need, and have various functions. Furthermore, computational design, parametric modulation 3D print, intelligent materials, and biological methods like animal printheads support today's adaptive structures and material research. An example is the master's degree thesis "Translated Geometries," proposing a new adaptive concept where shape memory polymers respond to heat, moisture, and light.[140]

Ece Tankal, Efilena Baseta, and Ramin Shambayati have constructed a shape-shifting modular component that expands and twists in response to heat. The component surface can expand to four times its original size. (Figure 95)

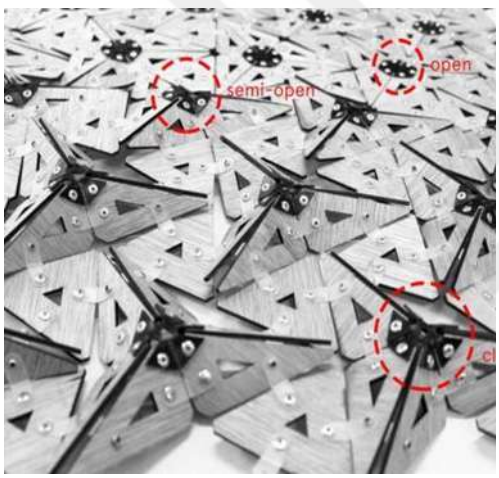

Figure 95. Geometric details

Some recent examples include the "Hy-Fİ"[141] project, made of organic and compostable tiles, and the Silk Pavilion, constructed with a flock of 6,500 live silkworms. Urban agricultural areas can serve as places to explore and apply these examples within the biomimicry framework.

Involving these areas in zoning plans to be used after a disaster and their preservation is crucial for an earthquake-prone city like Istanbul.

The IMM proposes two different plans of area for disasters and emergencies.

1. Assembly Areas: Open spaces for assembly after evacuating the buildings
2. Temporary Shelter Areas: Areas that should be available to use immediately after any disaster, providing temporary shelter and responding to basic human needs with the necessary infrastructure, electricity, water, sewage, and communication systems until they recover from the acute shock.[142]

   Open Temporary Shelter Areas

   Closed Temporary Shelter Areas

140 For detailed information see: ''https: //www.archdaily.com/546834/iaac-students-develop-material-system-with-responsive-structural-joints?ad_medium=gallery''

141 Arch dail ''IaaC Students Develop Material System with Responsive Structural Joints''

142 Istanbul Metropolitan Municipality News Archive, "Permanent and Temporary Shelter Areas"

All assembly and open temporary shelters planned by The IMM Earthquake Risk Management and Urban Improvement Department are recommended to be integrated with existing urban agricultural areas or future designs. A guide can be prepared to determine design and improvement criteria for this. The infrastructures of the sustainability-based urban agricultural areas and those determined to be used after disasters correspond. Conversion of urban agricultural areas into disaster assembly areas in cases of an expected earthquake and tsunami disaster in Istanbul should be designed and shared. Thus, it will create a ground for points to consider while adding new functions to the areas. It is important to determine the road connections and entrance and exit points of the neighborhoods where these areas are located. When determining these areas on a neighborhood scale, they should preferably be integrated with structures such as health centers and mosques. Compost toilets, mobile showers, common kitchen areas, alternative energy resources, clean water tanks, and containers storing the tools, sheltering, and first aid materials can be added to the areas.

Considering Istanbul's geographical structure, designs and structures that can be used on the water surface are also recommended. Dinesh Ram, the designer of the Hope Waters Dome,[143] designed this structure, which serves as a production area and a social space, out of bamboo and plastic materials, as a solution for the rising sea level and food crisis.

2. Management of Ecosystem Services

2.1.Management of Environmental Ecosystem Services

The ecosystem services can be classified as Regulating, Supporting, Provisioning, and Cultural Services.

2.1.a. Soil Management (Supporting Services)

The common ground for all bostan types is food production, and soil is the main material. (Except hydroponic systems.) The soil is polluted with improper agricultural methods and the uncontrolled use of chemical fertiliz-

143 Esther Sanyé-Mengual, Specht,K., Vávra J., Artmann. M, Orsini F., Gianquinto G.,''Ecosystem Services of Urban Agriculture'',p.4,5.

ers and toxins, losing its vitality and ecosystem year by year. Therefore, soil analyses should be conducted before cultivating any land, and the first few years should be spared for soil enhancement if needed. A few years ago, soil analysis was only conducted to examine the levels of beneficial plant nutrient elements and to determine the fertilizer type and amount required by the plants, while today, we have analysis examining the microorganisms in the soil nutrient network.[144]

An unlively soil needs to be constantly supported extrinsically with chemicals. Besides, plants growing in lean soil get damaged as they are not resilient to diseases, which creates a cycle that would harm sustainability.

Therefore, all bostan areas should incorporate composting, choosing the most suitable method for the scale of the space and its users. Recycling the organic waste produced in the area and the neighborhood, homes, and offices in the designated 'composting units' within the area is important. When reinforced with animal manure, this compost can replace chemical fertilizers. Recycling organic waste where they are instead of being carried to distant locations under the name of rubbish is a positive economic and ecological action.

Depending on the organic waste volume, the compost produced may provide input for the system as a commercial product or a trade-in in alternative economies.

2.1.b. Climate Change and Water Management (Regulating Systems)

Water is the source of life. Therefore, protecting water resources and using them effectively is crucial in adapting to the ever-growing effects of climate change and drought. The quarterly drought map (November 2022 - January 2023) published by the Directorate General of Meteorology uses the phrase 'extraordinary drought.'[145]

Therefore, it is essential to integrate sustainable water resources in the bostans. Commercial bostans use artesian and wells as water resources. Allotment bostans owned by the municipality use the city water supply. The source of these systems consists of underground waters and dams. Nevertheless, they are not infinite. Therefore, water coming from these sources should be used carefully and cautiously by employing water-saving methods,

144 For detailed information, see: https: //linktr.ee/soilfoodwebschool

145 For detailed information,see: https: //mgm.gov.tr/veridegerlendirme/kuraklik-analizi.aspx

and alternative water resources should be urgently integrated into the system.

Today, storing rainwater in water tanks to be used in irrigation comes into prominence. While establishing the rainwater harvest systems, including the adjacent buildings' roofs for rain harvest, ensures the expansion of the spatial design and integration into the surrounding. Another method is treating and using the greywater (foul water with no chemicals or excrement) produced in the buildings for irrigation. (Figure 96).

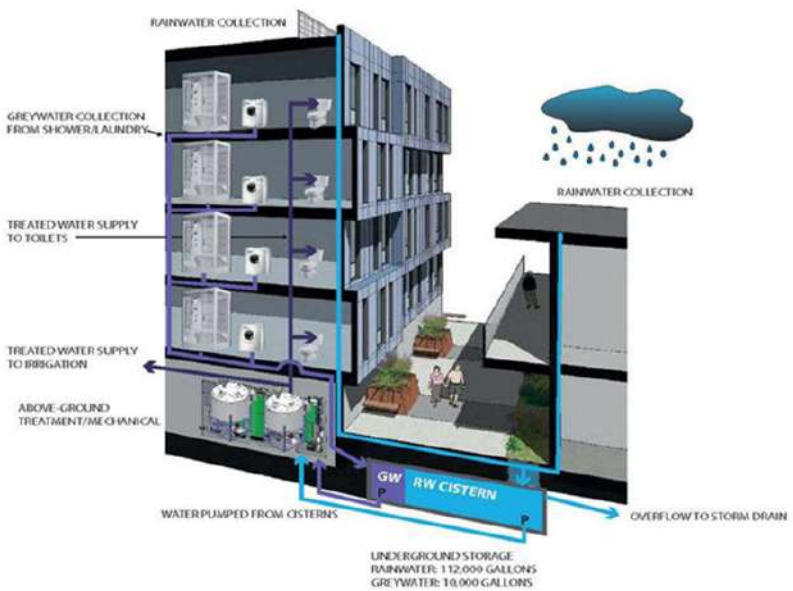

Figure 96. Rainwater & greywater harvesting. (Source: Dakotah Bertsch Landscape Architecture)

Promotions provided by municipalities for facilities that integrate greywater systems and ecological solutions into their designs will help spread this perspective.

Especially in sloping areas, rain swales should be integrated into the designs. The rain swales are dug out horizontally across the landscapes along the elevation contour lines and store the rainwater in the land, feed the underground water, and attenuate the flood peak discharge. The effect of the heat islands within the city is reduced with the vegetation within and around the rain swales. The biodiversity increases. (Figure 97)

Rain Gardens are one of the methods for holding water and allowing it to soak into the ground. They consist of a ditch that collects the water without interfering and suitable plant species. The ditch does not fill with water when it does not rain.

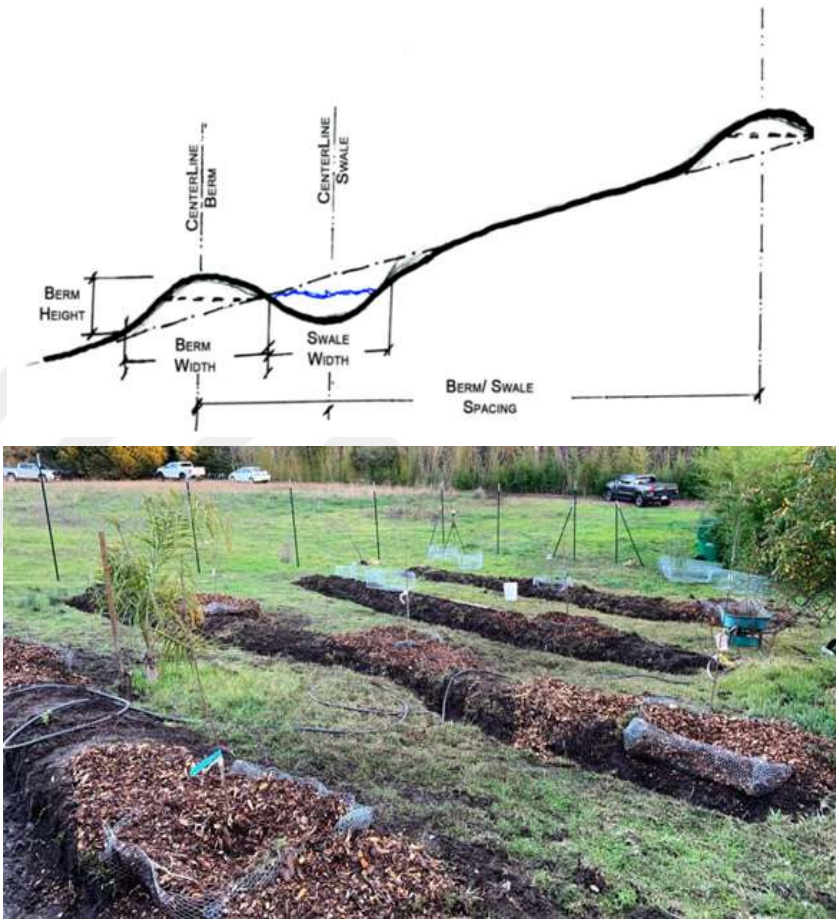

Figure 97. (Top) A sketch for building a rain swale. (Bottom) An example of field implementation of the rain swale. (Santa Cruz Permaculture Community)

All ground materials used in the areas should be ecological and leachy. In areas of increased drought, the condensation traps that trap moisture in the roofs and hydropanel technology producing drinking water should be integrated into the areas to be utilized in disaster.

Mulching is the process where the soil is covered with such materials as hay, tree leaves, sawdust, woodchips, and shredded paper to reduce soil evaporation. This method is applied to save the water used in the bostans. The mulch materials are spread on the cultivated areas. The material decomposes in time and becomes compost, simultaneously enhancing the soil. The diminishing material should be fed back. Therefore, the necessary material should be stored in the area to be available when needed.

2.1.c. Integration of Animals Into Urban Agricultural System (Provisioning Services)

The villages evolving into neighborhoods within the scope of the metropolitan municipality law brought along many prohibitions and restrictions related explicitly to animal husbandry. Nevertheless, sustainability can be achieved through systems incorporating animals in agricultural areas regardless of their scale. The rural neighborhood is a concept discussed to address these problems; nevertheless, it is more feasible for the districts in the immediate surroundings of Istanbul. Animal breeding, which is challenging to practice within the city due to malodor and noise, can continue in rural neighborhoods with suitable designs. (E.g., Eyüp, Göktürk, Sarıyer, Gümüşdere, Pendik, and Göçbeyli) It is necessary to open a parenthesis here. Water buffalo breeding, practiced in the area during the construction work of the Istanbul Airport and the 3rd Bosphorus Bridge, was harmed by the disruption of the ecological system alongside the land. Wetlands are ecological systems as important as pastures for animal husbandry and must be preserved. Using small and large cattle manure in the bostan as fertilizers, supplied from the nearby locations, will provide ecological benefits by reducing fossil fuel consumption. The manure goes through specific processes to turn into a healthy fertilizer. After these processes are completed, the fertilizers can be used immediately or kept outdoors and in storage spaces.

Chickens, bees, and worms can easily be integrated into the system in the bostan areas. Especially in permaculture systems, chickens are used as agricultural laborers. Their eggs and meats are secondary outputs. They air the soil and feed on the insects and larvae in it. Organic home and bostan waste constitute their primary food resources. Pens and chicken tractors should be arranged to meet the animals' needs. (Figure 98)

Figure 98. Chicken tractor (Designed for 4 adult chickens with wheels, which can be moved.29 m^2. (amazon .com .tr)

The other indispensable animals in urban agriculture areas are the bees. Bees are crucial for the urban ecosystem and biodiversity as pollinating animals. In Istanbul,[146] beekeeping is practiced in the periphery or the hidden corners of the city, while in Paris,[147] Berlin, and London, there is an ongoing dispute as to the damage of urban beekeeping on urban wildlife. Rooftops are recommended to start urban beekeeping for the urbanites in Istanbul to acclimate to the idea. Honey and the byproducts produced have a high economic value. Nevertheless, it should be noted that the use of pesticides in agricultural areas and the urban landscape is detrimental to the bee population. (Figure 99)

Figure 99. (Left) Beehives on a tree in the Gümüşsuyu Park. (Şahan Nuhoğlu 2019), (Right) The bees at their home, on top of Notre Dame. (Gerard Harten, 2018)

Integrating the worms into the system enables organic waste and fresh manure to turn into compost and usable fertilizer rapidly. Especially the organic waste in the neighborhood and community bostans can be brought into the bostan and recycled in the vermicompost units. The solid and liquid vermicompost can be used in soil amendment and cultivation, besides providing financial profit as a commercial product.

2.1.d. Alternative Economic Models

Access to healthy food is the right of every citizen. The consumers' purchase power should be fairly distributed with the labor-value equilibrium. Therefore, alternative food networks should be used for the consumer to directly reach the food produced in the bostans. Considering the productivity and profit-oriented production approach in commercial bostans, direct sales will minimize the price gap between the producer and consumer. Pur-

146 For detailed information,see: https: //www.atlasdergisi.com/gundem/metropolun-arilari.html

147 For detailed information,see: https: //www.nhm.ac.uk/discover/news/2020/september/beekeeping-in-cities-harming-other-wildlife.html

chase-guaranteed production and community-aided agricultural models will eliminate the distanciation and alienation between the producer and buyer, thus allowing them to question the production process together. In addition to fresh food, surplus products prepared under suitable storage conditions can also be involved in the food networks. (Canned, dried, and fermented food (pickle); i.e., processed food) For this kind of production, social initiatives and associations should be contacted to whom the food processing can be transferred. (E.g., the Woman to Woman Refugee Kitchen) Thus, new employment opportunities will be provided for different groups who are not directly involved in the bostans. These groups should be given precedence through affirmative action. In addition, outputs such as dairy products, compost, and vermicompost hold economic value. Considering these circumstances, specific recommendations are developed for the areas and cities.

Alternative sales channels and food networks should be created to sell the production outputs in the bostans directly. The recommendations stated below can be used as examples of that.

- The bostans should be accessible for the prosumers to come and buy their products (E.g., accessible by public transport, an available parking lot)
- Creating a subscription system for direct sales from the bostans
- Designing sales areas in the bostans
- Spreading the local producers' markets held by municipalities
- Allocating stalls for the urban farmers in the district markets
- Allocating plots for urban farmers in the fixed or public markets owned by the municipalities.
- Establishment of earth markets[148] by the municipalities
- Designing mobile produce trucks to reach the consumer easily
- Using these produce in the city restaurants, social facilities, and solidarity kitchens owned by the municipality
- Building connections between the bostans and the food cooperatives and Non-Governmental Organizations in different parts of İstanbul. Selling these products in the neighborhood shops of the cooperatives
- Online sales to the city through websites. (Websites supporting the producer and alternative economy, e.g., Good4trust and Local Maker) (As the consumers' physical interaction with the bostans, bostancıs, and visits to the area will increase the sense of belonging, this can be planned as one of the last choices.)

148 These are the markets that support local development and small producers initiated by Slow Food. It is carried out with the motto of good, clean, fair food directly from the producer to the consumer. In order to participate, it is necessary to be producing at a maximum distance of 40 km from the market. The producer can only sell the products he has produced, harvested and canned. There is only 'Şile Earth Market' in Istanbul. Organic certificate is not required. Good agricultural practices are sufficient.

An examination of the examples in the world reveals that urban agricultural areas rent the area for such organizations as weddings and meetings; they apply discounts on purchases and workshops through a subscription system; they prepare name-specific souvenirs such as t-shirts, aprons, and cups; they publish and sell books on urban agriculture and related topics. Bostans are a source of income for urban farmers and their families. Awareness-raising activities should be organized for the citizens and the government to sustain the artisanship we define as bostancılık. Academic research, establishing NGOs, artistic collaborations, and the events organized in these areas will help restore the old connection. Opening technical high schools on agriculture, founding institutes that research the bostans and the vocation of bostancılık, and spaces that bring the citizens and the bostancıs together are essential for communication. Furthermore, in the community gardens and sponsored bostans, these activities should be planned and supported by individuals knowledgeable on ecology, production, and sustainability. Under these circumstances, new areas of expertise have emerged, and related certification programs have been established. (E.g., permaculture designer, urban agriculture expert, lab technician for soil nutrition network)

As of 2018, the increasing economic crisis has caused a decrease in purchasing power, which creates difficulties in accessing healthy and fresh food. Urban agriculture constitutes one of the layers that can provide solutions for the food crisis as it reduces certain costs, such as transportation and reseller, facilitates food access, and allows the citizens to grow their own food (though only certain kinds).

2.1.e. Productive and Sustainable Urban Landscape

Nowadays, we are witnessing a transformation of urban landscape strategies in cities. Ecological facts like drought and biodiversity loss cause the local administrations to employ plans that use natural resources more carefully and effectively. “Edible Landscape” conversions, which started with the integration of fruit trees into green spaces, are extrapolating; and xerophytic, productive, and sustainable landscaping concepts are now used to define urban landscape.

With this novel planning perspective, public bostans and hobby garden projects designed by local authorities in the past should be revised in

accordance with the concept of sustainability. The existing ones should be improved, and the new ones should be designed accordingly. Therefore, the areas that constantly bring an expense load on local authorities can transform into self-sufficient areas. Furthermore, communities should be encouraged to start their own neighborhood, school, and community bostans in light of the knowledge and experience they gain in these areas. The municipality can become an advisor rather than a doer. It can provide space for communities demanding it. Examples include transforming lawns, removing asphalt and concrete areas in the city, and opening new soil spaces, using the potential of vacant roofs of public buildings. In order to raise awareness of urban agriculture, urban furniture applications can be added to city parks.

One of the most successful examples is the ensuing urban agricultural practices following an embargo in Cuba. The urban landscape transformation in Istanbul should be accelerated before any other obligations.[149]

2.2. Management of Socio-Economic Ecosystem Services

The effects of the bostans on the communities they serve as producers and users are identified as physical, mental, and emotional health, education, transferring ancient agricultural knowledge, building community and fostering connection, and social solidarity.

2.2.a. Invisible Structures

The role of design in agriculture and community interface should be awareness-raising, complementary, and informatory. The term invisible structures used in permaculture designs refers to community social ties.

Bostans function as social meeting spaces in the city. Designs inside and outside the area that allow the bostancı and the consumer to meet are important because it builds a sense of belonging and enables a connection. (Accessibility arrangements, stalls, markets, education areas, and tour organizations)

Shared spaces that unite the community are of primary importance in community gardens. Open and closed rest areas that can be used night-day and in different seasons, common kitchen, and areas to organize events (fire

149 Kunt, "Sustainable Urban Agriculture in Cuba"

well, bakery oven), environments for knowledge and experience exchange (library, workshop area) designs that include people with disabilities, elderly, children, and pets in the community will be inclusive designs.

Integrating repair (bicycles, small home appliances), sowing, knitting, and art studios in urban agricultural areas may create attraction points that may help the community grow.

Individuals uninterested in agriculture may explore the area and the community through alternative workshops, subsequently becoming involved.

A circular form is recommended for rest areas to be designed in such areas. When the community is seated in a circular form, everyone is equally distanced from the center and can see each other. Spatial design should be utilized to ensure healthy and equal talking and listening.

Creating a manifesto, nonviolent communication, non-discrimination, and a fair approach is the starting point of a sustainable community design.

Allotment gardens allow the residents of different economic, social, and cultural groups living in the same neighborhood who do not meet to come together.

They become neighbors in the adjacent parcels with the draw and work together for 6 to 12 months. This collaboration enables knowledge and experience exchange.

The bostancıs and laborers working in the commercial bostans receiving the payment they deserve for their labor and social security are part of the invisible structures. Taking responsibility as a prosumer in different subjects related to the production system enables the design to reinforce the community as much as its establishment.

Establishing organizations with legal status and holding the community together when an area is occupied and cultivated is essential to create a direct food distribution network. Examples include foundations, associations, cooperatives, and food communities. It is particularly impactful to dialogue with local authorities as an official community.

When all recommendations are examined, noting the differences between the bostan typologies, a common starting point emerges: “Protection all urban areas that we can cultivate”. Particularised to Istanbul, all available potential of the interfaces that bring the city and agriculture together should be utilized, considering the devastating effect of the expected Marmara earthquake on top of all the processes that lead to more concretion and overcrowding with each and every interference. It must not be forgotten that

food and good production are political. Therefore, the protection of these areas is all citizens' responsibility. Overall, preserving Istanbul's agricultural activity throughout history is important for protecting its memory and being a sustainable and resilient megacity in future predictions.

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