RECLAMATION OF WATERWAYS IN URBAN CONTEXT:
A STUDY ON ANKARA STREAM AND ETİLER NEIGHBORHOOD

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ABSTRACT

RECLAMATION OF WATERWAYS IN URBAN CONTEXT: A STUDY ON ANKARA STREAM AND ETİLER NEIGHBORHOOD

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The streams and rivers are significant determinants of urban form; however, today, they have become barely recognized in cities. Over time, the interwoven relationship between city and water has gradually been shifted and lost its significance. Since the 1960s, plenty of towns tended to restore and reclaim their waterways to avoid the ill effects of rapid urban growth, industrialization, and the alarming environmental crisis. Reclamation of the waterways has emerged as a growth strategy since the waterways are still an essential part of the urban fabric as flowscapes, enhancing the social, spatial, economic, and ecological urban networks. Ankara is a noteworthy case that exemplifies such a shifting relationship between the city and waterways. Thus, the present study focuses on Ankara Stream in the context of the Etiler neighborhood in Etimesgut, and aims to discover the possible potential of waterway reclamation in this particular urban context. To frame the conceptual ground, the thesis analyzes five reclamation projects and uncovers associated strategies: Queen Elizabeth Olympic Park in London, the Seine River Regeneration in Paris, the Grorud Valley Project in Oslo, the Cheonggyecheon Stream Regeneration Project in

Seoul, and the Little Sugar Creek Daylighting project in North Carolina. Next, the thesis examines how Ankara and Etimesgut established the link with the streams throughout history. Accordingly, the study offers suggestions for the reclamation and restoration of the Ankara Stream in Etiler Neighborhood based on the studied precedents.

Keywords: Waterways, Urban Form, Flowscape, Reclamation of Waterways, Ankara Stream, Etiler Neighborhood.

ÖZ

KENTSEL BAĞLAMDA SU YOLLARININ YENİDEN CANLANDIRILMASI: ANKARA ÇAYI VE ETİLER MAHALLESİ ÜZERİNE BİR ÇALIŞMA

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Nehirler ve dereler şehir biçiminin önemli belirleyiciysi iken; bugün şehirlerde zar zor tanınır hale gelmeye başlamışlardır. Zaman içinde, şehir ve su arasındaki iç içe geçmiş ilişki giderek değişmiş ve önemini yitirmiştir. 1960'lardan bu yana, birçok şehir, hızlı kentsel büyümenin, sanayileşmenin ve endişe verici çevresel krizin kötü etkilerinden kaçınmak için su yollarını restore etme ve iyileştirme eğiliminde olmuştur. Su yollarının akış mekanları olarak hala kentsel dokunun önemli bir parçası olması ve şehirlerin sosyal, mekansal, ekonomik ve ekolojik ağlarını güçlendirmesi nedeniyle su yollarının yeniden canlandırılması büyüyen bir strateji olarak ortaya çıkmıştır. Ankara, şehir ve su yolları arasındaki değişen ilişkiye örnek teşkil eden dikkate değer bir vakadır. Dolayısıyla bu çalışma, Etiler Mahallesi, Etimesgut bağlamında Ankara Çayı'na odaklanmakta ve bu özel kentsel bağlamda su yollarının geri kazanılmasının olası potansiyellerini keşfetmeyi amaçlamaktadır. Kavramsal zemini çerçevelemek için, tez beş su yolunu yeniden canlandırma projesini analiz etmekte ve stratejilerini ortaya çıkarmaktadır. Bunlar: Londra'daki Queen Elizabeth Olimpiyat Parkı, Paris'teki Seine Nehri Yenilenmesi, Oslo'daki

Grorud Vadisi Projesi, Seul'deki Cheonggyecheon Çayı Yenileme Projesi ve Kuzey Karolina'daki Little Sugar Deresi Gün Yüzüne Çıkarma Projesi'dir. Daha sonra tez, Ankara'nın ve Etimesgut'un tarih boyunca akarsularla olan bağlantısını nasıl kurduklarını incelemektedir. Bu doğrultuda, incelenen örnekler ışığında çalışma, Etiler Mahallesi bölgesinde Ankara Çayı'nın yeniden canlandırılması ve ıslahına yönelik öneriler sunmaktadır.

Anahtar Kelimeler: Su Yolları, Kentsel Form, Akış Mekanları, Su Yollarının Yeniden Canlanlandırılması, Ankara Çayı, Etiler Mahallesi

To me

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ABBREVIATIONS

Turkish Radio and Television Association (TRT)

Ankara Metropolitan Area Master Plan Bureau (AMNPB)

Statistic Information System (SIS)

CHAPTER 1

INTRODUCTION

The relationship between living organisms and water is vital. The city and water also have an unbreakable and essential connection, similar to that between the water and living organism. The waterways as significant infrastructures establish a strong bond with the town since the first human settlements. The present thesis claims that these waterways – multiscale infrastructural forms- could moderate social, economic, spatial, ecologic urban relations as flowscapes. In the book *Flowscapes: Designing infrastructure as landscape*, flowscapes were described "as the formal expression of structures for the provision of food, energy, and freshwater; support for transportation, production, nutrient cycling; social services such as recreation, health, arts; and regulation of climate, floods, and wastewater" (Nijhuis, Jauslin, & Hoeven, 2015, p. 23). Thus, the urban waterway infrastructure affects the city in many ways and allows the city to run properly. The city dwellers are usually not aware of the constantly flowing infrastructures and background functions on a regular day; however, they realize it when exposed to deficiencies, deteriorations, and interruptions in these flows.

Today, freshwater levels are alarming, and sea levels are rising due to global climate change. One of the primary reasons for that is rapid urban growth and industrialization. Most waterways are the victims of industrialization and urbanism and were transformed into sewers and covered in cities. As a result, the streams and rivers are polluted, do not include biological diversity, leading to health problems. Consequently, the relationship between city and water has deteriorated, and in certain cases, it has been completely broken. This also led to the fraction between

flows and city, which caused various problems in the urban fabric. The condition of water channels requires the reconsideration of the connection between the waterways and the city. Especially after 1960, water quality, waterway biodiversity, water management, rehabilitation, and reclamation of the waterways have been included in the urban agenda. Several studies were conducted on waterway revitalization on several global examples, especially since the first half of the 20th century.

The streams are one of the main geographical characteristics of Ankara. They had a significant impact on the city-forming throughout history. Even the ancient civilizations organized the city based on the streams. Notably, in the first half of the 20th century, the streams were used as recreational, picnic, and promenade areas, besides agricultural and industrial occupation. Ankara was once rich in streams and had a strong relationship with the water; however, this relationship was lost after the second half of the 20th century. The significant results of this development include climate change, urbanization, and industrialization. Accordingly, the streams intensively have been polluted due to urbanization and industrialization after the 1960s. Furthermore, the floods and epidemics led to the gradual covering and culverting of the streams in Ankara.

Several academic studies, books, and documentaries were published to address this problem in Ankara during the last few decades. The book by Erman Tamur, *Suda Suretimiz Çıkıyor*, 2012, provided significant historical documents on the connection between Ankara and urban streams. The documentary "Asfaltın Altında Dereler Var" directed by Yasin Semiz focused on the lost streams in Ankara. In the dissertation by Umut Pekin (2007), "Development of Urban River Corridors and Concept Greenway Plan of Ankara Stream", and master thesis by Özge İdalı (2020) "Stream Daylighting: An Operative Landscape Infrastructure for Ankara", presented promising future transformation objectives for Ankara's streams. Irmak Yavuz researched and detailed the geomorphologic formation of Ankara in her thesis "Calyx: A Geomorphological Approach to Formation of Urban Space in the Context of Ankara" in 2018. Her study illustrates that the geomorphological form of Ankara correlated with its streams valleys which shaped the city form. Furthermore, Yavuz

addressed the loss of riverscape in Ankara in ICONARCH III International Congress of Architecture (2017).[1]

Ankara should establish a strong relationship with waterways in both the urban center and suburbs due to its specific geography. A suburban area, Etimesgut has also established a multi-layered connection with streams that considerably impacted the social, economic, and spatial features of the region throughout history. However, this connection with water was also broken similar to the Ankara urban center. The present thesis focuses on the determination of the restoration and reclamation potential in the broken relationship between the Ankara Stream and the Etiler neighborhood in the Etimesgut district. Thus, initially, the relationship between the city and water, and the social, economic, spatial, ecologic, and historic changes since the 20th century were scrutinized. Then, the five urban waterway reclamation projects were examined to reveal the strategies adopted in these projects: Queen Elizabeth Olympic Park in London, the Seine River Regeneration in Paris, the Grorud Valley Project in Oslo, the Cheonggyecheon Stream Regeneration Project in Seoul, and the Little Sugar Creek Daylighting project in North Carolina. Next, the changing streams in Ankara and Etimesgut were discussed. Thus, the research aimed to determine reclamation strategies for the Ankara stream in the Etiler neighborhood based on the notion of waterways as urban flowscapes. To achieve this aim, precedent projects provided the conceptual framework, and published documents, photographs, postcards, and city maps were included among the primary research material in the study.

The thesis includes six chapters. It begins with the definition of the research problem and the scope. Thus, the first chapter provides brief information about the research, the methodology, and the development of the stages to reach the study objectives.

[1] Ergül previously addressed the loss streams of Ankara and revitalization possibilities in the Master's course: "Introduction to Architectural Research," instructed by Prof. Dr. İnci Basa in METU, 2020.

In the second chapter, the versatile relationship between city and water is discussed based on historical urban settlements. Thus, the development of social, cultural, spiritual, economic, ecologic, spatial links between the city and water was scrutinized based on the examples of Netherland water canals, the Ganges River, and Iran underground water canal – the *karez* system. In the past, the waterways were significant determinants of the urban form and had a strong relationship with the city. However, the link broke after the 18th century due to the changes in urban dynamics. Thus, they became idle and forgotten urban sectors. In the present chapter, the process of the shifting relationship between city and water is analyzed. For this purpose, the city of Spiro Kostof and various published resources were employed. As argued in the *Flowscapes Designing Infrastructure as Landscape*, the waterways are among critical urban infrastructures that include flows. Therefore, the urban waterways provide a great potential to improve social, economic, ecologic, and spatial urban attitudes. Finally, the waterway reclamation and restoration trends since the second half of the 20th century that led to the fortification of the relationship between city and water in new urban spaces are addressed.

In the third chapter, to provide a conceptual framework and to reveal the urban waterway reclamation project strategies, five projects were analyzed in different geographies. Each of these examples is analyzed based on a different scale and concept. The Sein River revitalization, the London Queen Olympic Park regeneration project, re-opening of the waterways in Grorud Valley in Oslo, the daylighting of Cheonggyecheon Stream in Seoul, and the Little Sugar Creek in North Carolina were analyzed based on their spatial, economic, social integration, memorial and ecological contributions to the city. These projects offered the acquisition of new perspectives for the relationship between Ankara and urban waterways.

In the fourth chapter, Ankara and its relationship with streams and the transformation of this relationship were investigated since the early 20th century. Characteristically, Ankara had several streams, and the urban form was associated with the waterways to a higher degree. Furthermore, the social, economic, ecological, and spatial

character of Ankara has also been affected by the streams, especially before the second half of the 20th century. However, today, the conditions are quite different. Thus, the chapter was divided into three subtitles that scrutinize the shift in the meaning of streams in Ankara. These sections reflected the process where the streams that were natural habitats had turned into landscapes, and finally into urban sewerage channels. The section included various aerial photographs, urban plans, and published documents and papers.

Etimesgut is one of the peripheric suburbs of Ankara that shared similar changes to other districts in Ankara. Thus, the fifth chapter mainly focuses on the Etiler neighborhood that hosts the Etimesgut Sugar factory and residential areas. The neighborhood was analyzed based on the dramatic shift in its relationship with Ankara Stream since its settlement as a model village in the early 20th century. Thus, aerial photos, urban plans, published documents, newspapers, and photographs were employed in the chapter.

In the sixth chapter, certain strategies were proposed for the Etiler neighborhood. These strategies entailed spatial, ecological, social, and educational improvements in the area. To determine the strategies for the Etiler Neighborhood, the analyzed reclamation projects (in the third chapter), the unique historical background of Etimesgut, and the social, spatial, ecological context of the area was considered.

CHAPTER 2

WATERWAYS IN URBAN CONTEXT

To comprehend the position of the waterways in an urban context, it is crucial to reconsider the link between water and city, the development, and the impact of this relationship on both sides throughout history. This would assist the comprehension of the current relationship between the city and waterways and prevalent changes.

2.1 City and Water

Since the very beginning of human history, water has been a significant source of physical and spiritual nourishment. Water could be employed as a freshwater source for all living organisms, an irrigation tool, to sustain nature, a means of transportation, aesthetical element, and an industrial requirement. Thus, artists, architects, scientists, engineers, theologians, and politicians have been interested in water since early times. For instance, Leonardo da Vinci considered water as the driving force behind the universe and the mysteries of creation could be enlightened by a study on the laws of movement through the earth and air (Vinci, edited 2008, p. 18). Ancient people attempted to understand the nature of water. Antique Egypt, one of the first riverine settlements, employed the waters of the Nile and observed annual flood cycles (Hassan, 1997; Mark, 2016).

The first known urban settlements, as Spiro Kostof (1991) mentioned in *The City Shaped*, were established in the muddy plains between the Tigris and the Euphrates rivers in Mesopotamia around 3500 BC. Then, Nile urbanization sprawl around 3000 BC alongside the Nile River. A millennium later, the Indus Valley civilizations were established on the fertile plain of the Indus River. The first Chinese cities were settled on the western floodplains of the Yellow River and the lower Wei River Researcher Renato Sala (2003, p.1) emphasized that

> The presence of water determined favorable places for hunting, collecting fruits and seeds, localizing camps, and more or less stable settlings. From the earliest times, it has been used in all its forms: as surface water from rivers, lakes, springs; as subsurface (underground) water reached by shallow pits and wells; as meteoric water collected in natural or artificial concavities.

Thus, people preferred to live in the river banks which supplied their needs easier. As Shaw stated, "Water, the primary human resource, was the reason for the original location of the people, providing means of transport, defense, leisure and recreation" (Shaw, 2001, p. 160). It is clear that river valleys were always preferred for early urban settlements (Kostof, 1991).

According to Kostof, to understand the development of the city form, architects and architectural historians need to review the entire urban plan: "…urban process, in our sense of the phrase, is in large measure the story of urban development within the pre-existing frame or "ground plan.' It manifests itself through changes in plot configuration and the size and scale of the solid structures that occupy it. On this head at least, urban geography has much to teach us" (Kostof, 1991, p. 26). Urban development or design is determined by, at first glance, their relationship with the natural landscape. Because it is easy to comprehend topography as a significant determinant of the urban form. According to Kostof, the riverine settlements, which is our primary focus in this paper, are one of the topographical determinants of urban formation (Kostof, 1991, p. 54).[2]

Waterways as natural landscapes are one of the influential factors for the formation of the urban image. Several cities were deliberately established in river valleys and water sources as mentioned above. However, in this process, the human factor also plays a significant role. Also, as waterways changed cities, cities or city makers also changed the waterways. According to Kostof (Kostof, 1991, p. 55),

[2] Kostof defined five more urban forms that determined by the topography in addition to riverine settlements. These are natural harbors, defensive sites, linear ridges, hilltops, and sloped terrains (Kostof, The City Shaped: Urban Patterns and Meanings through History, 1991, p. 54).

> Seen in the aggregate, there is perhaps as widespread a tendency in city-making to amend the natural landscape as there is to work with it. Hundreds of past cities were lodged in cleared forests and on land reclaimed from swamps and bays. To fit their public buildings, connect points of consequence directly or dramatically, and enhance their functions and beauty, hilltops were leveled and canyons filled in, rivers were diverted and inlets dammed.

The Netherlands presents striking urban examples formed by humans. It is located on a large delta formed by three large rivers in Europe; Rhine, Maas, and Schelde. Only fifty percent of the Netherlands is a meter higher than the sea level. Consequently, water control has always been a struggle for the Netherlands due to low elevation, and around two-thirds of the surface area was reclaimed and elevated by dikes. Their struggle with the sea level has always been a challenging problem (Meyer & Nijhuis, 2014; Dutt & Heal , 1979; Pleijster & Veeken, 2015). However, they turned these disadvantages into advantages thanks to the employment of technology:

> The earliest attempts to drain the land date back to ancient times. Early residents built mounds, called terps, on which to safeguard their property during periods of high water. When three or more terps were linked together, the interior could be drained by allowing the water during periods of low water to flow out through an opening that could later be closed during periods of high water… The introduction of the windmill with rotatable heads in the sixteenth century and the steam-driven pump in the nineteenth century served to increase the efficiency of land drainage efforts, and both innovations have been instrumental in reclaiming much of the land (Dutt & Heal , 1979, p. 131).

The review of urban dike maps would reveal that the land has been reclaimed with the techniques adopted in the 14th century until the 20th century (Briliant Maps, 2017) (Figure 2.1). After the 1953 flood disaster, the delta project was implemented. The project minimized the flood risk and redefined and emphasized the relationship between the city and water. The area was transformed from a poor and isolated district into an industrialized, wealthy, and integral part of the city (Meyer & Nijhuis, 2014).

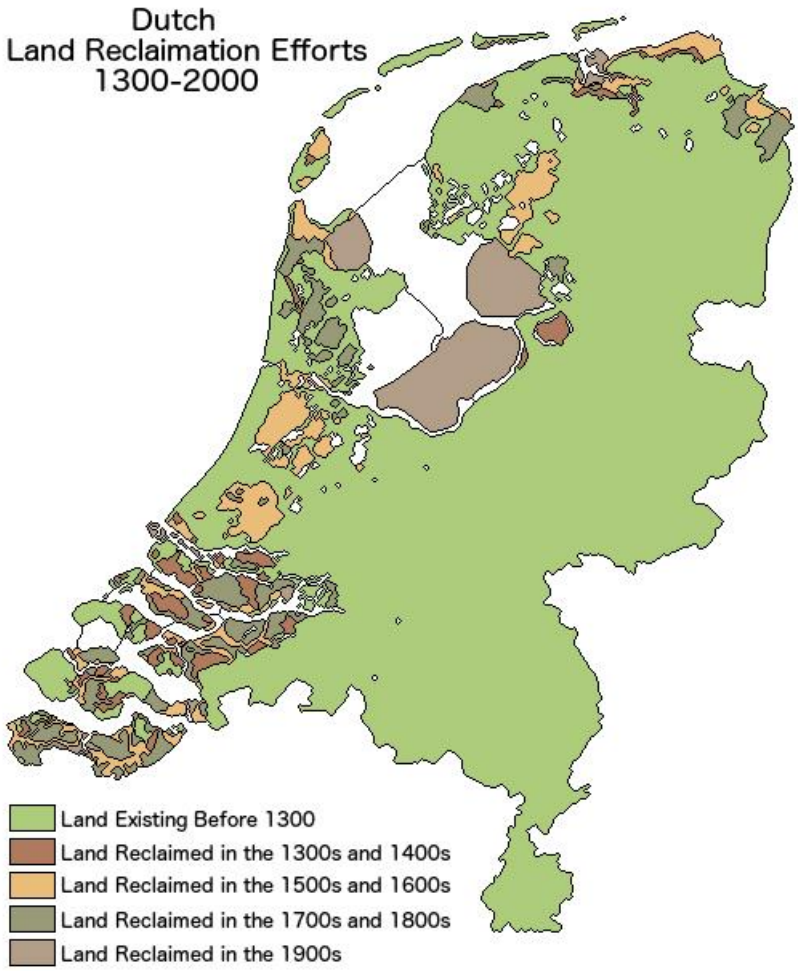

Figure 2.1. The transformation of land with dykes, Netherlands (Briliant Maps, 2017).

Throughout history, the urban form has often adapted to the topography of the water bodies such as rivers, water channels, lakes, or seas. Several cities lie along a riverbank or a seashore to benefit from the water. In contrast, sometimes the city shaped the waterbodies. Meanwhile, the city makers intervened and altered the shape of waterbodies. These entailed flood control measures, freshwater, transportation, irrigation or industrial requirements, wastewater discharge, etc.

Furthermore, as a spiritual resource, water is the foundation of several beliefs, myths, and religions- Abrahamic religions, Hinduism, and Buddhism. Water represents a

bilateral meaning in religions. It is considered as a gift and a purifying force, as well as a powerful destructive power. This destruction is in the form of catastrophic floods and threatens life (Brüesch, 2011). British author, theologian, and journalist Ian Bradley emphasized in his book *Water a Spiritual History* the spiritual value of water due to its religious, symbolic, healing, purifying, and sanctifying associations throughout history:

> Like a flowing mirror, water reflects the fluidity of the beliefs and practices of humankind over thousands of years – from primitive animism and medieval piety through the rigor and rationalism of the Reformation and the Enlightenment, to the idealism of the Romantic Movement and the hedonism and individualism of the modern age (Bradley, 2012, p. 11).

The historical analysis of the relationship between water and humans would reveal significant evidence for the central role of water in human beliefs.[3]

For example, The Ganges River[4] symbolizes the eternal circle of life and death (Brüesch, 2011). Kapila Vatsyayan, who was a leading Indian classical dance, art, architecture, and art history scholar, advocated that "Indian cosmology tends to be circular or what was the fluid within is the ocean" (Vatsyayan, 2009, p. xiv). It is one of the most revered waterways in the world. Because Hindus believe that the Ganges is sacred and the Himalayas, the origin of the river, is also the origin of the earth. They take ritual baths[5] and small sips while reciting prayers. (Shoemaker, 2014) The

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[3] For instance, Babylonian, Assyrian, African, American, Scandinavian, Japanese, Australian and Pacific Ocean, Greek, Roman, and Hindu creation myths significantly include the water element (Gaskin-Reyes, 2016). In Babylonia and Assyria, the water God (*Ea or Enki*), who is the creator of streams, rivers, and lakes, was connected with fertility and wisdom. In Sumerian creation myth, primeval sea represents the goddess of *Nammu* who gave birth to Heaven and Earth (Bradley, 2012).

[4] Diana L. Eck, who is a religion scholar and a professor of comparative religion and Indian studies at Harvard University, mentioned in her book that the Hinduist tradition perceived "life and death as an integrated whole" (Eck, 1982, p. 17).

[5] These baths liberate them from their sins and save them from eternal cycle. The river does not only play a role of sacrifice and purification, it is also a place where several votive offerings are dedicated

Ganges River is a cultural artery in India. Around the Ganges River, religious events lead to social cohesion. They call the river the "mother Ganges" since a mother always takes care of her children (Pemberton, 2017).

The Ganges is not only a place for religious rites but also games are played and children and adults swim in the river. The river is also strongly integrated into their socio-cultural life. Vatsyayan stated that the Ganges was "ever-changing, ever-flowing, and yet ever the same" (Vatsyayan, 2009, p. xv). This perception of the Ganges River has affected the urban manifestation. Due to the holiness of the river, the temples and shrines are located along the river. Eck stated the following on Baranas (Varanasi): "The temples and shrines, ashrams and pavilions that stretch along the river for over three miles are golden in the early morning. They rise majestic on the high riverbank and cast deep reflections into the waters of the Ganges" (Eck, 1982, p. 14).

While water provides an urban character, it is also the source of a power that generates a unique social and cultural life. In his book *Site Planning*, Gary Hack emphasized that "water can also be a focus of civic life" (Hack, 2018, p. 135) To supply water, the civilizations changed the flow of water from the ancient systems to vast hydraulic systems during the Roman Empire. (Watson, 2019). For example, "the fountains of Rome not only provided a supply of potable water for residents, but also cooled the air, celebrated mythology, and became focal points for neighborhoods" (Hack, 2018, p. 135). The Central Asian Underground water system served a similar purpose. The connection of central Asian cities with water led to multi-layered urban outcomes. In his book *Lost Enlightenment: Central Asia's Golden Age from the Arab Conquest to Tower Lane* (2013), S. Frederick Starr christened Central Asia as an intensive civilization. He suggested that mastery of irrigational arts and technology led to the rise of this civilization. They achieved

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and the ashes of the dead are scattered. Certain bodies are not fully cremated before the release to the river (Watson, 2019).

great success in irrigation with a unique hydraulic character[6]. Central Asians constructed a brilliant system to employ underground water by tunneling aquifer water to the surface through *underground galleries*. In the world, half of the irrigation by underground water is conducted in Iran, followed by Afghanistan, Pakistan, Turkmenistan, Azerbaijan, Tarim, Oman, Maghreb, Morocco, and Mexico (Sala, 2003). "Drainage galleries are called by different names in different parts of the world: *qanat* in Iran; *karez* in eastern Iran…These names all mean "devices bringing groundwater at the surface" (Sala, 2003, p. 3). Basically, these galleries serve as an intelligent underground spring that is connected to several vertical wells for aeration and maintenance. These wells keep the water cool, clean, and prevent evaporation as the water flows on a sloped area due to gravity (Sala, 2003) (Figure 2.2 and 2.3). In his article "*Qanat* irrigation systems as important and ingenious agricultural heritage", Jomehpour (2009) discussed how the *Qanat* system integrated sustainable urban development. The construction of this system resolved water shortage, secured the domestic water consumption in rural and urban areas. It balanced water consumption in energy production (Jomehpour, 2009).

[6] According to Starr, due to this character Central Asia is a "Hydraulic Civilization". This notion was initially mentioned in the book "Oriental Despotism" (1957) by Karl A. Wittfogel, a German-American historian. In hydraulic civilizations, if a culture adopts an agricultural system, managing the water by irrigation, flood control, this requires a large-scale governmental organization (Britannica, 2020). This atmosphere is provided by totalitarian despotic governments. The "hydraulic civilization" approach to the state is holistic; however, disregards individual oases, communities, or city-states. According to Starr, Central Asia differed from Wittfogel's hydraulic description. He advocated that "the great distances between oases, combined with the organization skills needed to manage each of the separate hydraulic systems, created an intense public life on each oasis but a much thinner and more narrowly military governmental presence at the regional or international level" (Starr, 2013, p. 38).

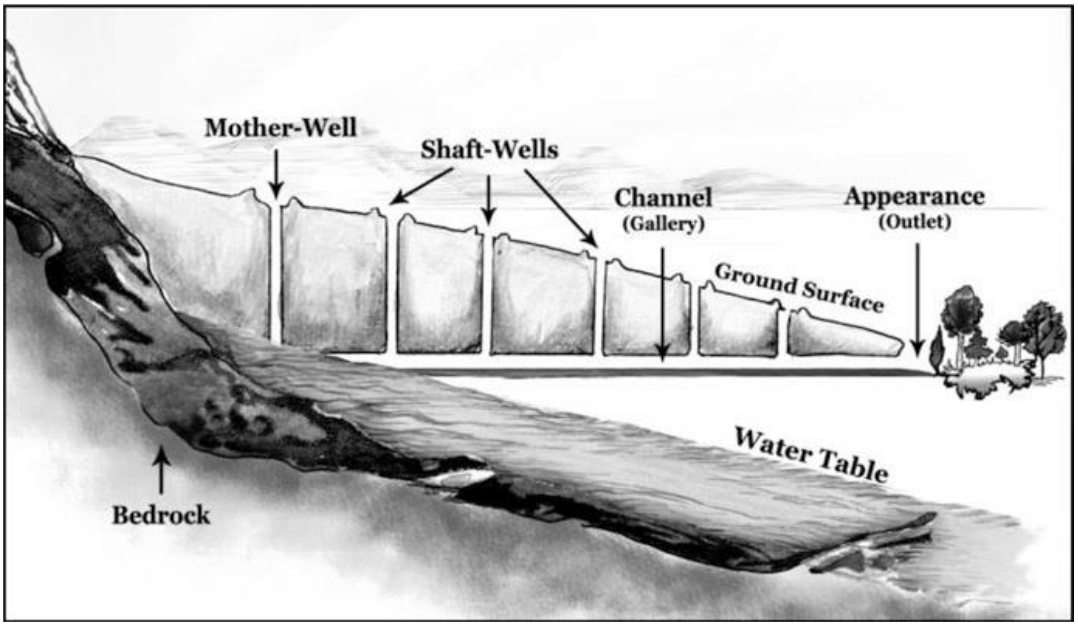


Figure 2.2. Two intersecting qanats near the town of Meybod, Yazd Province, Iran (Photo by Mehdi Khebredast) (Yazdi & Khaneiki, 2017).

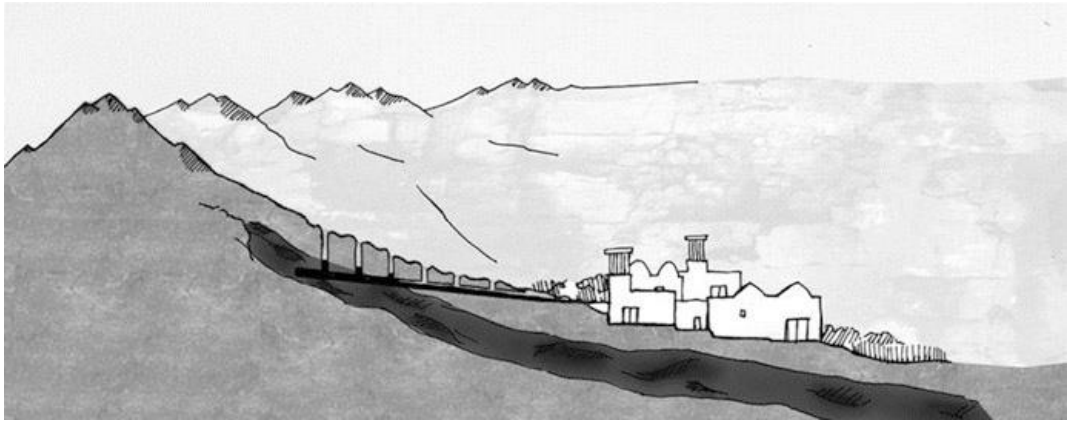


Figure 2.3. A typical qanat system (Yazdi & Khaneiki, 2017)

Furthermore, the structural and technical success of the *karez* systems also influenced social behavior in Central Asia. Inexpensive workers and slaves worked in the construction and maintenance of these systems. It was a high-cost project; thus, *karez* constructions were sponsored by landlords, rich families, or tribes. A group of specialists contributed to technological and technical construction. These

three classes/social groups allowed the operation of these water systems. The harmony between these groups led to social integration (Sala, 2003). The location of a house determined the social status of the inhabitants. Furthermore, the location of a house upstream or downstream of the qanat reflected the social hierarchy (Jomehpour, 2009). It was necessary to clean and maintain the *qanats* periodically, which led to the development of a financial system. Thus, *qanat* systems allowed a profitable business and social integration.[7]

On the other hand, due to political and economic significance, freshwater supplies and transportation facilities provided by water sources always affected urban welfare. Water provides essential irrigation and transportation network and has been valuable in urban settlements. For example, "in the Middle Ages, trade attracted urban development along rivers and inlets, to sites which were highly vulnerable. Two kinds of town layout met the challenge: dike towns and dike-and-dam towns" (Kostof, The City Shaped: Urban Patterns and Meanings through History, 1991, p. 56). The Netherlands as a dyke society is a good example. This example was explained in detail in the "urban form and waterway relation". The 17th century marked the emergence of rational port urban planning in Europe. "This is the time of permanent commercial and naval fleets, a consequence of the establishment of far-flung colonial empires that stretched the boundaries of Europe to Southeast Asia and the Americas" (Kostof, 1992, s. 42). Port cities provided large trade networks due to the exploitation of the seas. As a result, the river channel connections were an important component of trade networks. After the late 19th century, new transportation technologies reduced the significance of the port cities. The railroads

[7] An assistant professor in urban design at Shahid Rajaee Teaching University in Teharan, Sina Razzaghi Asl asserted that *Qanats* affected the urban form and environment in an article titled "Perceiving and Exploring Multi-dimensional Roles of *"Qanats"* in Urban Sustainable Environments of Iran" (2017). Based on his analyses, *qanats* reflected the microscale formation of courtyards , and the development of street and neighborhood centers in urban scale. Although the first Qanat systems were 2700 years old, they still play a vital role in Iran (Katko, Juuti, & Tempelhoff, 2010).

offered a new transportation alternative. Then, in the 1950s, the freight trains were replayed by trucks. This transformed both ports and railways into urban wasteland (Kostof, 1992). After the 1960s, the waste coastlines and other wastelands were transformed in several cities, especially in the US. These transformation projects still continue to provide urban economic returns.

2.2 Shifting Relationship Between City and Water: Waterways as Flowscapes

Between the mid-18th century and the mid-20th century, the relationship between waterways and the city was gradually altered. As discussed in the *Rivers Lost Rivers Regained*, this change was mainly due to industrialization and urbanization. Hence, this led to a radical transformation (Knoll, Lübken, & Schott, 2017). Before the massive urban development and changes, natural features dominated the urban environment. However, rapid urban growth, industrialization, and population growth required more roads, buildings, and infrastructures, leading to pollution and environmental damages in and around the waterways. These effects were experienced globally in America, Europe, and Asia. Thus, creeks, streams, and rivers were largely converted into drainages and diverted into different paths. That led to the isolation and rejection of these riparian urban corridors (rivers, creeks, or streams). Then, the occupants of these corridors were also wiped out. In other words, the waterways and waterway habitats were progressively ignored in cities. Finally, in the late 20th century, a significant number of cities started to restore urban rivers. However, as indicated in the *Rivers Lost Rivers Regained*, "nowhere have urban rivers been restored to their preindustrial status—an impossible task anyway in most cities" (Knoll, Lübken, & Schott, 2017, p. 17). However, the relationship between city and water significantly started to improve due to social, economic, spatial, and ecologic urban attitudes.

In the 21st century, the meaning of the city is transformed and evolved, and it could be defined with the absolute integration of complex variable systems that always move and flow. According to Micheal Weinstock (Weinstock, 2013, p. 17),

> Considering the city as a dynamic complex system places emphasis on the interactions and connectivity of the flows through its infrastructures, and of the feedbacks and critical thresholds that drive the emergence of new spaces and urban morphologies that are animated by new modalities of culture.

The waterway infrastructure is an essential part of the above-mentioned dynamic and complex urban systems. As argued in the *Flowscape,* the transportation, green, and waterway infrastructures are analyzed based on the concept of flowscape as an operative landscape structure in the city, "… because they direct and facilitate urban development, stimulate social and ecological interaction and establish the relationship between process and form, between 'flows' and 'scapes'" (Nijhuis, Jauslin, & Hoeven , 2015, p. 24). In *Flowscape* (Nijhuis, Jauslin, & Hoeven , 2015, p. 29), the waterway infrastructure was explained as follows:

> Important issues here are coast and river management – including river modifications, seawalls, and floodgates – as well as the use of beach nourishment, sand dune stabilization, development of flood forests, and coastal/estuarine wetlands to create new multifunctional landscapes. It includes the planning and design of land reclamations, major flood control systems (dikes, levees, major pumping stations, and floodgates), drainage systems (storm sewers, ditches), major irrigation systems (freshwater reservoirs, irrigation canals), and also sewage collection and disposal of wastewater beyond their utilitarian use. Other important operations are planning and design of multifunctional flood defense structures, river landscape modifications, aquatic landscape development, freshwater storage, and supply landscape infrastructures, waterfronts, wastewater treatment plants, and adaptive water protection measures.

Even though the waterway infrastructure has an impact on the larger urban scale, Paul Edwards, in his essay "Infrastructure and Modernity", emphasized that the infrastructure is mostly invisible in daily life. We only notice them when they fail (Edwards, 2002). The waterway infrastructure is an urban connective and circulatory system. The waterway infrastructural flow always runs in the background in the urban domain to allow proper urban functions. Thus, it could be argued that the broken relationship between the city and the waterway led to social, ecological, and economic urban problems.

To resolve the broken relationship between the city and waterways, an increased number of large-scale urban transformation projects have been conducted globally

due to the adverse effects of rapid urban growth and the alarming environmental crisis. A significant urban infrastructure, the waterways play a key role in urban transformation. Urban development is concerned with the provision of industrial and economic needs, restoration of freshwater biodiversity, removal of pollution in rivers and lakes, provision of equal access to the water supply, sanitation of the water supply, and elimination of water-related diseases and epidemics. Thus, the significance of water protection, rehabilitation, reclamation, and management has increased gradually. The next chapter will analyze five cases to determine the strategies adopted by these projects, the contributions of these projects to the urban environment, and the new spaces developed during the integration of the waterway flow.

CHAPTER 3

LEARNING FROM THE PRECEDENTS: TOWARDS A CONCEPTUAL FRAMEWORK

In the chapter, five waterway revitalization projects were analyzed based on social, economic, ecological, and spatial urban attributes. The first project is the Seine River revitalization project that provided significant public utilities for Parisians. The second is the regeneration of the Queen Elizabeth Olympic Park in London, which constituted an economic urban catalyst. The third is the re-opening of the Oslo waterways, which developed an urban bridge for cross-cultural and cross-generational interaction and other benefits. The fourth case is the Cheonggyecheon Stream Regeneration Project in Seoul, and the fifth is the Little Sugar Creek Daylighting in North Carolina in the USA. All five projects entailed green ecological urban corridors. They provided wildlife habitats and biological diversity. However, each case is analyzed based on different concepts to determine the integration of the waterway flow and the city, the town, or the neighborhood.

3.1 Waterway as a Public Facility: The Sein River Revitalization

The Seine River "…extends over 76 000 km2, of which 65,000 km2 are upstream of its estuary, with the outlet of the basin located at Poses" (Flipo, Lestel, Labadie, Meybeck, & Garnier, 2021, p. 4). As seen in the figure, the waterway expands through a large region in Paris (Figure 3.1). The Parisians are strongly connected with the river due to historical geopolitical, geographic, social, economic, industrial, and agricultural benefits. However, pollution and urbanization broke the connection between the city and the river. Today, thanks to the revitalization project that was initiated in 1989, the Seine River was reconnected with the people and the city. The

program offered ample “opportunities for human and nature interactions,” while providing public facilities in riparian corridors of the Seine (Groffman, et al., 2003, p. 317).

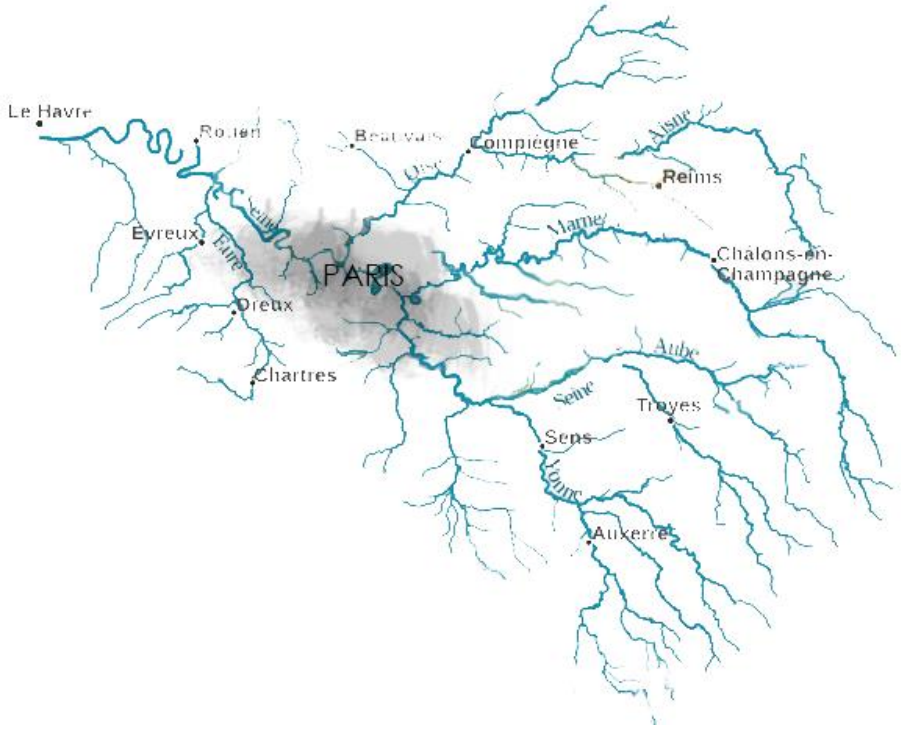


Figure 3.1. The Seine River Basin. Edited by the author (Flipo, Lestel, Labadie, Meybeck, & Garnier, 2021).

The Seine provides a gate to the English Channel for Parisians, and it was the only river port in France for centuries (Vadepied, 2012). Thus, industrial areas were located near the river. Furthermore, it was employed as a large irrigation reservoir for the highly productive agricultural areas around the river banks (Flipo, Lestel, Labadie, Meybeck, & Garnier, 2021). These factors indicate that the city has been shaped by its close relationship with the Seine River. However, the river was almost completely turned into a canal to improve agricultural benefits (rich alluvial soil), for better river navigation, and to avoid floods in the early 20th century (Poudevigne, Alard, Leuven, & Nienhuis, 2002). Thus, the relationship has been deteriorating for almost 150 years until the restoration program. In 1989, the chemical and ecological conditions in the Seine River were quite poor. The urban wastewater was discharged to the river without any or adequate treatment. Paris had long been populated,

deforested, and industrialized (Flipo, Lestel, Labadie, Meybeck, & Garnier, 2021, p. 17).

First, the biochemical and hydrological contributions of the program improved water quality. Studies conducted with historical data allowed the reconstruction of nitrogen circulation and associated water quality, fish population, and the contamination of the river by numerous and diverse legacy pollutants (Flipo, Lestel, Labadie, Meybeck, & Garnier, 2021, p. 14). The interaction between society and the environment improved after ecological and hydrological rehabilitation.

The revitalization program was gradually managed to construct permanent communication gateways and meeting places where people could meet and socialize. In a social sense, reclamation of the Seine River led to the development of public areas, wider pedestrian roads, relaxing beaches, and various social activity areas for the occupants. Since 2002, the Riverside has been used as a beach in the summer and included a swimming pool and boat anchorage facilities that host concerts (Vadepied, 2012). For example, the swimming pool at the Bassin de la Villette canal was transformed into an outdoor swimming space in 2017. The swimming pool at Luxigon is presented in the figure. Furthermore, the reclamation of the quays allowed the development of new public recreational spaces in Luxigon, Paris (Figure 3.2). The formation of two separate quay levels are free of motor vehicles and serve as a promenade and commercial zone (O'Sullivan, 2015). The Seine revitalization project has been developed and planned to serve various urban activities. During the Covid-19 pandemic in 2020, the Seine River continued to offer Parisians active public facilities, despite the closure of several indoor facilities worldwide. Based on the *My Modern Met* website, the River was employed as a floating movie theater. People watched the movies on the boats eating popcorn (Stewart, 2020). The Seine River was referred as the "social and economic heart of the Paris" in *the Seine River* (Flipo, Lestel, Labadie, Meybeck, & Garnier, 2021, p. 3). In 2018, more than 110,000 people swam only in the Bassin de la Villette canal, and four million people visited the area after one and a half years of renovation (O'Sullivan, 2015). Thus, in addition to ecologic and social benefits, this revitalization program contributed to the Parisian

economy. Furthermore, the visitors of Paris benefited from social spaces and activities.

Figure 3.2. Opening day in 2017 at the Bassin de la Villette swimming pool on the Canal de l'Ourcq in Paris. (Resource: https://www.curbed.com/2017/8/3/16089352/city-rivers-swimming-safe.

3.2 Waterways as Economic Catalysts: Queen Elizabeth Olympic Park

Queen Elizabeth Olympic Park is the second biggest regeneration project in the UK (Johnston, 2013). After serving 2002 London Olympics, the space was transformed into a public park. The central regeneration idea included the Stanford area in the lower reaches of the Lea river valley (Palmer, Ker-Reid, Venn, & Bruni , 2014; Shepherd, 2014). "The River Lea drains a catchment of approximately 1400 km2" (Palmer, Ker-Reid, Venn, & Bruni , 2014, p. 46). Before the regeneration, the area was one of the poorest and most deprived in the UK (ODA, 2008). The countryside in the Lea valley was a significant local industrial center, which included various manufacturing industries, wharves, warehouses, railways, and open spaces based on the 1943 map (Figure 3.4). The area became a part of a green and socio-economic

landmark (Brown & Brown, Siting re-assemblage: Queen Elizabeth Olympic Park, 2018). The aerial photo demonstrates the unique architecture, the bridges across the river, over 100 ha of gardens and wildflower meadows, playgrounds, and housing around the transformed area (Figure 3.3).

This project was different from the Paris Seine River Regeneration since it was conducted in two stages. In the first stage, the project aimed to provide facilities for

Figure 3.3. 1943 London's social and functional analyses map (Brown & Brown, Siting re-assemblage: Queen Elizabeth Olympic Park, 2018)

the 2002 Olympics. In the second stage, it was the development of a long-term, sustainable revitalization. In the article "Sitting Re-assemblage, Queen Elizabeth Park", it was reported that the park went through a double life: the first as an Olympic venue, and the second as the post-Olympic revitalization (Brown & Brown, Siting re-assemblage: Queen Elizabeth Olympic Park, 2018). The Olympic Delivery Authority (ODA) official website published two revised Olympic Master Plans. The first entailed the plans for the Olympic facility, and the second was the long-term legacy transformation (Master Planning and Town Planning, 2012). In this master plan, water was the baseline (ODA, 2008, p. 5). Prioritization of the waterside development was inherent in the Olympic Park Project (ODA, 2008).

The program also included microbiological and macroeconomic ideas, and horizontal and vertical compositions (Brown & Brown, Siting re-assemblage: Queen Elizabeth Olympic Park, 2018). The first determination criterion was the urban design and landscape framework, including the highways, street furniture guidelines, bridges, architectural requirements, abutments, retention walls, buildings, followed by water space master plan, biodiversity action plan, lightning strategies, and inclusive design strategies. After the parklands and public realm masterplan were completed, artistic and cultural strategies were defined (ODA, 2008). The new park occupancy types included navigation, freight, transportation, recreation, education, flood relief, and ecology (ODA, 2008, p. 5).

Figure 3.4. The view of the Queen Elizabeth Olympic Park from the south along the River Lea in 2014 (Palmer, Ker-Reid, Venn, & Bruni , 2014).

It was remarkable to observe that the post-Olympic program served as a long-time socio-economic catalyst for this site and east London. That was not only due to the included social recreation programs in the area, but also due to the increase in the number of new homes, developments in transportation and social infrastructure, new business spaces, world-class sporting venues and facilities, and the largest urban shopping center in Europe. “In the first tranche of work, some 2800 homes including 1379 affordable housing units will be provided… To help ease London's housing

shortage there will be about 8,000 new homes… There is further housing development to come with about 3000 further homes to be built" (Shepherd, 2014, p. 2). It included five new neighborhoods which provide 130 000 square meters of employment space (Ramsey, 2013). "Stratford is now a well-connected area of London, which allows commuters to travel to work easily. New jobs in construction and tourism have created a multiplier effect. It is estimated that over 20,000 jobs could be created by 2030, bringing more than £5 billion into the area" (Urban change in the UK, 2021, s. 3). According to LLCD Strategies, Stratford is becoming a new metropolitan center, rebalancing the city eastwards. Queen Elizabeth Olympic Park Project is one of the capital's leading attractions as a destination for domestic and international visitors alike (LLCD, 2016). Nearly four million people visited the Park in 2014. Six million people are estimated to visit the Park in 2018 (LLDC, 2018; LLCD, 2016). These facts evidenced that the Queen Elizabeth Olympic Park Project serves as an economic catalyst in east London. Thus, the final waterway revitalization project had a significant contribution to the economy despite the cost of construction.

3.3 Waterways as Urban Bridges: Reopening the Waterways in Grorud Valley

Re-opening the waterways in Grorud Valley was launched for sustainable urban development and to improve the living conditions in the region. It started in 2007 and ended in 2016. "The Grorud Valley is an area in which a quarter of all inhabitants in Oslo live, which is about 130 000 inhabitants (Gjorv, 2014, p. 4)." In a broad sense, the reopening of the Oslo waterways program included ten main waterways, 345 km of rivers and streams in Oslo (European Commision, 2018). The project covered four districts; World Park at Furuset in Alna District, Bjerkedalen Park in Bjerke District, Grorud Park in Grorud District, and Line Park in Stovner District. In all four districts, revitalization of the waterways contributed to the increase in recreational spaces, mitigation of the flood risk, improvement of water quality,

biodiversity, resistance to climate change, and public health (European Commision, 2018; Oslo Reopening Waterways, 2018). Unlike other regions, Grorud Valley played the role of an urban bridge and introduced several innovations to the region in terms of social integration. Its location is near Oslo's urban center (Figure 3.6).

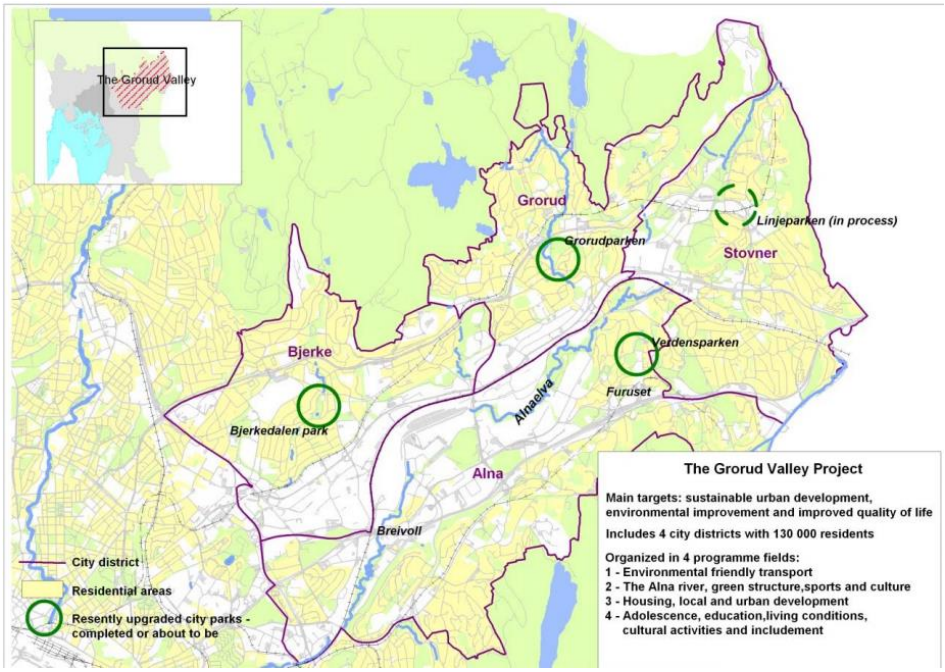


Figure 3.5. The Grorud Valley in Oslo (European Commision, 2018).

Before the transformation, the waterways were considered as an obstacle to effective development due to emissions pollution and sewage system leaks (Oslo Reopening Waterways, 2018). Thus, until the 1980s, most waterways were culverted into pipes (Oslo Reopening Waterways, 2018). Gjorv indicated that "the urban development of the valley has for years been dominated by transportation, both railroad, lorries and private cars commuting to the suburbs of Oslo…The traffic creates physical barriers and environmental problems like noise and air pollution" (Gjorv, 2014, p. 3). Furthermore, the increased flood risk due to climate change triggered the re-opening of the waterways in Oslo (Oslo Reopening Waterways, 2018).

From a social perspective, the inhabitants can enjoy recreational spaces to improve their well-being in the new environment. "The projects have invited the locals to

participate throughout the planning process via workshops, seminars, public meetings and exhibitions" (Oslo 2019 Application, 2019, p. 8). Near the Grorud valley, there were various neighborhoods occupied mainly by foreign roots. These immigrants were individuals "who have quite recently moved to Norway, who have not yet understand or speak Norwegian and not yet have a social network in their new neighborhoods." (Gjorv, 2014, p. 1) However, the project provided a common space for all neighborhoods due to several social, and educational activities. Therefore, "people with different languages and across generations, can meet and make friends with their neighbors." (Gjorv, 2014, p. 12) While creating a blue-green infrastructure, the area became a space for play, work, and socialization as presented in figure 3.5. The re-opening projects serve as an urban bridge and present several cross-cultural and cross-generational interaction opportunities.

Figure 3.6. Grorud Park, Grorud Valley (Gjorv, 2014)

3.4 Waterways that Revive Memories: Cheonggyecheon Stream Regeneration

Daylighting in the Cheonggyecheon Stream is one of the impressive transformation projects in Seoul. The project extends over 5.8 km and the transformation started in

2000 and ended in 2005 (Figure 3.8). Before the stream was daylighted, the water and natural environment quality were poor. Thus, the area was culverted and buried underneath a 12-lane highway. In the daylighting project, the highway was decommissioned, and a new river channel was excavated (Case Study: Cheonggyecheon; Seoul, Korea, 2021). Finally, a green, ecological riparian corridor was developed and the area recuperated the identity of a gathering and socialization space for the residents (Figure 3.9).

Figure 3.7. Cheonggyecheon Stream master plan. The grey area demonstrated the revitalized area (Lee, 2006).

The Cheonggyecheon Stream occupies a prominent space in the memories of Koreans (Cheong Gye Cheon, 2009). It included main urban roads and avenues until the 20th century (Jeon & Kang, 2019). "The stream marked a border between the northern and the southern parts of the city, where the aristocrats and the commoners lived, respectively…Thanks to its central location, the Cheonggyecheon provided a space for social gathering and collective seasonal activities like kite flying" (Jeon & Kang, 2019, p. 740). However, this stream was covered in the early 1900s for military, sanitary, and flood management purposes. The transformation was completed in 1958. Then, the highway was elevated in the 1970s (Chung, Hwang, &

Bae, 2012). All these developments broke the link between the waterway and the city. “While the express-way has played a positive role as the principal downtown arterial road, it has negatively influenced the city of Seoul” (Chung, Hwang, & Bae, 2012, p. 165).

Figure 3.8. The original Cheonggyecheon stream. The women washing clothes and the children playing in the original stream (Kim E. J., 2018).

In the Guardian newspaper, Colin Marshall (2016) reported that before the Cheonggyecheon Stream revitalization project, “one survey conducted by the Seoul city government indicated that 79.1% of residents supported the Cheonggyecheon revitalization.” This survey is an important detail since the occupants played an essential role in the transformation process. Finally, in the daylighting project, a 5.8 km section of the road was dismantled and the stream was uncovered in 2005 (Chung, Hwang, & Bae, 2012). The project created a green belt with a waterfront and ecological biotope extending from the west to the east (Lee, 2006). This environment-friendly space improved the quality of life and recovered historical and cultural assets (Lee, 2006). Eyun Jennifer Kim (2018), in a Ph.D. thesis titled “History, Narrative, and Production in the Cheonggyecheon Reconstruction” reported the following:

> The park has provided the city center with green space, helped the city become more pedestrian-friendly and gain an image of environmental

progressiveness, and contributed to the revitalization and rewriting of the city's history and identity.

Designed by the South Korean landscape architecture firm SYNWHA, the historical markers displayed on the walls include black and white photographs of the site as seen in the photo of women washing clothes in the original stream (Kim E. J., 2018, p. 13) (Figure 3.7). Thus, the Cheonggyecheon Stream was transformed into an urban park that allowed the revival of past memories of the area as a gathering and recreational space. As a result, the relationship between water and the city was enforced.

Figure 3.9. Before and after the daylighting project in Seoul (Kim & Jung, 2018).

3.5 Waterways as Green Riparian Corridors: Little Sugar Creek Daylighting

In 1966, the Charlotte-Mecklenburg master plan, which was one of the oldest recreation plans in North Carolina and the southeastern United States, was proposed. Officially the master plan was developed in 1980 and included a 73-mile network of trails through 14 creek corridors (Mecklenburg County Parks and Recreation Greenway Plan Update 2008, 2008). The plan was considered "…as 'green necklace' of creeks around the County that would address multiple objectives, including habitat conservation, recreation, alternative transportation, mitigation of flooding, and

protection of water supply" (Mecklenburg County Parks and Recreation Greenway Plan Update 2008, 2008, p. 1). In 1999, the plan updated the Greenway Master plan, and the Little Sugar Creek daylighting became a part of the master plan (Mecklenburg County Parks and Recreation Greenway Plan Update 2008, 2008) (Figure 3.11). "Little Sugar Creek and its major tributary, Briar Creek, drain 132.09 km2 (51 square miles)" is "in and around Charlotte, North Carolina (USA)" (Buchholz, Madary, Bork, & Younos, 2016). Today, the Little Sugar Creek Greenway daylighting project enhanced water quality and health of the stream, natural habitat through a green riparian corridor in North Carolina, USA.

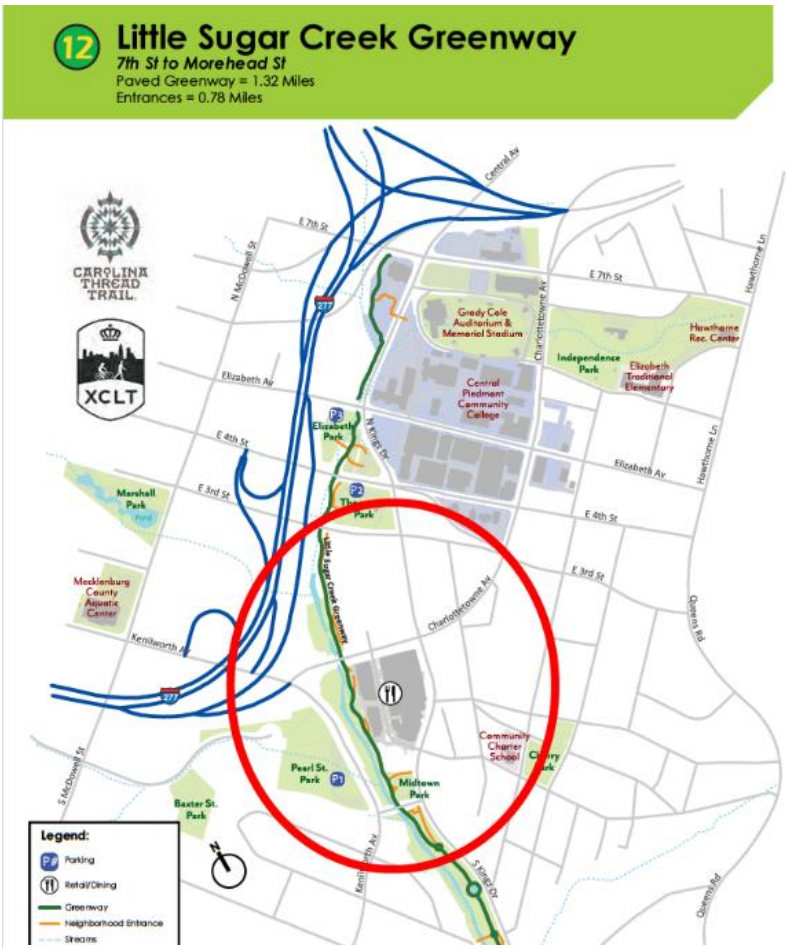


Figure 3.10. One section of the Little Sugar Creek greenway. The photos are taken in the red line area (Little Sugar Creek Greenway & Stream Restoration, accesed 2021).

As Newsom indicated, before the Little Sugar Creek daylighting project the creek was dead, considered a sewer and a scourge by the residents (Newsom, 2015).

Buchholz noted that it was historically maintained as a flood control channel, and most banks were solidified to stop erosion due to high flow velocity. Finally, the creek was buried underground for commercial reasons (Buchholz, Madary, Bork, & Younos, 2016). As mentioned by Barbara Doll, water protection and restoration specialist at North Carolina Sea Grant, "…around the 1970s, nothing was living in this stream" (Doll). In those years, the residents and industry areas utilized the nearby waterways (Angione, 2007). She emphasized that the creek was polluted and the quality of the water was extremely poor. The residents were unaware of Little Sugar Creek. In 1959, the Charlottetown Mall parking lot was built on top of Little Sugar Creek (Buchholz, Madary, Bork, & Younos, 2016, p. 149). Little Sugar Creek's

Figure 3.11. The Little Sugar Creek before and after the construction, Meredith Moore, Mecklenburg County Storm Water Service (Buchholz, Madary, Bork, & Younos, 2016).

proximity to the oldest neighborhoods led to the pollution of the stream due to sewage and industrial chemical waste discharge by the residents, the businesses, and the government (Newsom, 2015).

In the project, the creek floodplains were also re-developed. The creek was transformed into natural channels that included wetland ponds, stream stabilization banks, meandering turns, and natural ponds for insects and fish (Angione, 2007). The riparian corridor habitat was conserved and the flood risk was mitigated. The section that remained under the parking lot was dug up, daylighted, and vegetated (Angione, 2007). "Greenways are being built alongside the restored waterways for pedestrian and cyclist enjoyment, as well as educational opportunities (Angione, 2007, p. 18)."

This greenway network that was integrated with the Little Sugar Creek provides an attractive, safe, accessible space for individuals to bike, hike, jog, and skate (Mecklenburg County Parks and Recreation Greenway Plan Update 2008, 2008) (Figure. 3.10). It also supports alternative transportation means and provides a safe space for outdoor activities. “The researchers examined all types of crime and concluded that the subject of violent crime could not be addressed because virtually no violent crime was recorded during the 10-year period” (Mecklenburg County Parks and Recreation Greenway Plan Update 2008, 2008, p. 4) In addition to flood control and improvement of water quality, the Little Sugar Creek Daylighting project, which was a part of the Greenway Master Plan, integrated blue and green infrastructure, providing an excellent atmosphere for recreation and wildlife habitat. The stream network became a green riparian corridor in the city (Figure. 3.10).

Finally, although these five projects are implemented in different geographies and scales, they share several common properties. First, the main problem was similar in all regions: pollution due to urbanization and industrialization. Due to these factors, most rivers were covered and lost former functions. This led to the disconnection between the city and the waterways. To solve this problem, the development of reclamation projects was another similarity. These aimed to improve water quality and produce solutions for wastewater discharge that polluted the water and introduced improvements that required hydrological and biological expertise. In other words, it could be suggested that the second similarity between these projects included the improvement of water quality, their contribution to nature, the revitalization of the lost habitat, and the development of a space integrated with the green infrastructure in the region. The third similarity was the measures adopted to control the flood risk. Thus, the projects proposed adequate design strategies such as preventing construction in flood plains and flood control measures and solutions that required engineering expertise. The fourth similarity was the fact that all projects were long-term and required quite extensive investments. However, as it was discussed in a thesis by Özge İdalı Özden, these projects turned out to be economical in the long-term (Özden, 2020). The fifth similarity was the fact that all projects required a multi-disciplinary approach. The biology, engineering, architecture,

landscape, and hydrology experts had to work in collaboration. The sixth similarity was the fact that all projects offered open public spaces for the occupants.

The challenges encountered in these projects included high costs and long-term returns, and the risk of gentrification. Since they improved the regions' spatial and social well-being, they improved the regional advantages. For example, the apparent increase in housing projects around the Olympic Park project and the real estate market demonstrated success in the transformation of the neighborhood. Advantages, Challenges and technical properties of the Projects are indicated the table below (Table 3.1)

Table 3.1. The precedents studies's characterstics.

	Sein River in Paris	**Queen Elizabeth Olympic in London**	**Grorud Valley in Oslo**	**Cheonggyecheon Stream in South Korea**	**Little Sugar Creek in North Carolina, USA**
Project Year	1989- 2017(Swimming pools)	2002- ?	2007- 2016	2000- 2005	2006–2007 (design); 2008–2010 (construction)
Total Revitalization Area	76000 m (Three pool range more than 1579.35 m^2)	1300 m length (Lea River)	17000 m (Alna River)	13700 m (61 $km^{2)}$	1810.51 m of stream restored
Removed Culvert	-	-	237 m culverted area is removed	5400 m of concrete removed	685.80 m of concrete cap removed +174.65 m^2 of parking lot surface cover removed
Advantages	*Public Facility* - New social, recreational public areas -Transportation -Economic benefits to the city - Improvement of water quality and bio-diversity - Ecological progress - Mitigation the flood risk	*Economic Catalyst* -New housing areas -Economic benefits to the city - Helping transportation - New social, recreational public areas - Improvement of water quality and bio-diversity - Ecological progress - Mitigation the flood risk	*Urban Bridge* -Social integration - Educational areas - Improving the living conditions of the areas - New social, recreational public areas - Improvement of water quality and bio-diversity - Improving air quality - More relax and quite places - Ecological progress - Mitigation the flood risk	*Reviving Memories* - Ecological progress - New social, recreational public areas - Improvement of water quality and bio-diversity - Economical returns - Improving air quality by creating wind corridor in the city - Mitigation the flood risk	*Green Riparian Corridor* - Ecological progress - New social, recreational public areas - Improvement of water quality and bio-diversity - Mitigation the flood risk
Challenges	-High cost -Long-term returns (swimming in the Seine River will be possible in 2024 due to the cleaning need much time)	-High cost -Long-term returns -Gentrification risk (due to increasing high qualified housing around the project)	-High cost -Long-term returns -Traffic problem (solved by incentivizing public transportation)	-High cost -Long-term returns -Noise and dust (During construction) -Traffic problem (solved by incentivizing public transportation) - business decline (during construction)	High cost Long-term returns

CHAPTER 4

RE-THINKING THE STREAMS IN ANKARA

In history, the presence of various local waterways was one of the main characteristics of Ankara. Even today, although the rich waterways in Ankara are not recognized, the strong relationship between the streams and the city could be found in historical resources. Similar to the global examples as mentioned in Chapter III, the streams in Ankara were imperiled in time due to rapid urbanization, population growth, and industrialization. Once, streams had organic and robust ties with the city and urban residents; however, this link has gradually been broken over time. Currently, people do not realize that they walk over a network of streams, each progressively culverted as the city developed. Ankara's unique history would provide a clear perspective to understand the shifting of the urban waterways.

In the present chapter, the relationships between Ankara and urban waterways are discussed in three phases. Thus, we will observe the transformation in the significance of waterways in time and the impact of these transformations on the urban fabric. The first phase reviews the pre-20th century in Ankara. The flow of the Ankara Stream defined a *natural urban habitat*. Residents used to enjoy the streams and frequently occupied the banks in daily life to drink the water, and for irrigation, washing the famous Angora goat wool, and recreational purposes. During the first half of the 20th century, the stream network constituted a *landscape fabric* in Ankara. The routes of the streams included gardens and recreational areas. The city grew; however, the organic relationship between steams and the inhabitants was maintained. After the proclamation of the republic, the urban plans developed by Jansen and Lörcher effectively followed the waterways. Furthermore, the photographs and publications of the period reflect the condition of the waterways. Since the second half of the 20th century, the streams were transformed into *sewage*

channels in Ankara. In this period, the waterways have been radically transformed due to rapid urbanization, population growth, and the lack of effective infrastructure. The sewage was drained into the streams. Roads were constructed over certain streams. On the other hand, the uncovered streams became destitute areas in the city. This transformation was not observed only in the urban center but also in the rural and suburban areas.

In *Suda Suretimiz Çıkıyor* (2012), Tamur mentioned three main streams in Ankara. These included Çubuk Stream, Hatip Stream, and İncesu Stream. Çubuk Stream runs from the northeast, Hatip Stream runs from the east, and İncesu Stream runs from the southeast towards the city. Bent Stream and İncesu Stream merge. After a short distance, the stream formed by these two streams merges with the Çubuk Stream downstream of Akköprü Bridge. Then, Çubuk Stream is called Ankara Stream. Simply, Ankara Stream is fed by three tributaries; İncesu Stream, Çubuk Stream, and Hatip Stream, in addition to several minor streams and waterways. Ankara stream leaves Ankara Pot towards the west, passing through the Sincan district. Finally, it flows into the Sakarya River about 130 km after it leaves Ankara. According to Ankara's geographical map, Yavuz has drawn most of the waterway systems in Ankara with their names in her thesis (Figure 4.1). There are also large and small streams such as Bülbül Stream, Kavaklıdere Stream, Hoşdere Stream, Kirazlıdere Stream, Cevizlidere Stream, Dikmen Stream, Kutgun Stream, Macun Stream, and Hacı Kadın Stream (Figure 4.1). In the next section, the transformation of the waterways from natural habitats to landscape fabric, and from landscape fabric to sewage channels in Ankara is discussed.

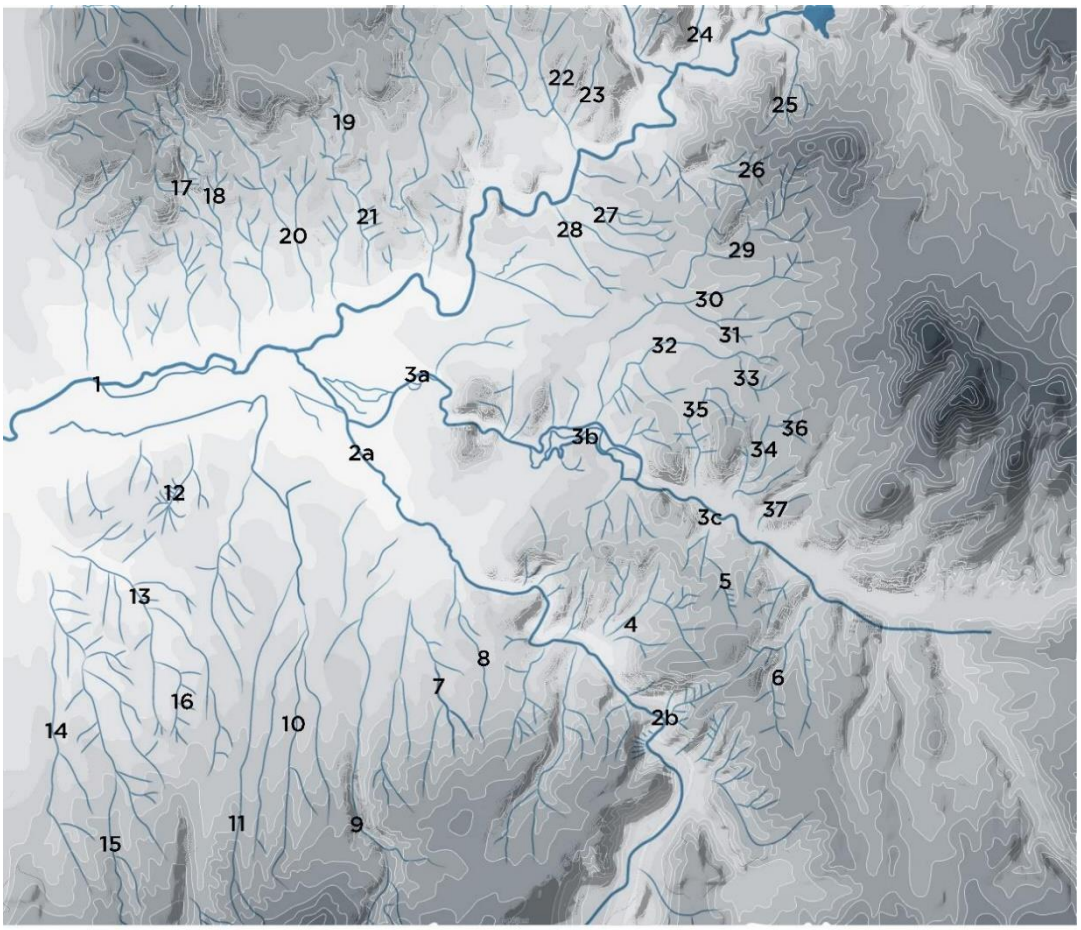


Figure 4.1. The stream system of Ankara. (Yavuz, 2018)

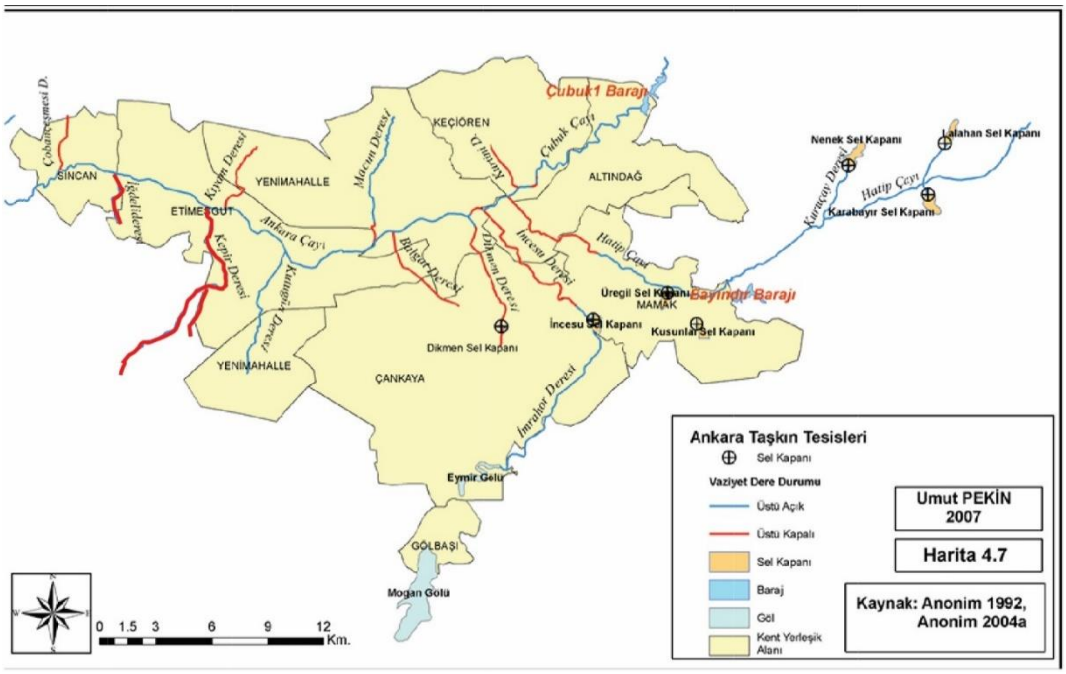


Figure 4.2. The stream network in Ankara and flood straps. The blue ones flow on the surface, the red ones are culverted and flow under the asphalt (Pekin, 2007). Edited by the author.

4.1 The Streams as Natural Habitats

The streams are prominent topographic features in Ankara, and they have had significant effects on urban formation since the first urban settlements. Before the 20th century, several civilizations have settled in Ankara. These settlements seem much related to natural elevations and waterways. For instance, according to Ela Alanyalı Aral (Aral, 2017), the location of Phrygians tumulus, one of the oldest settlements remains, dates back to the 8th century BC. The sketches of the tumuli drawn by R. C. Thomson demonstrate that the tumulus was located in stream valleys and waterway banks (Figure 4.2). However, "Ankara tumuli have been demolished and /or destroyed to a large extent throughout the fast urbanization process since the early Republican period" (Aral, 2017, p. 22). Another example is the location of the

Ankara Castle[8]; it could be observed that Hatip and Bent streams surround the Ankara Castle. Kostof argued that the first settlements benefited from the riverbank location (see chapter II). It was a reasonable choice due to the topographical shelter and proximity to the water.

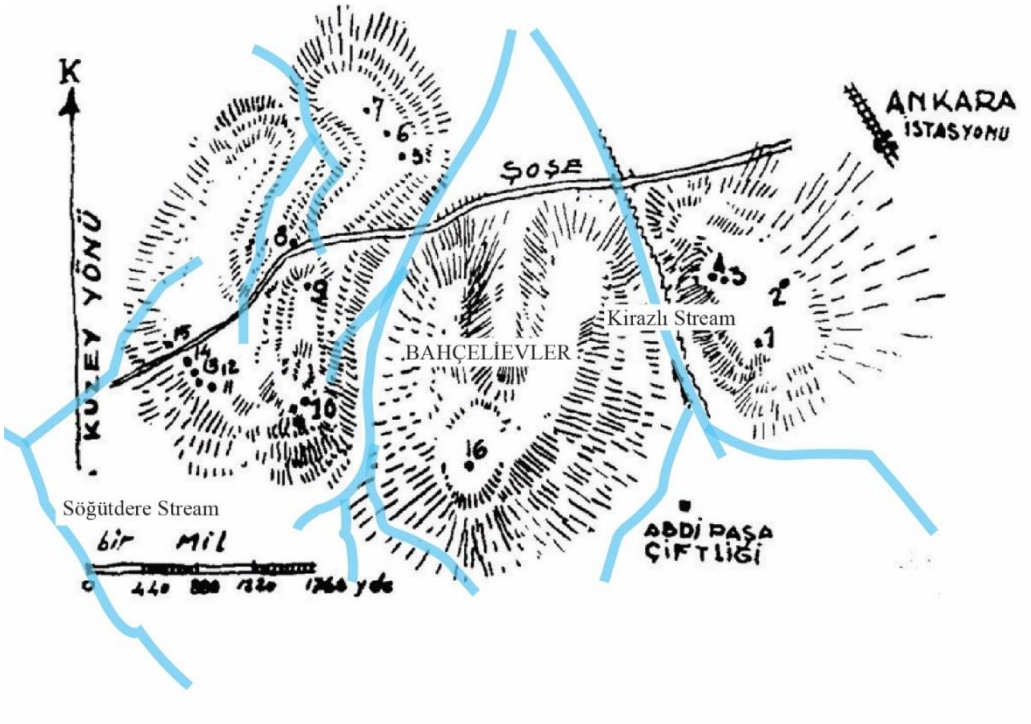


Figure 4.3. Thompson's topographical drawing of western Tumuli (Özgüç and Akok 1947:55) . The stream locations are edited by the author.

There are only a few pre-20th century documents that illustrate the relationship between the stream and the city. However, during the 16th and 17th centuries, travelers such as Dernschwam (1494- 1568), Evliya Çelebi (1611- 1685), and Tournefort (1656- 1708) mentioned that there were abundant streams in Ankara

[8] Ankara Castle is one of the most important urban symbols of Ankara. Although it is not clear when it was built, it was repaired several times by the Romans, Byzantines, and Seljuks and survived until today.

(Ankara Keçisi, Tiftik ve Sof, 2018). Hungarian researcher Dernschwam also wrote that the residents washed the famous Angora goat wool in these streams and mentioned that there were several fast-flowing streams in Ankara (Ankara Keçisi, Tiftik ve Sof, 2018, p. 48). Dernschwam's sketch shows the Ankara Castle, nearby houses, and the Bent stream that flows down the slope (Ankara Keçisi, Tiftik ve Sof, 2018, p. 49) (Figure 4.3). Furthermore, Dernschwam reported that he and his friends bathed in Sakarya River on the confluence with Çubuk stream (Ankara Keçisi, Tiftik ve Sof, 2018). Çelebi stated the following on Ankara waterways and water springs: "…the spring waters flow and gurgle"[9] in Seyahatname, written in 1630. In the second half of the 17th century, French naturalist Tournefort mentioned the inscriptions located around the Çubuk stream in the outskirts of Ankara (Ankara Keçisi, Tiftik ve Sof, 2018, p. 62).

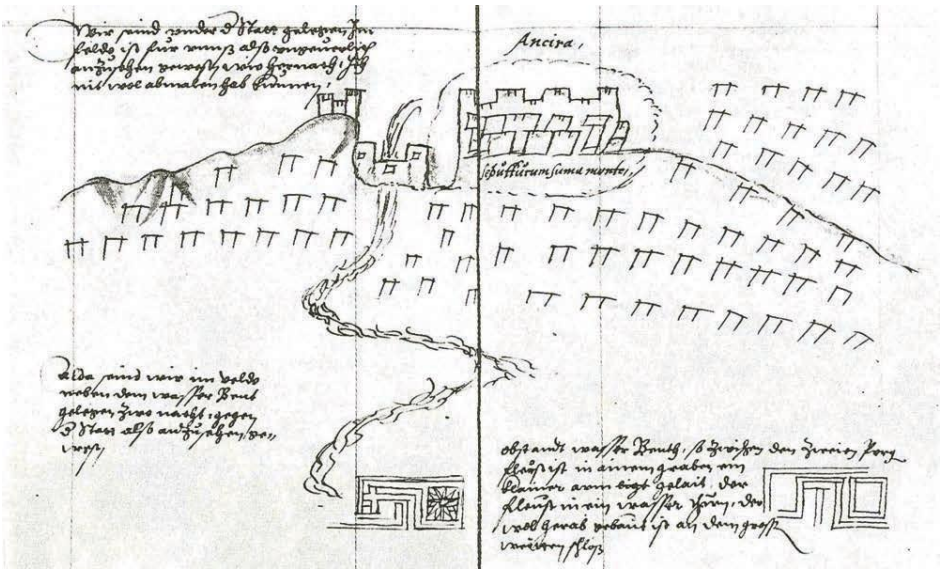


Figure 4.4. Dernschwam's sketch depicting Ankara Citadel, nearby houses, and Bent stream about 1500 (Eyice, 1972).

A painting of Ankara in the 1700s exhibits similar features (Figure 4.4). Bent stream and mohair wool production could be observed in the stream. The painting reflects

[9] The original turkish version is that statement: "...kaynak suları akar ve çalar".

the integration of the stream with the green habitat. Trees could be observed in both banks. The stream and stone bridges enforce the urban landscape.

Despite the abundance of streams, Ankara experienced difficulties in water supply in certain periods. Ankara is arid in summer due to the climate. In "Bir Zamanlar Ankara" (1994), it was mentioned that Ankara also experienced water supply problems due to its geological structure. The Romans supplied water from Elmadağ to the Ankara Citadel via stone aqueducts. However, these were transformed into castle walls in later periods. Paul Lucas, who visited the Augustus Temple in 1705, mentioned a water shortage due to the 6-month drought. Abidin Pasha brought water from Elmadağ to Ankara, which struggled with famine intermittently until the late 19th century (Bir Zamanlar Ankara, 1994).

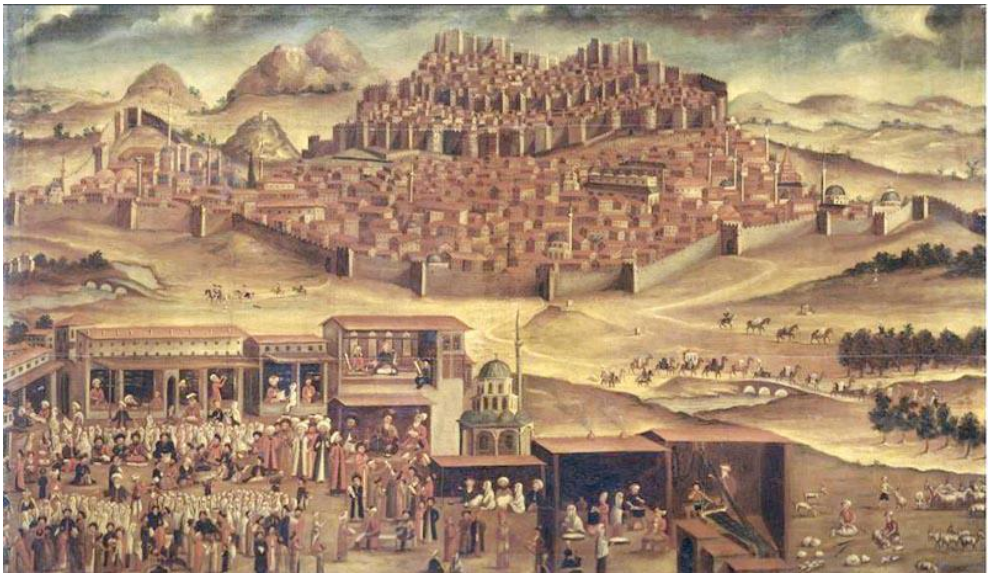


Figure 4.5. View of Ankara, oil on canvas, 117 x 198 cm (Anonymous, 1700-1799).

Based on available historical references on Ankara, the city was settled on waterway banks since antique times. In 1839 Ankara map (Figure 4.6), drawn by Von Vincke, gives extensive information about the geography of Ankara, the waterways relation with the city, urban fabric, street pattern, and significant public structures, and rural fabric (Yavuz, 2017). It is easy to comprehend that Bentderesi and the Hatip Stream merge and flow through the western part of Ankara Stream. Besides that, "it is visible through the map that the agricultural lands are irrigated through *Bentderesi* on the

northwestern edge of the city" (Yavuz, 2017, p. 308). Therefore, before the 20th century, the streams defined the unique urban character. They provided drinking and irrigation water, recreational facilities, and allowed the residents to wash Angora goat wool. Thus, they were an essential and visible part of the city. The steams provided a natural habitat which was very characteristic of Ankara.

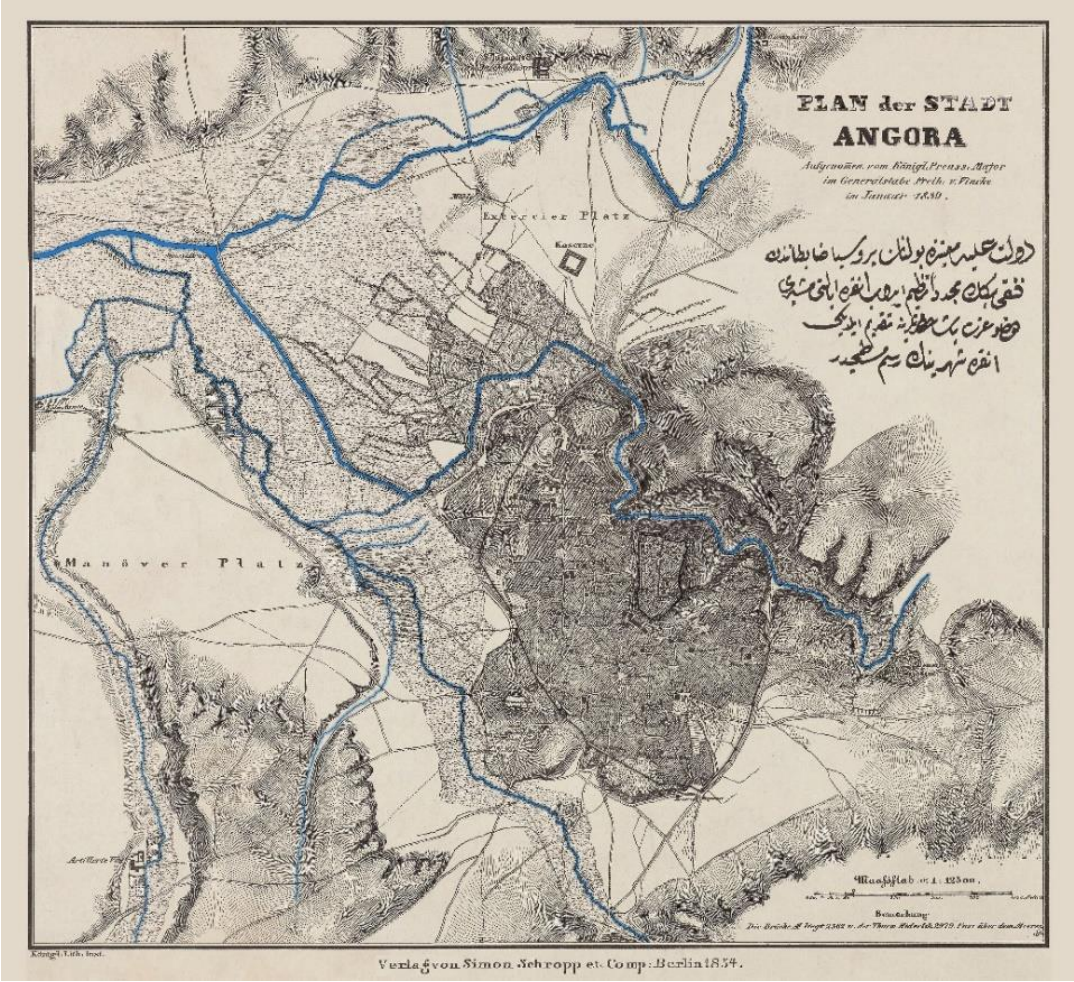


Figure 4.6. The earliest Ankara map prepared by Von Vincke, 1839 (Yavuz, 2017)

4.2 The Streams as Landscape Fabric

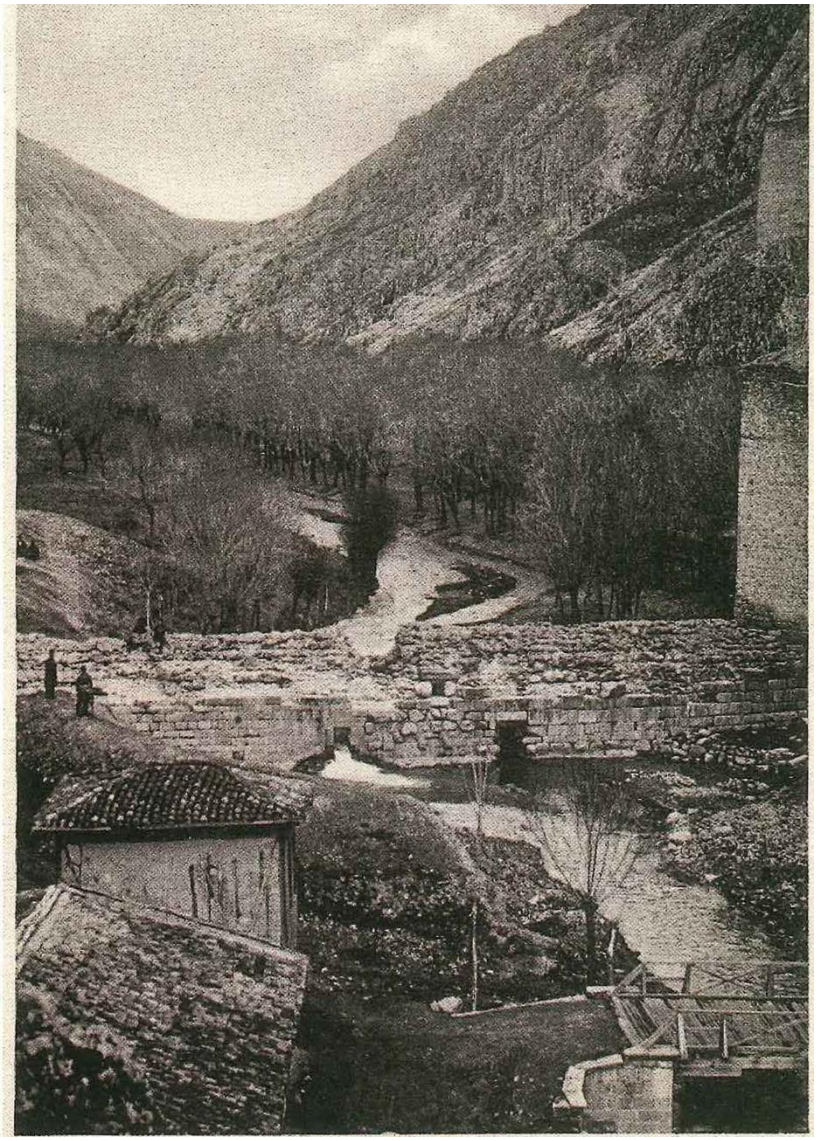


Figure 4.7. The Roman Dam in a "Moughamian Freres" postcard from early 1900s (Tamur, 2012).

In the first half of the 20th century, the streams constituted the landscape fabric in Ankara. The article "The Changing Conceptual Framework of the Urban Landscape: Reflections on Ankara" argues that Ankara has a designed holistic landscape texture, especially in the republican period (Bütüner & Sert, 2021). This led to an environment where the past habits such as promenading, picnicking, recreational facilities were maintained, and women could still wash their clothes, and children

could swim and play. They were beautiful urban spaces (Figure 4.5). After Ankara was declared the capital of Turkey, Ankara provided an urban model for the rest of Turkey. Thus, since the early years of the republic, the government has aimed to develop a planned and modern city in Ankara. Due to urban planning, Ankara played a key role in the development of urbanism and modernity. After World War I, the population of Ankara was still small. Ankara was a developing and growing city. The first urban plan was developed by Carl Christoph Lörcher for Ankara in 1924. Then, the Jansen urban plan was designed by Hermann Jansen in 1928 and the implementation was initiated in 1932. The documents for these two plans could help convey the transformation of the urban waterways. In addition to the urban maps, photos and published documents demonstrate that the water canals were still visible. However, they started to disappear during the 1960s.

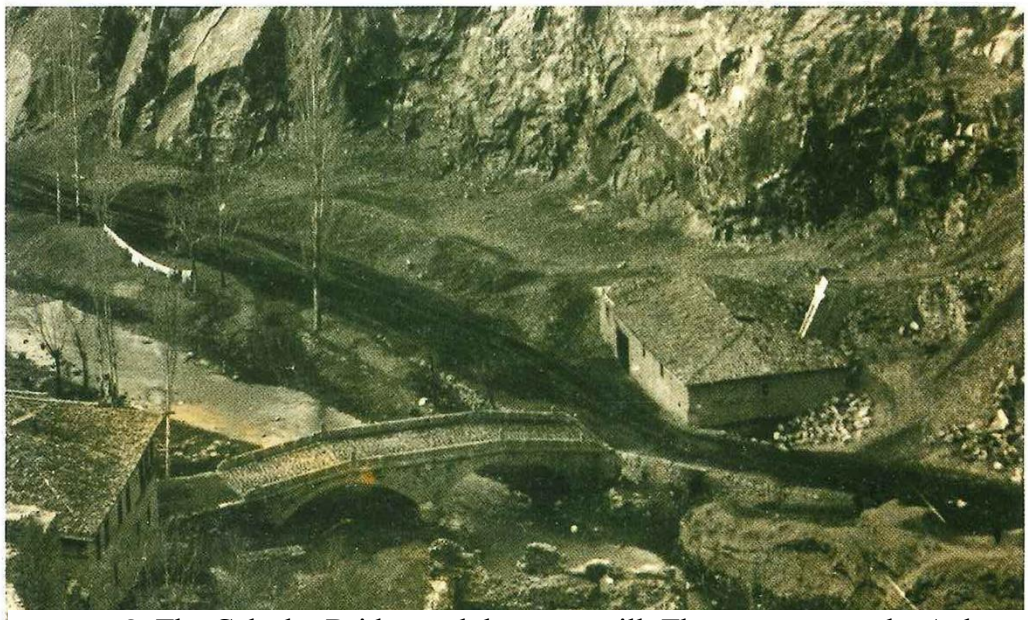


Figure 4.8. The Çakırlar Bridge and the watermill. They are next to the Ankara Citadel. It was taken from Altındağ side, around 1930 (Tamur, 2012, p. 51).

As mentioned by Günel and Kılcı, "during the War of Independence, military officers of the Department of Mapping coming from Istanbul prepared a scaled map of Ankara city" (Günel & Kılcı, 2015). A review of the 1924 urban map would demonstrate that the blue and green axes worked together. In the detail presented in Figures 4.6 and 4.7, it is impossible to ignore the intimate relationship between the city and the water. The waterways flow to the urban center and several watermills

and bridges could be seen on the map. It could be observed that the green and agricultural areas, and swamps followed the flow route of the stream. The streams encircled the settlements in the area called Ulus today.

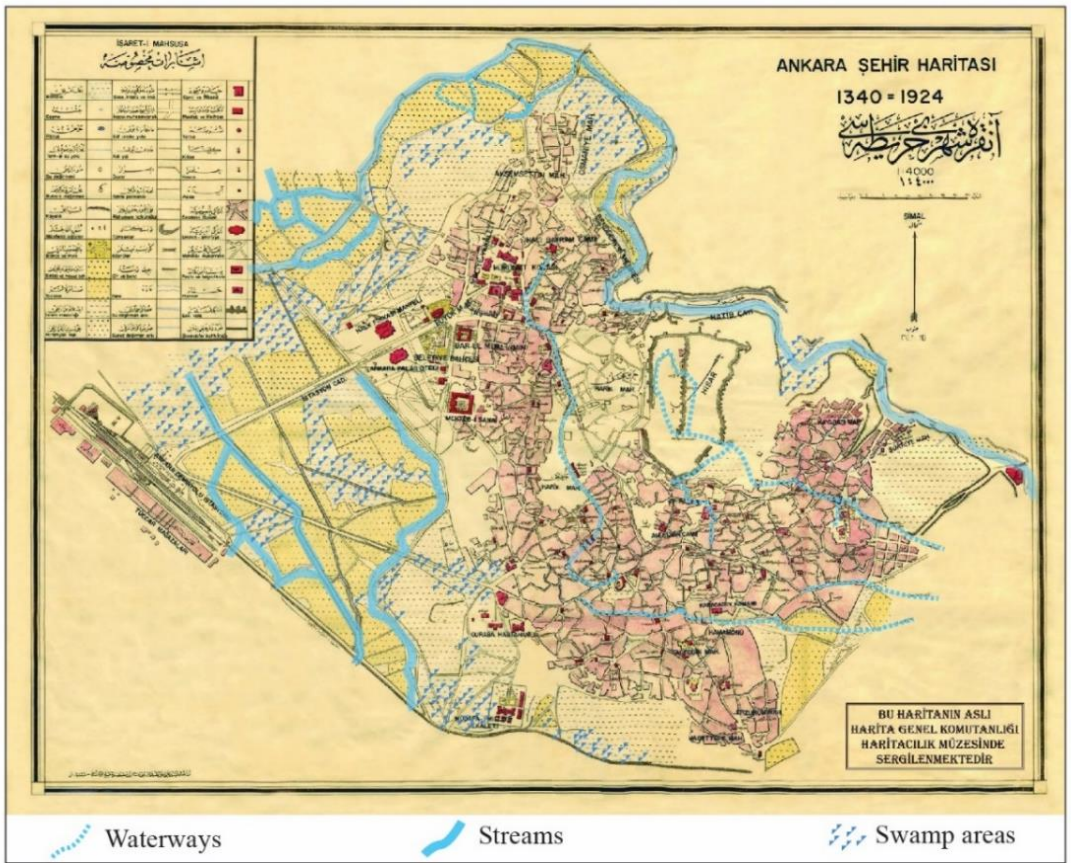


Figure 4.9. 1924 Ankara Map (Günel & Kılcı, 2015). In the map, the waterways, pools, swamps, and fountains are depicted in light blue, buildings and building parcels in light pink, parks and gardens, fields, and vegetable gardens in light green. It is edited by the author.

Another map that could provide information is the Lörcher plan, the first urban plan for Ankara. It was the foundation of the current Ankara urban plan. According to Cengizkan, Ankara was developed purely based on the Lörcher Plan until 1928:

> The branches of the Ankara Stream, which defines the settlement boundaries of the old Ankara and draws the settlement area of the plain, are considered green areas and green bands in the Lörcher Plan. Bentderesi Valley marks the border, especially in the north-east of Old Ankara; with ponds, rented

gardens, and city gardens (parks), the city becomes an area to breathe (Cengizkan, Ankara'nın İlk Planı 1924-25 Lörcher Planı, 2004, p. 84).[10]

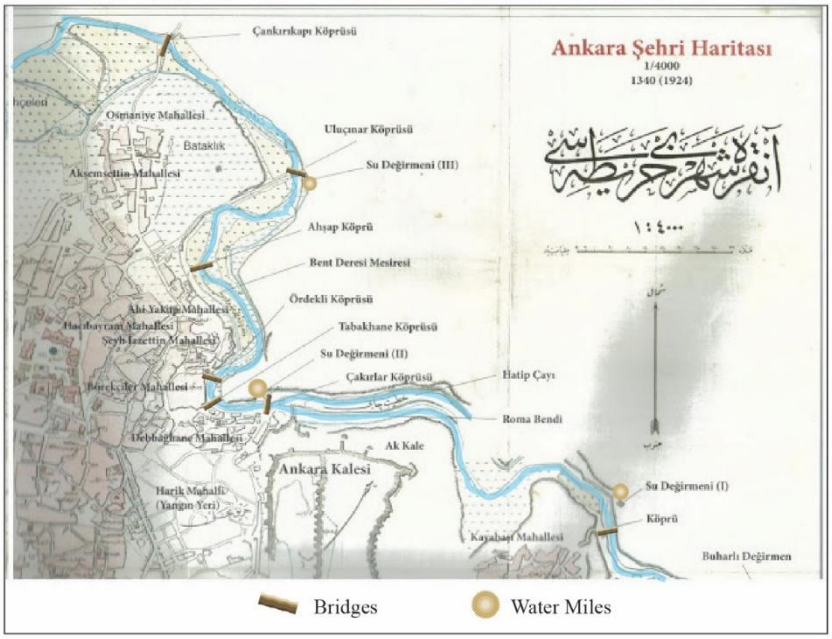


Figure 4.10. Bendderesi Stream and surroundings, detail from 1924 Ankara urban map. The map is edited by the author.

Lörcher plan depicted the waterways, which were strongly connected with the recreation areas in the city. It could be observed that the streams had the potential to change the arid fate of Ankara (Cengizkan, 2004, p. 147) (Figure. 4.9).

[10] Translated by the author.

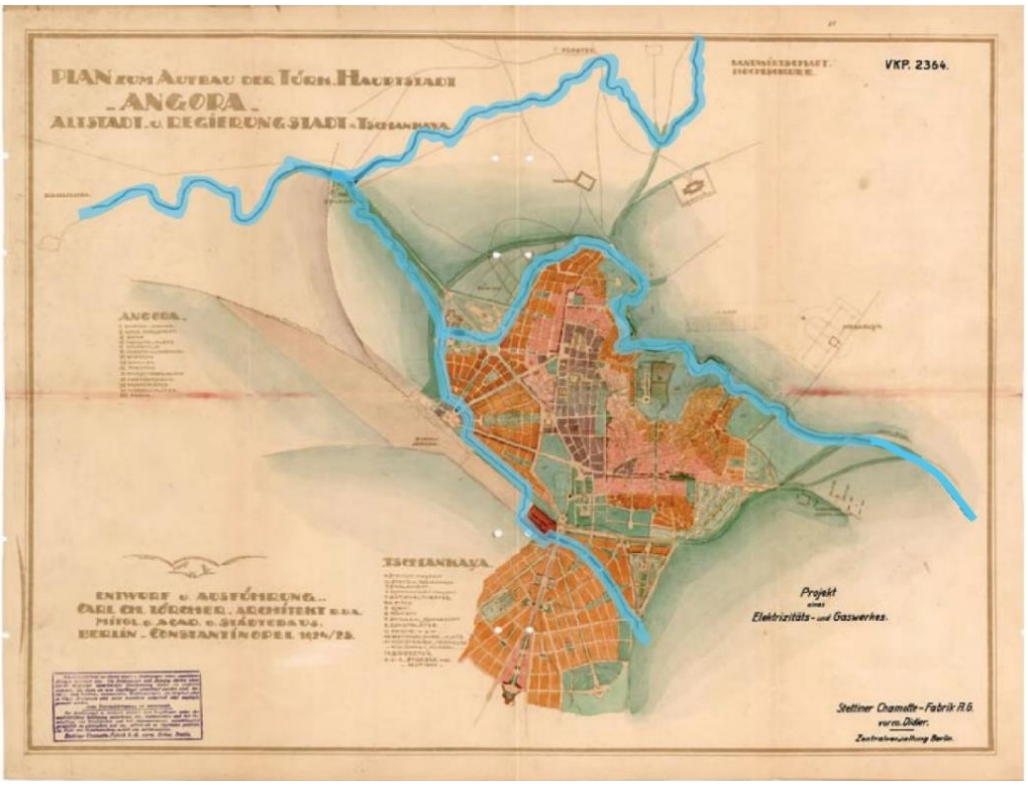


Figure 4.11. The 1924-1925 Lörcher Plan. The map is edited by the author.

In both Lörcher and Jansen's plans, the coexistence of waterways and green areas was common. Jansen noted that the plan was based on topography. The valleys and the hills, which provide nice views, were planned as recreational and park spaces. Even where they were not transformed into parks, construction was not allowed (Jansen, 1937). Jansen attempted to place natural thresholds and determinants on the north-south and east-west axes. Thus, he defined Ankara, İncesu, and the Kavaklıdere streams as significant open-green area infrastructures. Jansen also predicted that the land around these streams would gradually become high-value estates (Jansen, 1937). As an advocate of the garden-city trend, he planned the city in harmony with green areas (Cengizkan, 2006) (Figure 4.12-14). Jansen Plan also included the revitalization of the Roman dam. He planned a small pond on the Hatip stream, as presented in Figure 4.10-11. A portion of the urban water demand could be supplied by the pond. Furthermore, the space would be transformed into a recreational space that would include water activities such as swimming for the

residents. In "Once upon a time Ankara," this transformation was mentioned as "naive cuteness" in the city (Bir Zamanlar Ankara, 1994, p. 76). However, the naive cuteness was removed, the stream was entirely covered with a concrete road that connected Dışkapı and Cebeci (Bir Zamanlar Ankara, 1994). Çubuk I Dam was completed in 1936 as provisioned in the Jansen Plan. It supplied drinking water and recreation spaces in Ankara. "Çubuk Dam recreation area" could be considered as an effort by the Jansen plan to develop an urban green space system (Özer M. N., 2005) (Figure 4.12). This location became a favorite recreational area for the residents (Bir Zamanlar Ankara, 1994).

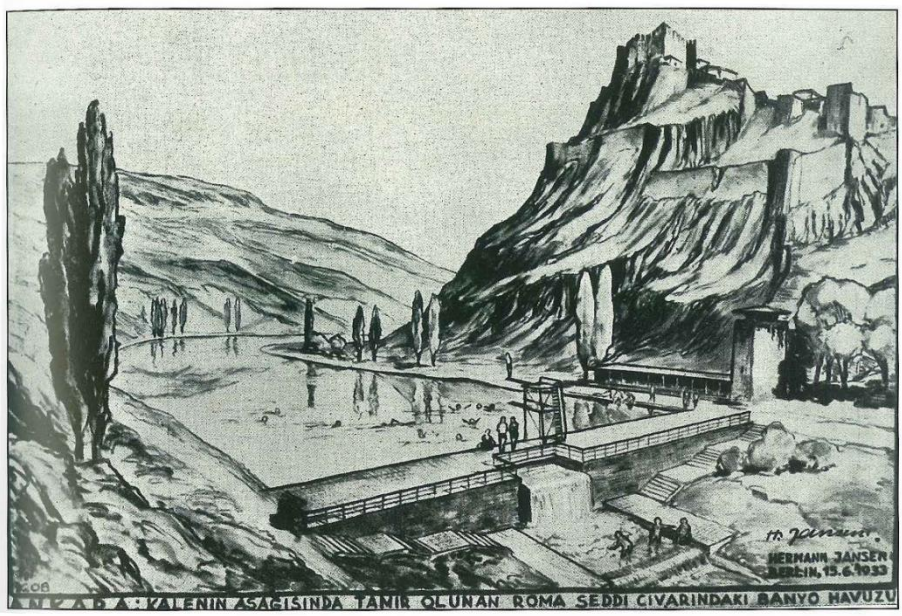


Figure 4.13. Hermann Jansen's Roma dam design, 1933 (Jansen, 1937).

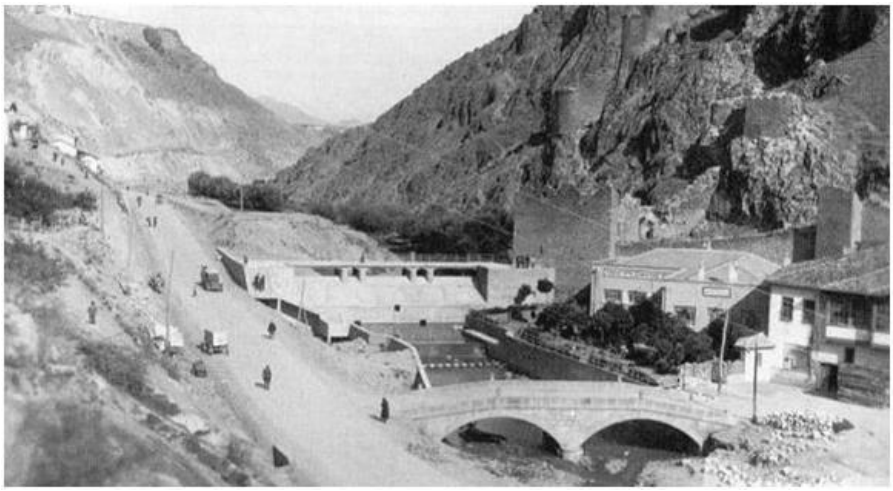


Figure 4.12. Bend stream in the 1930s (Bir Zamanlar Ankara, 1994)

Due to economic and industrial developments, several factories were founded in Ankara after the İzmir Economy Congress (Yücel, 2015). Easy access to transportation facilities and waterways was an advantage for the industries. Thus, they were mainly located along the railway infrastructure established in 1892 on trade routes in Ankara (Tekeli, 2010). In the east-west direction, the Çubuk stream flows parallel to the railway. According to Tekeli, the arms industry was prioritized (Tekeli, 2010). Due to the increase in housing demand, industries such as

construction, electricity, and coal-gas have developed (Tekeli, 2010). The Cartridge Factory (1923), the Cement Factory (1926), the Etimesgut Airport (1930) (Military), the Brewery (1934), the Aircraft Factory (1942) were constructed with connections to the railway and waterway systems. Also, several construction workshops were established around Akköprü along the Hatip stream in 1929. Tekeli argued that the connection between these industrial establishments and the railway was significant in the 20th century (Tekeli, 2010). Furthermore, the area always witnessed industrial investments.

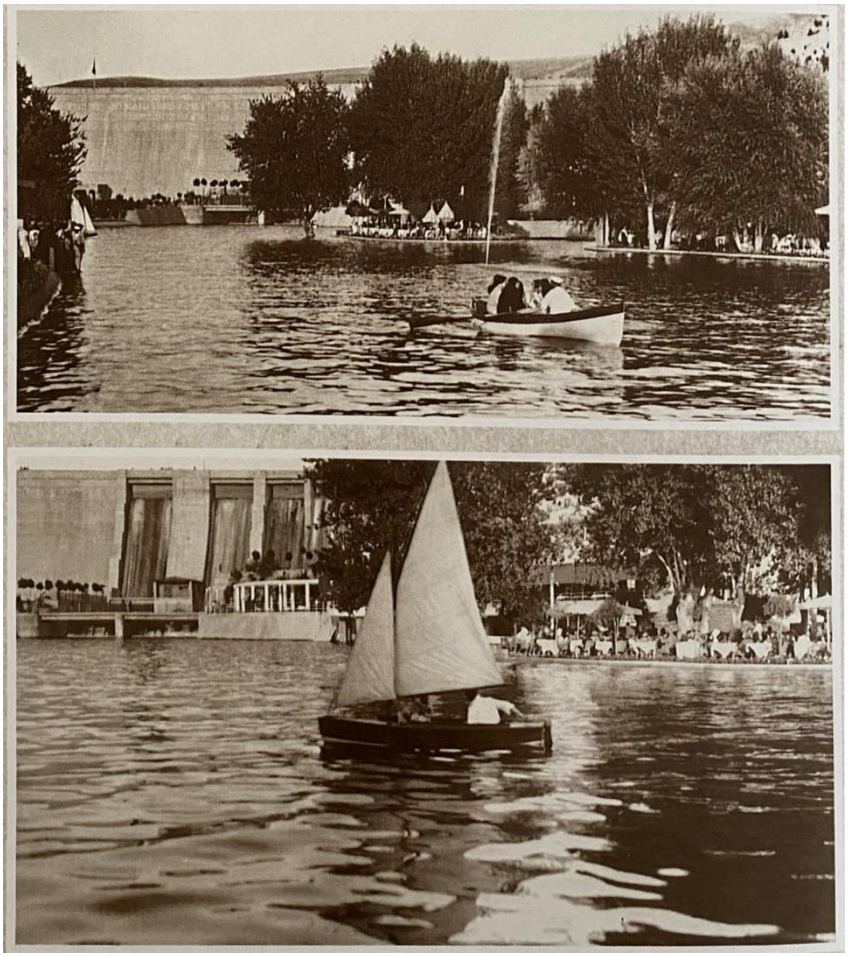


Figure 4.14. Çubuk 1 Dam, 1936 (Bir Zamanlar Ankara, 1994, p. 134)

Atatürk Forest Farm was established by Mustafa Kemal in 1925 and contributed significantly to the development of the landscape around the streams. Even today, Atatürk Forest Farm includes streams (Figure 5.12). The social life in the farm was

described in "Fluctuating Transformations in the Atatürk Forest Farm and Ankara" as follows:

> The Marmara Mansion, İzmir Mansion, pools (Figure 4.13), recreation areas in Atatürk Forest Farm are places where gender equality is ensured in the social area, and the urban area becomes public. The city dwellers used these areas for both sports competitions and leisure. (Kimyon & Serter, 2015, p. 46)

Later, although there were changes in the land, Atatürk Forest Farm provided recreational spaces for urban residents (Bir Zamanlar Ankara, 1994) (Figure 4.13).

Figure 4.15. The pool in Atatürk Forest Farm. (Resource: https://libdigitalcollections.ku.edu.tr/digital/collection/FKA/id/482/)

Figure 4.16. 1932 Jansen Plan (Bir Başkentin Oluşumu, 2010).

The landscape fabric could also be observed in photographs and postcards of the period. The streams were employed for several purposes such as drinking water, irrigation, washing and bathing, socialization, relaxation, and promenades. Erman Tamur (2012), in *Suda Suretimiz Çıkıyor,* wrote his memories on Hatip stream before the 1950s. He indicated that the water was fairly clean, and children could play and swim there (Figure 4.19). Also, he mentioned that he enjoyed a promenade in the banks on summer nights. He described the route that included several gardens and wooden bridges. In Figure 4.16, the cows that drink water next to Akköprü Bridge could be observed. The animals could still drink the water and the stream provided wildlife habitat. In Figure 4.17, nice views on Çubuk Stream and students could be

observed in the background. In Figure 4.18, a man and a woman picnic in the stream bank. All data suggest that the streams played a significant role in agricultural and social life in Ankara.

Figure 4.17. The Hatip stream and Ördekçiler bridge, the ducks drinking water. Resource: https://twitter.com/AntolojiAnkara/status/1282723541457276930/photo/1

Figure 4.18. Akköprü Bridge 1917. The animals drink water. Resource: https://i.pinimg.com/originals/2a/15/09/2a15095a58758dd6bfebc9f70d3df266.jpg

Figure 4.19. The Çubuk stream, 1930 (Tamur, 2012).

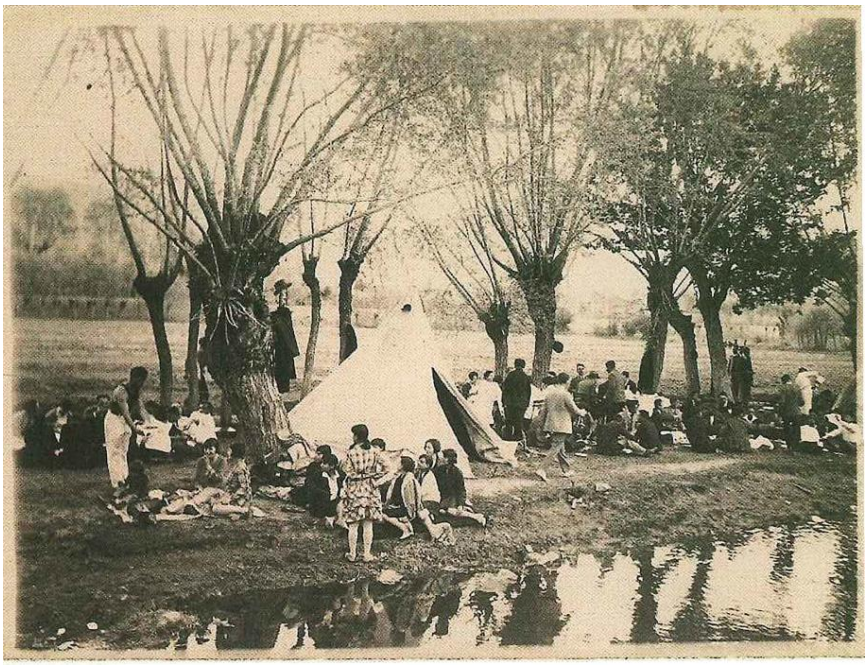


Figure 4.20. The Hatip Stream, in 1946 (Tamur, 2012).

On the other hand, there were infrastructural problems and epidemics due to the swamps. In 1924, Ankara had no sewage system (Cengizkan, 2004, p. 18). The population growth increases sewage problems. It was observed that the urban drinking water sources were sufficient until 1928 in Ankara (Cengizkan, 2004, p. 19). The malaria risk near the swamps led to the relocation of the residents from

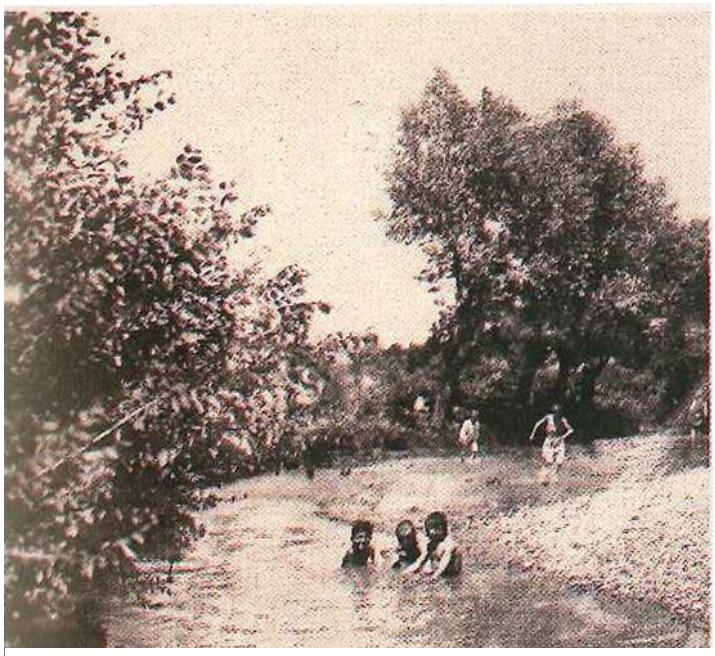


Figure 4.21. A view from the Hatip Stream, the children swiming and having fun 1950 (Tamur, 2012, p. 19)

these neighborhoods. Also, people attempted to fill the wetlands themselves for health purposes. Thus, the lack of infrastructure development and population growth exacerbated urban problems and changed the relationship between the water and the city during the 1950s.

4.3 The Streams as Sewer Channels

In the second half of the 20th century, the waterways and vicinity that formed an urban landscape began to lose their character. After the 1950s, urban population growth was unpredictable. In this period, the urban development rate was very high, and a population explosion was observed. The average population growth was about 27 per thousand in the country, while the same rate was around 75 per thousand in Ankara (2038 Ankara Çevre Düzeni Planı, Plan Açıklama Raporu, 2017). This was due to the socio-economic and spatial development in the city (2038 Ankara Çevre Düzeni Planı, Plan Açıklama Raporu, 2017). The slums increased during the 1950s, and these settlements also started to develop in stream basins. This was accompanied by urban industrial developments. Rapid urbanization, population growth, industrial

development, and housing needs had a significant impact on the state of urban waterways. Furthermore, the flood and epidemic (malaria) risks were the other significant factors that altered the character of the streams in Ankara. Consequently, several stream sections were culverted into sewage lines. The strong link between Ankara and its waterways, dating back to antiquity, disappeared gradually. Finally, the waterways were transformed into sewage channels. The trend still continues in 2021.

Population growth and urbanization in Ankara introduced further and efficient infrastructural system requirements. As mentioned in chapter I, urban infrastructure includes public transportation, power, drinking water, and wastewater systems for residences and industrial facilities. Lack of infrastructure would lead to urban problems. Especially after 1955, these problems were more complicated. The wastewater treatment systems were inadequate. As seen in the 1977-1982 5-year development plan, the sewage lines were mandatory by the 1956 construction law. However, effective solutions were not implemented due to social, economic, and constructional conditions in Turkey. Thus, especially the rural areas produced their own solutions. For example, the human feces were still deposited in cesspools and employed as fertilizer. Later on, they were piped to remote areas (IV. Beş Yıllık Kalkınma Planı Özel İhtisas Komisyonu Raporu, 1977, pp. 43-44). After 1970, the wastewater was discharged to the nearest stream or river in several Ankara neighborhoods (IV. Beş Yıllık Kalkınma Planı Özel İhtisas Komisyonu Raporu, 1977, p. 46) This led to significant pollution levels in Ankara waterways. Ankara stream became quite polluted and smelly during this time. That was one of the major reasons for the municipality to cover the urban and rural streams in Ankara.

In addition to the sewage problem, the floods had a major impact on the transformation of the streams in Ankara. Due to the population growth, slum neighborhoods were built in several parts, and some were located on stream floodplains. A TRT Archive video is available on the September 11, 1957, flood: “Flood invaded all the lower districts in Ankara, and water was drained from the houses for days.” According to the report, over 100 people lost their lives, and more

than 1000 buildings collapsed due to the flood (TRT Arşiv, 1957). The catastrophic scene in Ankara could be seen in Figure 4.24. İhsan Seddar Kaynar reviewed the period newspapers and provided evidence for the spatial impact of the 1967 flood on Ankara. These reports included both exaggerated and factual news depicting the phenomena. Common in all reports was the material and spiritual damage (Kaynar, 2017). Milliyet newspaper reported that more than 1000 people were considered dead and 200 houses were completely flooded (Figure 4.22). Hürriyet newspaper reported that the magnitude of the flood and the death count was still unknown, but expected to be over 100 (Figure 4.21). Akşam newspaper noted that the Hatip stream flood was the most significant disaster of the year (Figure 4.20). Thus, a large part of Ankara was affected by the 1957 flood. As a result, the natural urban structure was significantly altered after several casualties and significant financial damages (Kaynar, 2017). The 1957 flood caused significant life and property losses, and all bridges on the Bent stream were destroyed. The Bent stream was converted into a large trench by the State Hydraulic Works, and a road was constructed over the stream. The construction of the first stage of the 5 km long culvert was started in April 1958 between the Conservatory and Dışkapı, and the second stage between Dışkapı and Varlık neighborhood was completed at the end of 1959 (Tamur, 2012, p. 92) (Figure 4.23).

The streams did not only have flood risk but also certain sections exacerbated the risk of malaria due to swamp formations. To prevent pollution, floods, epidemics, and in certain cases, for irrigation purposes, the stream course was altered at different times, they were embanked, and certain sections were enclosed in culverts. For example, İncesu stream formed swamps in the area where Gençlik Park is located today (Ankara' da Su Altyapısı, 2013). İncesu stream is not visible but flows under Gençlik Park today. Although these interventions helped remove the malaria risk, they did not prevent floods. Two years later, in 1961, the Hatip stream flooded again. After the 1961 flood, flood traps were constructed on small streams and flood beds that feed larger streams (Kaynar, 2017, p. 221). Thus, the enclosure of the streams led to the destruction of the natural texture and landscape in recreation areas. It is clear that this application damaged the historical texture of Ankara and led to the loss

of several beautiful elements that added flavor to the urban landscape. (Tamur, 2012).

BÜYÜK SEL FELÂKETİ

Ankara'da 3000 ev su altında 1000 kişinin öldüğü sanılıyor

Figure 4.22. Milliyet newspaper on 12th of September, 1957 Felaketi, 1957).

Ankara'daki büyük sel felâketi

Perşembe 12 EYLÜL

Hürriyet

GÜNLÜK MÜSTAKİL SİYASİ GAZETE

Meclis dün seçim kararı vererek dağıldı

Seçim Kanunu sert münakaşalardan sonra tadil edildi

İşbirliğine çalan Bayura İnönü cevap verirken bir kavga çıktı

Muhalefet-iktidar mebusları sille, tokat birbirine girdiler

Yeni kanun karşısında muhalefetin kararı bugünkü toplantıda belli olacak

Tadil tasarısı 31 e karşı 361 oyla kabul edildi

Figure 4.23. Hürriyet newspaper on 12th of September, 1957 (Kaynar, 2017).

Hatip Çayı'nın taşması yılın en korkunç faciasına sebep oldu

800 ÖLÜ VAR

AKŞAM

12 EYLÜL

MÜSTAKİL GAZETE

KURULUŞ YILI : 1948

Figure 4.24. Akşam Newspaper in the 12th of September, 1957 (Kaynar, 2017).

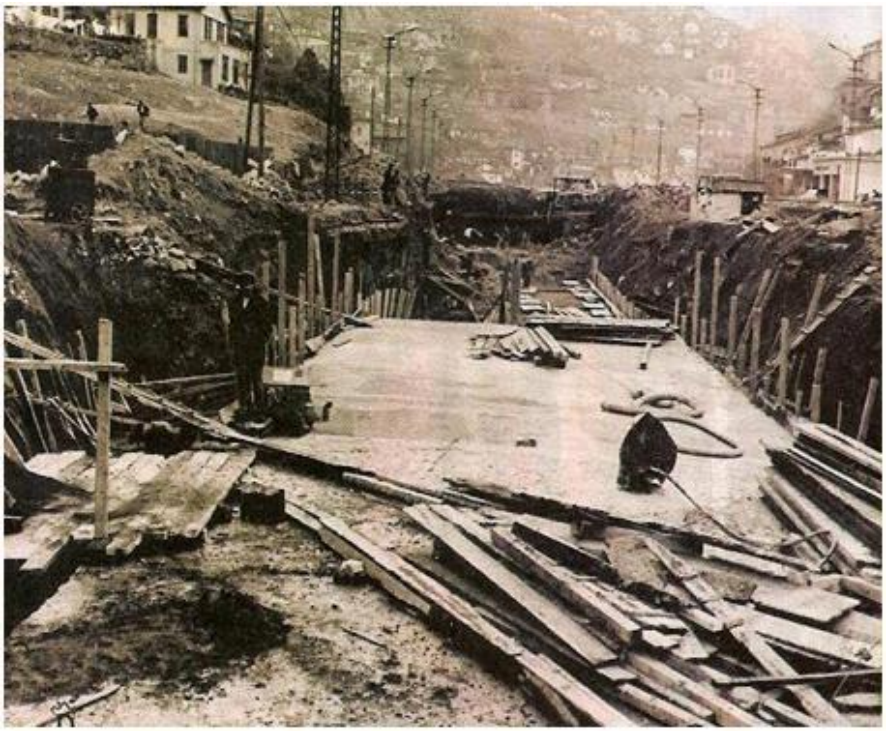


Figure 4.25 Bent stream under construction. Resource: http://dericizade.blogspot.com/2017/04/bentderesi-hatip-cay-tabakhane-eski.html

Figure 4.26. 1957 flood (Tamur, 2012).

Uybadin–Yücel plan attempted to produce solutions for the water and sewage problems in Ankara. (Cengizkan, 2006). However, Cengizkan asserted that the streams constituted urban boundaries and walls (Cengizkan, 2006). To supply the housing demand, the plan increased the allowed building height. On water and sewage, the report argued that the Çubuk stream could supply sufficient drinking water, except the draughts; however water treatment was inadequate. The decision to build a dam near Orta Imrahor village was deemed appropriate; however, the dam was destroyed during the floods in the 1960s. For the first time, an integrated sewage system was planned in Ankara, where the wastewater was managed by independent cesspools (Cengizkan, 2006). Cengizkan criticized the Uybadin-Yucel plan due to the problems in its approach to urban open and green spaces since the plan did not include green bands and perception corridors, urban and spatial qualities, urban open spaces, and public spaces strategies included in Lörcher and Jansen plans. (Cengizkan, 2006, p. 41). Günay argued that the government did not take necessary action concerning the valleys in this period. In particular, the green spaces were not implemented and the slum settlements were neglected (Günay, 2006). The Uybadin-Yücel plan could not accurately estimate the future population growth and could not include versatile and innovative designs based on the existing general plan. Thus, it was accepted from the very beginning that it was not a feasible plan for Ankara (Cengizkan, 2002, 2019, p. 189). Consequently, new settlements were not connected with the waterways like before and the stream valleys were gradually transferred into residential zones instead of green recreational spaces. Yücel-Uybadin's plan was followed by the 1990 Ankara master plan.

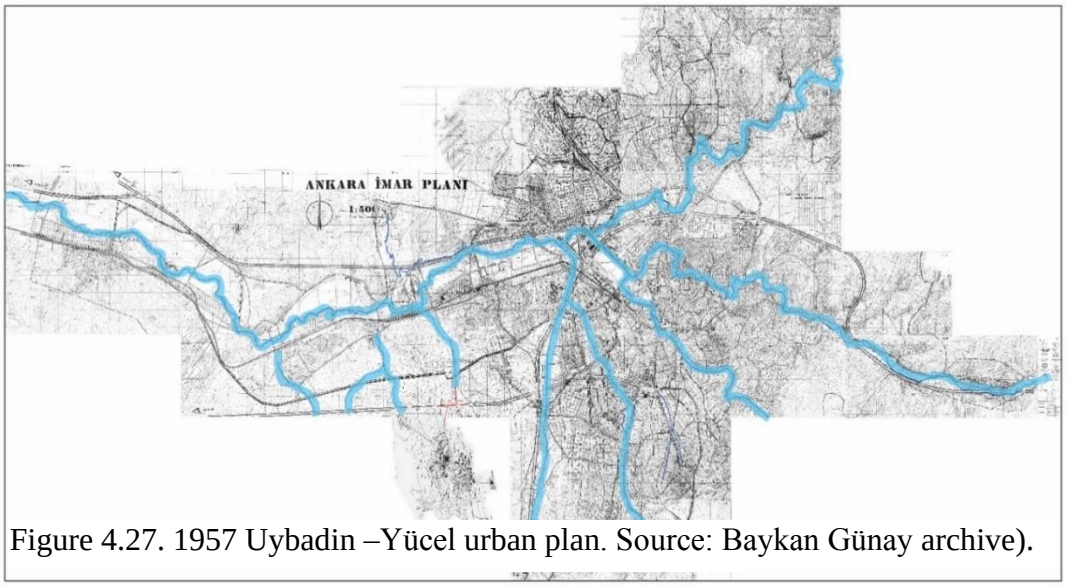


Figure 4.27. 1957 Uybadin –Yücel urban plan. Source: Baykan Günay archive).

Ankara Metropolitan Area Master Plan Bureau (AMNPB) developed the 1990 master plan targets after extensive research and analysis conducted between 1970 and 1973 (Altaban, 2002). AMNPB advocated that the 1/50 000 scale plan included flexible principles and projected a south-westward urban development (AMNPB, 1977). While the Lörcher, Jansen, and Uybadin- Yücel plans focused on Ankara core, the 1990 Master plan approach concentrated on Ankara suburbs. In other words, the first three urban plans were based on the geomorphological features of Ankara. However, the 1990 Master Plan emphasized the transportation infrastructure as a potential development direction towards the west. Günay called this direction the western corridor (Günay, 2006, p. 98):

> In the development of the Western Corridor, priority was given to the north of the Istanbul road in the Batıkent region, not the surroundings of Istanbul Road…in the west, but the calmer Ayaş road environment was adopted. The existing Etimesgut and Sincan campuses and the presence of the suburban train were prominent in this decision.

The Western Corridor strategy did not lead only to the development of housing projects but also industrial development. However, Raci Bademli argued that Ankara was not an industrial city (Bademli, 1987, p. 49). Based on the SIS statistical data, Raci Bademli claimed that Ankara exhibited a lower industrialization rate since 1955 when compared to other metropolitan cities such as Istanbul, Izmir, and Bursa. However, Ankara has exhibited industrial growth since the 1920s. Thus, while the

railway was an important factor in the development of the small, medium, and large-scale industrial establishments between the 1950s and the 1970s, highways became more significant after the 1970s. According to Bademli, the industrial investment strategies that determined industrial establishment locations were affected by the transportation infrastructure, followed by ease of water and energy access, and lower slope of the land (Bademli, 1987). The following map exhibits the close relationship between the industrial establishments and streams (Figure 4.26). Thus, the discharge of the industrial waste to the nearest stream was another reason that dramatically exacerbated water pollution.

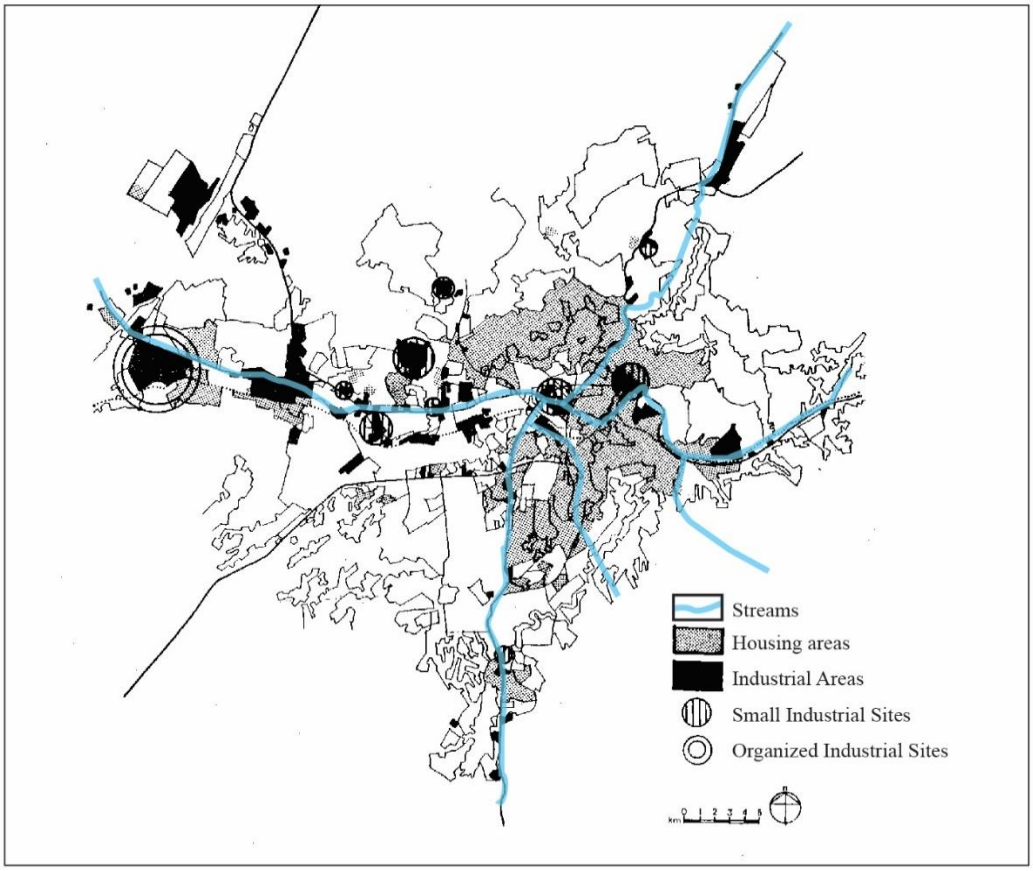


Figure 4.28. Industrial areas in relation with the streams in 1988 (Bademli, 1987).

In the 1970s, urban air pollution increased gradually, similar to water pollution. It could be suggested that air pollution control solutions were prioritized when compared to water pollution. According to AMNPB, the green belt in Ankara's 1990 plan was an important step towards the solution of the air pollution problem in the 1970s. The plan envisaged the revitalization of urban valleys (İncesu-İmrahor, Dikmen, Hatipçayı, Macun valleys) as urban green spaces. The residential settlements were restricted in these areas, these valleys were planned as air corridors and as recreational areas. The 'Corridor Scheme' was adopted by the Ministry of Forestry as 'Ankara Green Belt Project' on December 24, 1982, and 3 main lines were determined. 1. The route between Atatürk Forest, Eymir and Mogan lakes, İmrahor and Hüseyingazi Çubuk dam, Bağlum, İvedik, Macunköy, and Atatürk Orman Çiftliği. 2. Nenek, Tatlar, Mahmudiye, Susuzköy, and Sincan, Osmaniye, Elvan, Bağlıca and Alaçatlı areas in the Bayındır Dam basin. 3. Elmadağ, Hasanoğlan,

Kırıkkale, Kurtboğazı Dam and the southern slopes of Kızılcahamam and Haymana (Özer & Başkurt, 2017). In the 1990 Master Plan, it was obvious that the development of Ankara was directed towards the west. The green belts, which included mostly stream basins, only included indirect waterway projects.

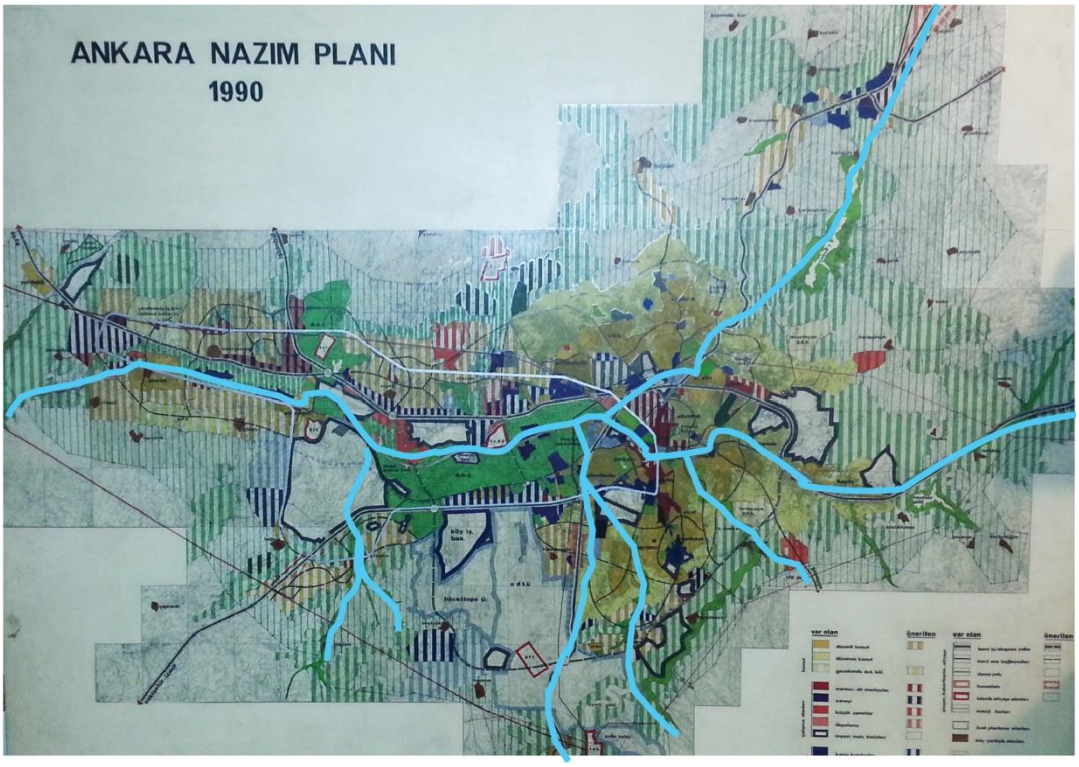


Figure 4.29. 1990 Master Plan (Uğur, 2015).

A structural plan was developed by a group of academicians at METU in 1987 based on a star-shaped urban structure, proposing a multi-corridor system developed with the employment of several techniques, technologies, and mathematical approaches (Günay, 2006; Çalışkan, 2019). The plan included the green belt project, which was first proposed in the 1990 Master Plan to control urban pollution. In the plan, the green belts that were embedded in the star-shaped Ankara plan could be observed (Figure 4.27). According to Özer and Başkurt, the green belt approach was based on the valley formations that pass through the urban center and water bodies outside the urban development limits (Özer & Başkurt, 2017). Çubuk, Hatip, and İmrahor basins were proposed as green roads. Thus, it could be suggested that the green belt project

was associated with the waterways in Ankara. In the 2038 Report on plan details, it was noted that the air pollution in Ankara could be eliminated by meteorological ventilation due to the condensation of the pollution in the urban center. Hence, the plan aimed "to create green belts between radial corridors and ventilation corridors", attempting to resolve the pollution problem (2038 Ankara Çevre Düzeni Planı, Plan Açıklama Raporu, 2017, p. 62). On the development of this plan, Tekeli argued that Ankara was faced with serious air pollution (Tekeli, 1987). He discussed the impact of the green belt project on Ankara, and whether it could solve the air pollution problem. He suggested that certain developments were already observed in urban services and environmental standards in Ankara after 1975 (Tekeli, 1987). However, Tekeli also claimed that the green belt approach was not effective, since they could not be a part of the inhabitants' lives (Tekeli, 1987).

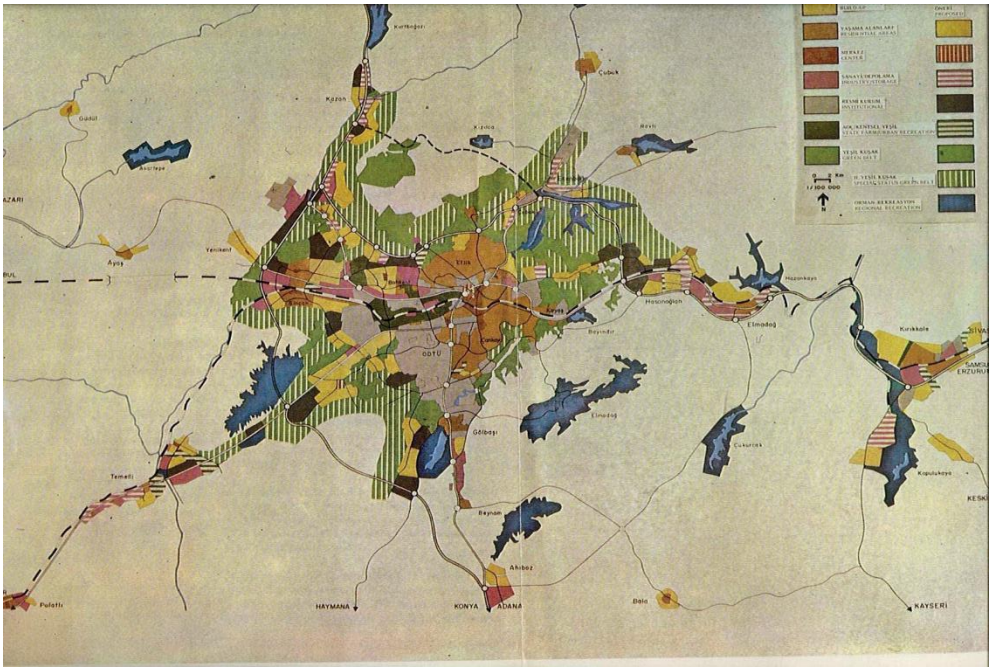


Figure 4.30. Ankara 2015 Structural Plan (2038 Ankara Çevre Düzeni Planı, Plan Açıklama Raporu, 2017).

Since the late 1980s, a macro scale plan that aimed at 2025 has been developed by Ankara Metropolitan Municipality Zoning Department and was finalized on 30.07.1998. Then, Ankara 2025 Master Plan was submitted to the Metropolitan Municipality Council for approval (2038 Ankara Çevre Düzeni Planı, Plan Açıklama

Raporu, 2017). During this period, the city continued to grow in the southwest direction and the impact of the 1990 Master Plan gradually diminished (Günay, 2006) (Figure 4.28). Due to the extensive urban sprawl, the control of urban expansion became quite difficult. Furthermore, it was observed that the macro form that provided the ventilation corridor was lost considerably (2038 Ankara Çevre Düzeni Planı, Plan Açıklama Raporu, 2017). For example, the integrity of the green belt was broken due to the shift of the ring road that passes through Batıkent towards the north (Kayasü, 2006). The plan prioritized the protection of urban valleys (Eymir Lake, Imrahor Valley, Tuzluçayır and Akdere, Dikmen Valley, Büyük Esat Valley, Çankaya Botanical Park Valley, Seğmenler Park, and Papazın Bağı), water basins, and enforcement of the green belt and integration of the existing green spaces. The Macunçayı area was reserved as a recreation area around Çubuk stream, Yunus lake, and Susuz lake. In the plan, it was also suggested to introduce new recreational areas and to transform the landfills that were over capacity into green spaces (Özer & Başkurt, 2017). Although there were improvements such as the preservation of Eymir lake and the restoration of Susuz lake, there were no significant revitalization projects for the streams.

The analysis of urban plans developed for Ankara revealed that valleys and waterways were considered green areas in the first half of the 20th century. Although this approach is still reflected in the current urban plans, the interwoven relationship between the blue and green infrastructures had disappeared gradually. The waterways were covered to prevent floods, due to factors such as urbanization, industrialization, population growth, and to prevent diseases. Although certain interventions such as the development of air corridors in stream valleys and green belts were implemented, after the 1990 Master Plan, the urban plans did not offer a comprehensive solution for the waterways. Especially in the urban center, residents avoided contact with urban waters due to foul odors and unhealthy conditions around polluted streams. The interventions such as the culverting the streams led to the perception of Ankara streams as sewage channels by the residents. Despite their long history, these streams and surrounding areas lost their character. Thus, the

connection between residents and streams was disrupted. According to Tamur (Tamur, 2012, p. 9),

> …there have been significant losses in the natural and historical values of Ankara in this process. Some of these losses are related to the rivers of Ankara. During this time, most of the Ankara creeks were filled with shrinkage, culverts, the bridges and embankments were destroyed, and the gardens on their shores were destroyed. Thus, for the people of Ankara, walking along the streams on summer nights, arched stone bridges, women washing clothes behind the mills, ducks floating in flocks turned into dreams that reflect a distant past in photo frames.

In "Asfaltın Altında Dereler Var" (Under the road, there are rivers, 2019), director Yasin Semiz emphasizes the concrete outlook of Ankara and several urban infrastructural problems associated with the destruction of urban streams. The documentary was a sort of reproach to the current image of Ankara. In the International Symposium (2016) on all aspects of Çubuk and its environs (*Bütün Yönleriyle Çubuk ve Çevresi Uluslararsı Sempozyumu)*, Kaynar stated that observing the rich waterways is almost impossible in Ankara on popular Internet map applications because the rivers mostly flow underneath the streets. Today, the streams are still polluted and release unpleasant odors almost everywhere in Ankara. The confluence of the Sakarya River and Ankara stream exhibits the degree of pollution in the Ankara stream (Figure 4.29).

The above-mentioned data based on historical documents and visual research proved the rich waterway structure in Ankara. The waterways are natural habitats, significant topographic determinants of Ankara since early civilizations. Associated papers, urban plans, and visuals evidence the strong relationship between Ankara and urban waterways until the 1950s. The streams provided drinking and irrigation water, industrial requirements, and supported the social life in Ankara. While they constituted a significant landscape in the first half of the 20th century, the streams became the sewage of Ankara in the late 20th century. Although certain improvements were observed, no radical suggestions or projects were produced. Due to the global environmental concerns and the benefits of previous reclamation projects (see chapter II), Ankara should re-examine the stream system once more.

It is possible to observe the changes in urban streams in Ankara's urban center and suburbs. Similar to Ankara, each region has a unique relationship with local streams. In the next chapter, the Ankara stream in the Etiler neighborhood and Etimesgut district is discussed.

Figure 4.31. Ankara stream (on the right) and Sakarya river (on the left) confluence in 2019. (Photo: Ahmet Soyak, https://www.youtube.com/watch?v=DSp20PvSVRo&t=167s)

CHAPTER 5

THE RELATIONSHIP WITH THE ANKARA STREAM: THE ETİLER NEIGHBORHOOD

In the present chapter, the changes in the Ankara stream are discussed based on a cross-section of the Etimesgut district center. Although Etimesgut has been a suburban settlement historically, it has been transformed due to the changes in the urban center. This area was selected since the Etimesgut district has lost its strong relationship with the Ankara stream over time, similar to other neighborhoods in Ankara. Several studies have been conducted on the Bent and Hatip streams in central Ankara. However, there are only a few studies on the suburban Etimesgut district. Thus, the current study aimed to investigate the process of change in the Ankara stream in the Etimesgut district. Also, the selected area is a significant case where different relationships could be observed between the stream and the city. Because Etiler neighborhood is located at the intersection of industrial, residential, green, and military zones and allows the discussion of various spaces that determine the relationship between the water and the city.

Etimesgut, which was only a village after the proclamation of the Republic, gradually became one of the fastest-growing municipalities in Ankara. The geographical location of Etimesgut is presented in Figure 5.1. In "Network and the City", it was reported that

> Many metropolitan cities were originally a collection of small, disconnected towns. Population flow expanded the town borders towards the nearby local centers, eventually merging them within a larger urban system. What was once empty landscapes of isolated urban centers are now crossed by spatial networks that enable traffic flows and social exchange (Valverde & V. Solé, 2013, p. 117).

Due to the easy connection with the nearby railway and main road networks, Etimesgut district developed although it was far away from Ankara urban center. As mentioned in Chapter IV, the development in Ankara continued towards the west, where Etimesgut was located especially after the 1990 master plan. That development exposed the region to several spatial, environmental, and infrastructural changes. Thus, Etimesgut became a crucial part of the urban growth in Ankara. The present chapter focuses on the transformation of the section of the Ankara stream in the Etiler neighborhood in Etimesgut. The analysis was conducted based on the documents, photos, maps, and aerial photos published over 100 years. Could Etiler neighborhood have been more connected with the Ankara stream spatially, ecologically, and socially when compared to global examples discussed in Chapter III? To respond to this question, we first analyzed the brief history of Etimesgut. Then, the association between the Ankara stream and the Etiler neighborhood, the Sugar Factory, Atatürk Forest Farm, the Military Airport, and the other significant venues were analyzed.

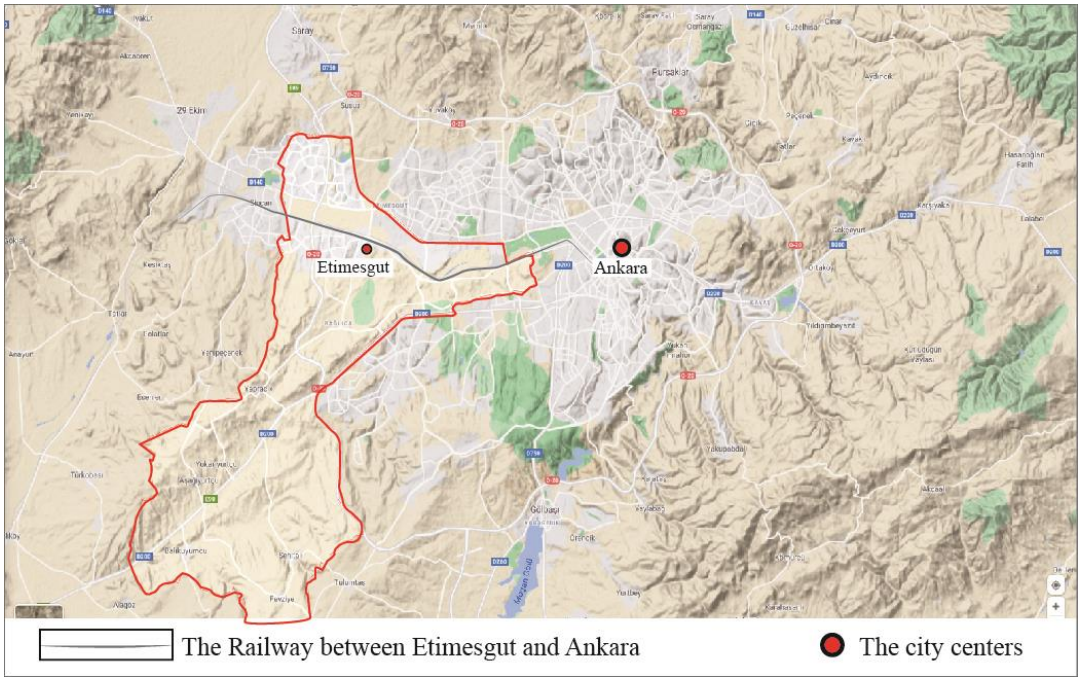


Figure 5.1. The location of Etimesgut, red line is the Etmesgut demarcation line in 2021. Source: Google Maps, 2021.

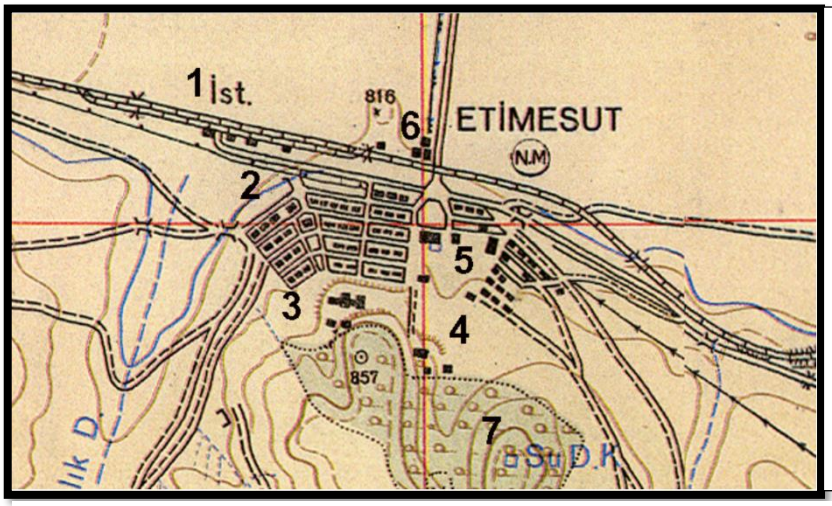
5.1 Etimesgut: From a Model Village to a Municipality

Etimesgut was established as a model village at a distance of 20 km from the urban center in Ankara by Mustafa Kemal Atatürk in 1928. Its location was quite strategic due to its proximity to railroad and highway systems, which provided easy access to the Ankara center (Figure 5.1). Ankara stream, located in the north, provided easy irrigation. Furthermore, the first Turkish Radio and Television radio transmission station (TRT), Türk Kuşu Institution, Turkish Red Crescent Campus, Atatürk Forest Farm, and then the Etimesgut Sugar Factory were established in the district. Since the republic, Etimesgut expanded gradually. Besides them, the west corridor idea, implemented in 1957 Uybadin – Yücel City Plan, has affected the fast development and growth of the Etimesgut district (see chapter IV). Therefore, Etimesgut has become a significant part of west corridor in urban. The village turned into a neighborhood within Yenimahalle Municipality in 1968, then became a municipality in 1990. Today, Etimesgut records the highest population growth rates in Ankara and it was estimated that Etimesgut will be the highest populated district in 2038 (2038 Ankara Çevre Düzeni Planı, Plan Açıklama Raporu, 2017).

Figure 5.2. Etimesgut model village in 1928 (Öztürk, 2019).

Around the 1920s, eighty percent of the Turkish population lived in villages. Thus, the new republic promoted rural development. Following the village law, the government established 69 model villages in Antalya, İzmir, Samsun, Bilecik, Cebelibereket, Mersin, Manisa, and Ankara (Çetin, 1997, p. 29). The immigrants

were settled in these model villages. Etimesgut hosted 50 families who migrated from Bulgaria (Figure 5.2-3-5). The Etimesgut model village plan was designed by Ernst Arnold Egli in 1928. It included 52 simple, standard, single-story, two-room mudbrick houses on 52 parcels of 1000 square meters (one acre each). Furthermore, a boarding school (Etimesgut Boarding School), attended by the students in nearby villages, a bazaar, and a caravanserai were established. In the village, 'Asri Bathhouse', the 'Gazi Mansion' (later Etimesgut District Directorate), and State Hospital (Etimesgut Healthcare Dormitory) were built during the same years (1925) (Hangi Açık Alan AOÇ, 2014), (Figure 5.3).



1. Train Station Building (1929)
2. Bathhouse '*Asri Hamam*' (1929)
3. the Boarding School (1930)
4. The state Hospital(1925)
5. Gazi Mansion, Bazaar, and Caravanserai (1925; 1928)
6. Ahi Mes'ud Tumulus (Frig ve Hitit çağları)
7. Radio Transmitters

Figure 5.4. Important settlements in Etimesgut, in early republican period (Hangi Açık Alan AOÇ, 2014).

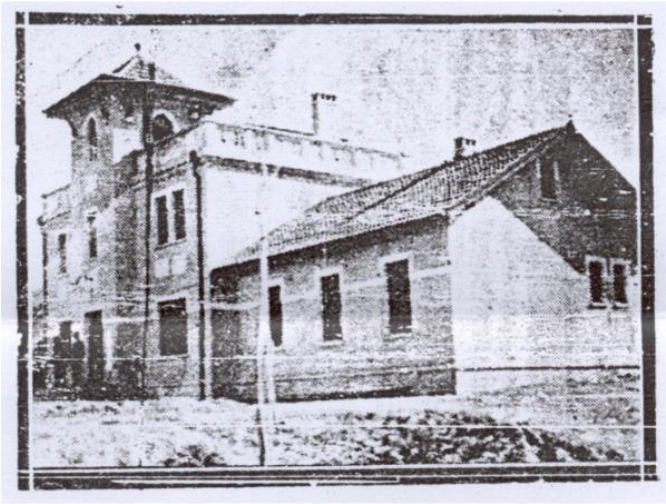


Figure 5.3. Gazi Mansion (Hangi Açık Alan AOÇ, 2014)

The development of a socio-spatial balance between the village and the city was an absolute objective of the state for economic and social rural development (Ömercioğlu, 2019, p. 737). Thus, drinking water and power systems, social, agricultural, health, education, and transportation facilities in model villages formed an example for other small-scale settlements. The students had agricultural classes in Etimesgut so that the villagers could be more profound about their life source (Figure 6.1). Because the economy mostly based on the agriculture in Etimesgut. Falih Rıfkı Atay emphasized the presence of asphalt roads, electricity, water,

Figure 5.5. Etimesgut model village around 1930s (Murat, 2018, p. 57).

railroad facilities, school, and a hotel as follows: "What is the difference between Etimesut Village and a Swiss village?[11]" (Yılmaz, 2021).

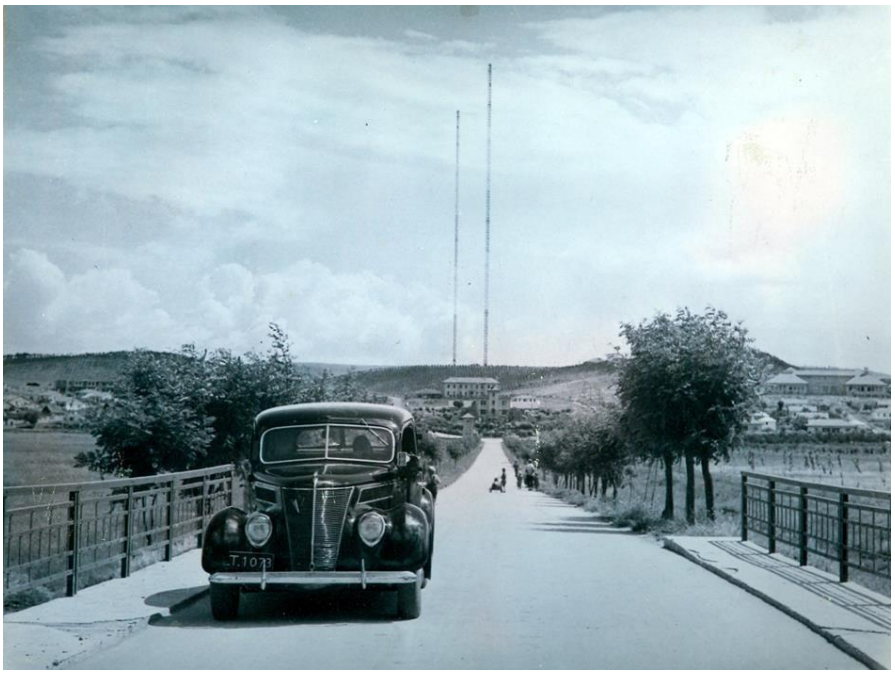


Figure 5.6.. The gates of Etimesgut in 1930s. Atatürk Forest Farm on the left, the Sugar Factory on the right (Yılmaz, 2021).

While Etimesgut had single-story homes with gardens, vineyards, a green village entrance, and the clean Ankara stream in the first half of the 20th century, these characteristics were destroyed in the second half of the 20th century (Figure 5.3 and 5.4). The foundation of the Sugar Factory employed the villages who lived on vineyards and agricultural land previously. The interviews conducted by Hülya Demir Yaleze (2018) revealed that the government taxed the vineyard owners. They did not want to pay these taxes. Thus, the desolated vineyards were seized by the Treasury (Yaleze, 2018, p. 22). In time, these vineyards were transformed into slums around 1969 (Yaleze, 2018, pp. 22-23). The population of Etimesgut increased with the population of the capital. The establishment of the Etimesgut Sugar Factory, TRT, the Military Airport, and the Red Crescent Campus were the other reasons for

[11] Translated by the author.

the population growth in the district. The model village texture was altered and gradually wiped out in Etimesgut. In the METU Atatürk Forest Farm Research website, the transformation in the Etimesgut district was addressed as follows (2014):

> The rapid "transformation" that started in 2007 resulted in the construction of "build-sell" apartment buildings in the parcels and the rapid destruction of the 52 residences in the center. The Yacht School, which is used only as a health facility today, the inn (hotel), which has not yet been transformed, and the "Electricity Transformer", which continues to stand on the roadside and continue to provide evidence for the existence of the model village[12]

The transformation from a model village to a municipality could be observed in the Etimesgut center (Figure 5.1). The current Etimesgut expanded towards the southwest. It is surrounded by the Eryaman neighborhood to the northwest and Ahi Mesut neighborhood to the southwest with middle-high and high-income groups, in strict contrast with the population in central Etimesgut. In the center, the residents are low and middle-low income. The transformations led by urbanization, population growth changed the relationship between the stream and the city. In the next section, the Etiler neighborhood and its changing relationship with the Ankara stream are discussed.

[12] Translated by the author.

5.2 Geography of Etimesgut and the Changing Relationship with Ankara Stream

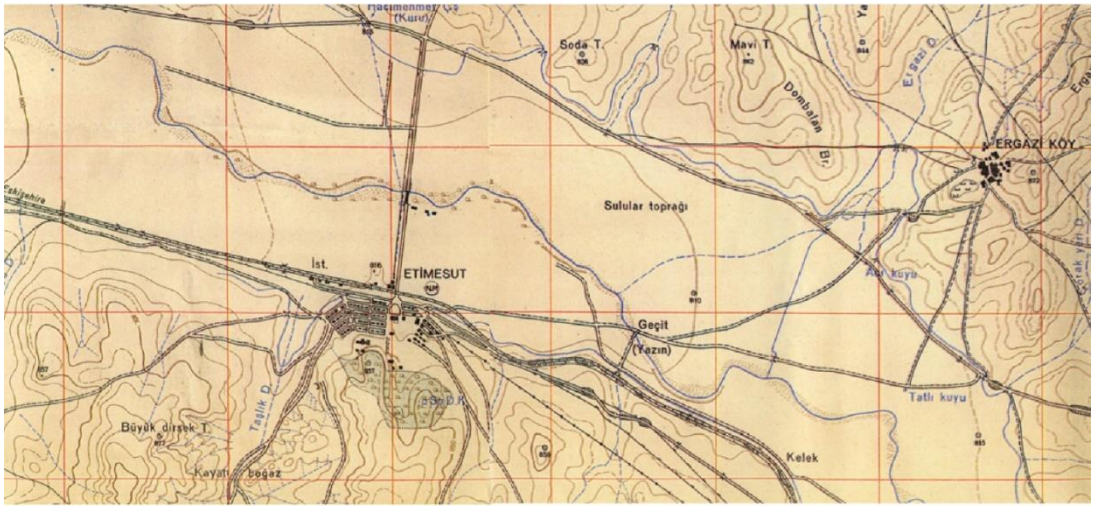


Figure 5.7. 1928 Model Village Plan (Hangi Açık Alan AOÇ, 2014).

Etimesgut includes plains and streams. It is known that it included wetlands and swamps in the early years of the Turkish Republic (ATO, 2003). Tatlı Well, Acı Well, Hacı Mehmet Fountain (Dry), aqueous soil, Taşlık stream, and Ergazi stream could be observed in the 1928 plan (Figure 2). The plan also characterized the region as wetlands. In *Atatürk and Etimesgut,* Ahmet Nur Or described the early years of Etimesgut (ATO, 2003, p. 95):

> ... it spanned 38 kilometers from north to south and 18 kilometers from east to west ... an extremely large area surrounded by swamps. The Ankara stream passes through the middle, and several small streams contributed to this stream.

In the interviews conducted by Yaleze (2018) with grandchildren of the immigrant Kabasakal, who lived in Etimesgut for at least 50 years, Kabasakal stated the following: "The natural water source was at the Çakırlar farm. The farm was located at a higher elevation, and the water flow downwards" (Yaleze, 2018, p. 19) (Figure 5.6). The source fed the fountain in the Technical and Vocational High School for Girls, and then the Atatürk Fountain next to the Turgut Özal Bridge at a later date. In the interview, Çokay and Kabasakal mentioned the villa of Atatürk (Gazi Mansion) on the banks of the Ankara stream with a great view of Etimesgut plains

(Yaleze, 2018, pp. 17-19). Thus, the banks of the Ankara stream were preferred for settlements.

Figure 5.8. Atatürk fountain in Etimesgut (Yılmaz, 2021).

However, malaria triggered by the swamps threatened the health of the villagers in the first half of the 20th century. Or (ATO, 2003) emphasized that the swaps formed due to two factors: The unauthorized excavation of the sand by the contractors for construction elsewhere in Ankara. The excavation pits were invaded by stream waters. The second factor was the fact that the landowners channeled the water without permission to irrigate their land, leading to the formation of swamps. During this period, the state attempted to improve the marshlands and build water canals[13] (ATO, 2003, p. 72).

[13] In order to obtain efficiency from the land distributed to the villagers of Ahimesut, soil reclamation, swamps were drained and the land had to be irrigated. For this purpose, with the decree dated March 3, 1929 and numbered 7753, the canal to irrigate to Ahimesut land, departure and distribution canals were tendered. It is possible to reach document in the "Atatürk and Etimesgut" book, page 72, 2003.

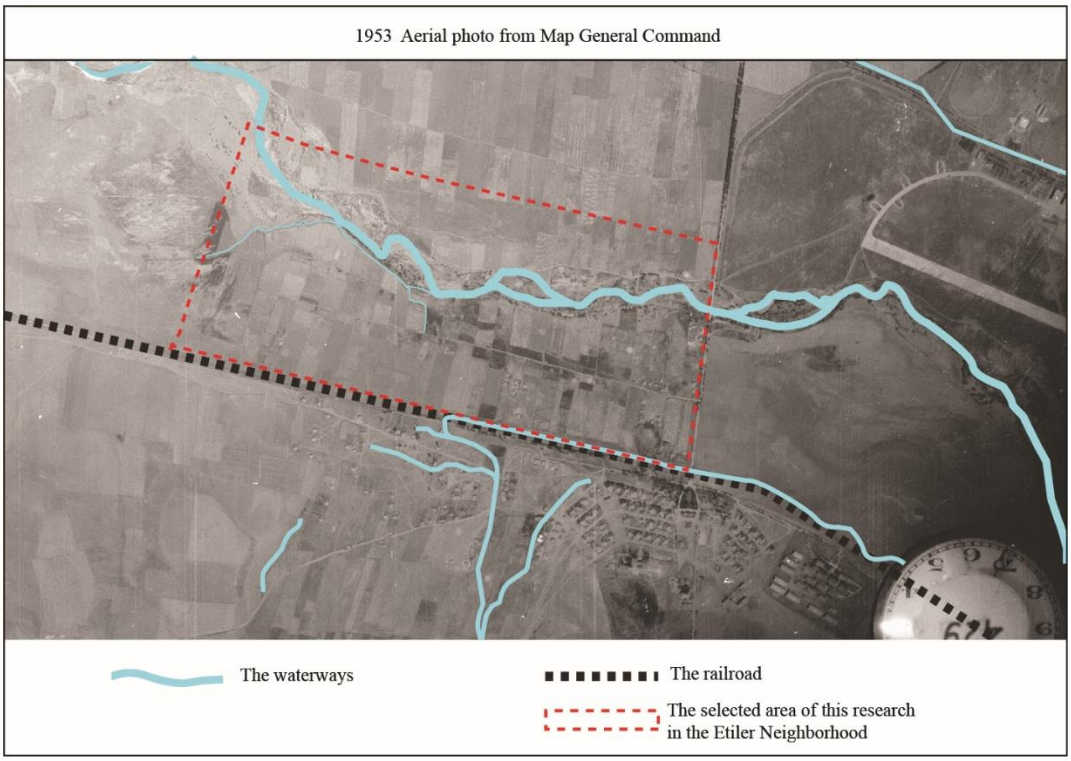


Figure 5.9. 1953 Etimesgut aerial photo . Source: Map General Command (Edited by the author)

In the 1953 aerial photo, the land allocated to the model village that was established in 1928, the military airport that was built in 1930, the TRT Campus and radio transmitter, and the Red Crescent Campus could be observed. A small section of the Atatürk Forest Farm, established in 1925, could also be seen on the upper right. The north of the Ankara stream included farming lands. Vineyards and farmhouses were located southwest of the railroad. The waterways were scattered around Etimesgut, rather than following a single axis. It was stated in the 1928 plan that several small tributaries fed Ankara. Although some tributaries disappeared in the 1953 map, Taşlık Stream still existed. This stream merged into another tributary that flow parallel to the railroad (Figure 5.7).

Etimesgut was also affected by the 1957 flood. Hürriyet newspaper reported the following (Kaynar, 2017, p. 214):

> After the General Directorate of Meat and Fish Institution was flooded, the flood progressed towards the Hippodrome. The zoo narrowly escaped from the disaster as the flood affected the area between the zoo and Etimesgut.

> There, the water was 20-25 cm deep, perishing all animals except for a few chickens and chicks.[14]

After the flood, Milliyet newspaper (Kaynar, 2017, p. 219) reported the following:

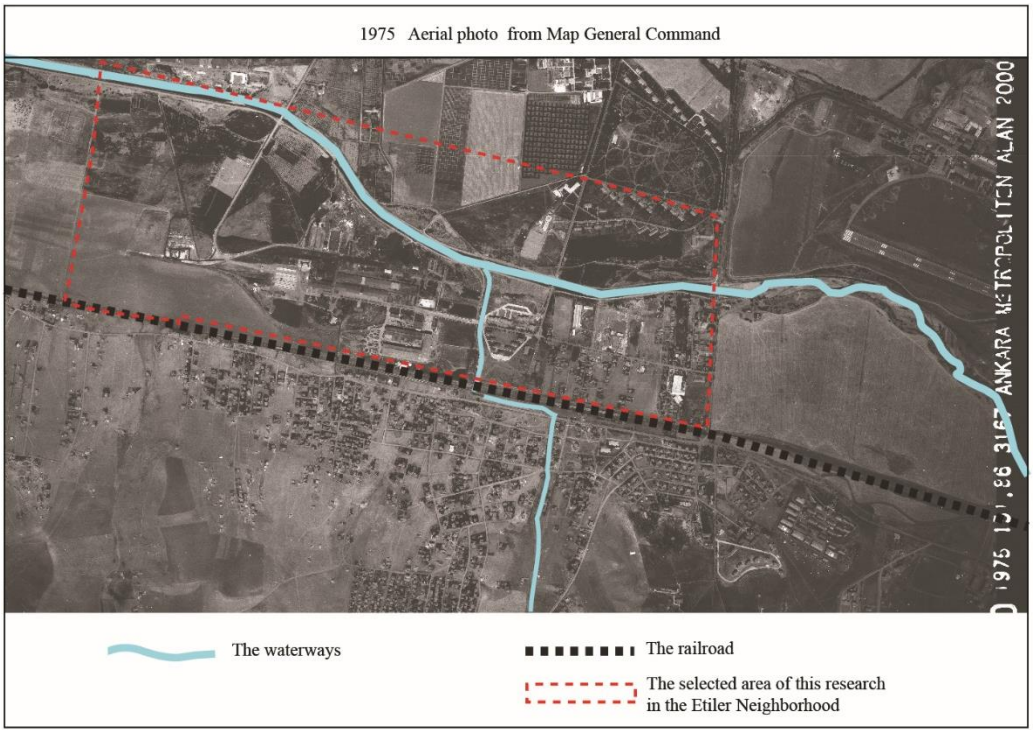


Figure 5.10. 1975 Etimesgut aerial photo . Source: Map General Command (Edited by the author)

> On September 13, life became normal in the areas where floodwaters receded and transportation was possible to the disaster areas. It will take a long time to completely clean the road between Kayaş and Etimesgut, and it is not clear what is under the debris.

[14] Translated by the author.

As seen in the 1975 map, the number of scattered waterways had decreased (Figure 5.8). Thus, it could be suggested that the drainage of the swamps conducted in the early 1930s was effective. In 1975, the only tributary of the Ankara stream was the Taşlık stream. Furthermore, an expansion was observed in residential areas. However, these settlements were mainly slums promoted by the population growth in Etimesgut. As mentioned above, the residents abandoned their vineyard/orchard homes. The traces of the model village planned by Ernst Egli could still be observed in the current plans; however, the general view of the built area looks pretty disorganized. The sugar factory campus, first established in 1962, has expanded. Thus, the farmers and vineyard owners became sugar factory workers. After the implementation of the 5-year development plan in 1960, the sewage was discharged to the nearest creek (IV. Beş Yıllık Kalkınma Planı Özel İhtisas Komisyonu Raporu, 1977), leading to the rapid pollution of the stream.

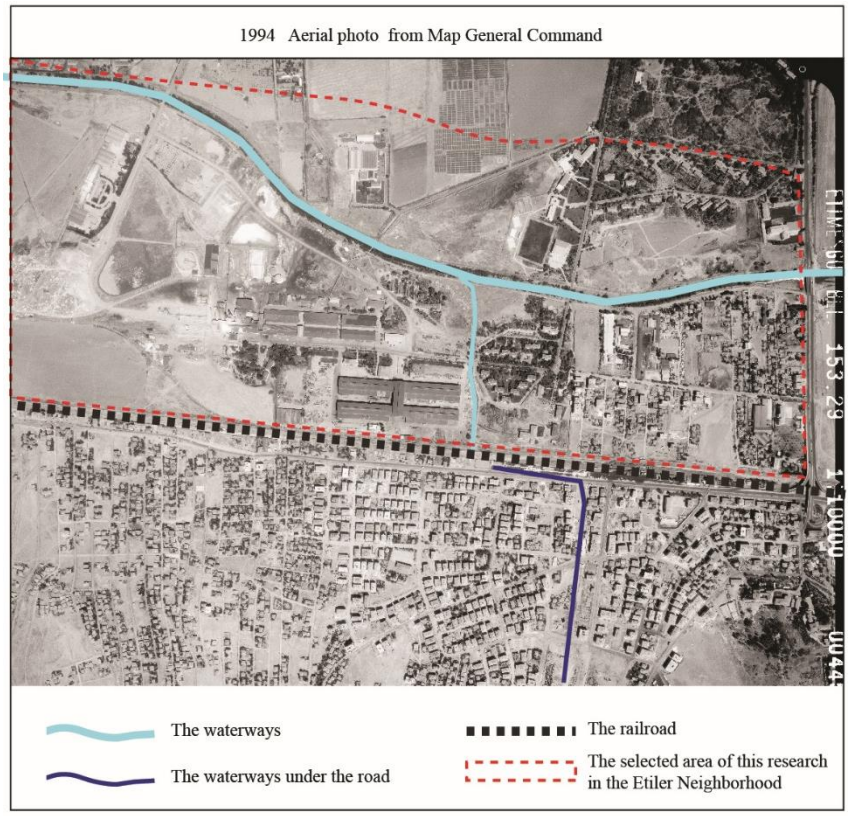


Figure 5.11. 1994 aerial photo of Etimesgut. The map is taken from Map General Command which is Edited by the author.

Both the population growth, residential development, and water pollution led to the enclosure of certain parts of the stream. Around the 1990s, one of the tributaries of the Ankara stream, the Taşlık stream that ran by the Sugar Factory towards the south was enclosed. In the 1994 map, the dark blue lines depict the covered sections of the stream (Figure 5.9). This section of the stream still flows under the road. The enclosed stream was transformed into residential streets. Ankara stream flows through Etiler Neighborhood district near the slums. Until the 2010s, the Ankara stream was a waterway that people avoided due to the pollution-induced unpleasant smell. In the 2010s, the Ankara stream was rehabilitated in Etimesgut. Then, the residential areas in the Etiler neighborhood were transformed from slums to 4-5-story apartment blocks. Especially, after the second half of the 20th century, the Ankara stream was avoided by the residents due to the foul odor. Today, although the conditions are better, it is still polluted. In the 2020 satellite image, the dense expansion of the residential areas could be observed (Figure 5.10). While the main

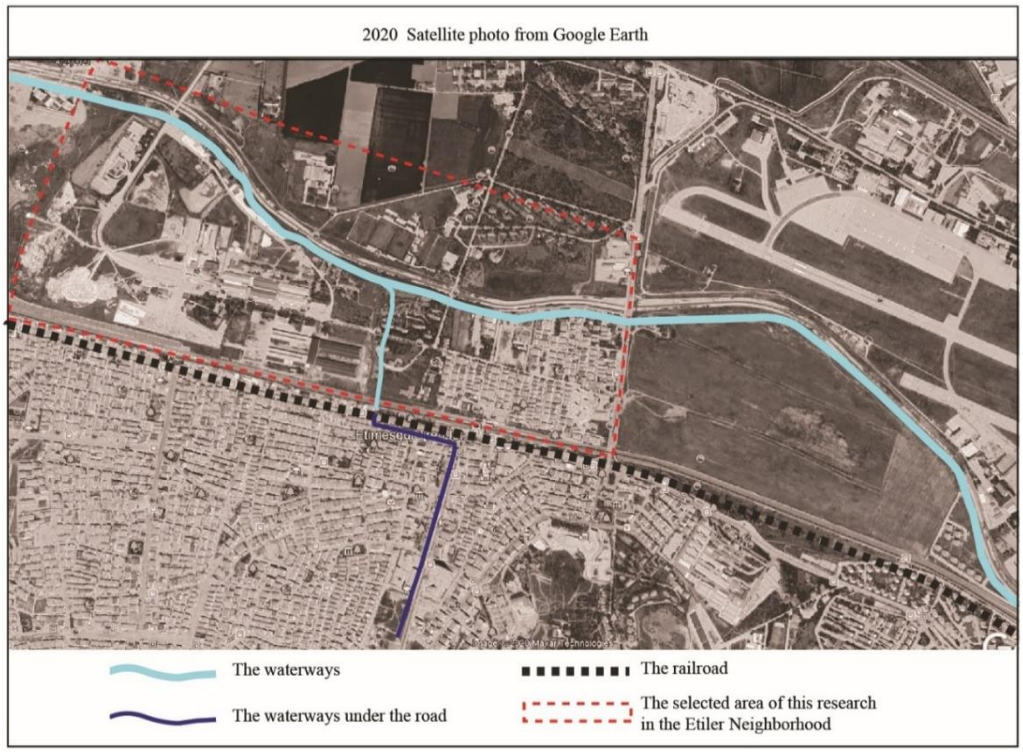


Figure 5.12. 2020 Etimesgut aerial photo . Source: Google Maps 2021 (Edited by the author)

branch of the Ankara stream and the section that passes by the factory are natural, the roads and parks could be observed in the covered sections.

5.3 Ankara Stream and the Etiler Neighborhood

Etiler neighborhood includes the Sugar Factory and residential areas as seen in Figure 5.11. Although both areas are called Etiler, they demonstrate different characteristics. Also, their relationships with the Ankara stream are different. Thus, the relationship between the sugar factory and residential areas in the Etiler neighborhood and Ankara stream is discussed in the following two sections.

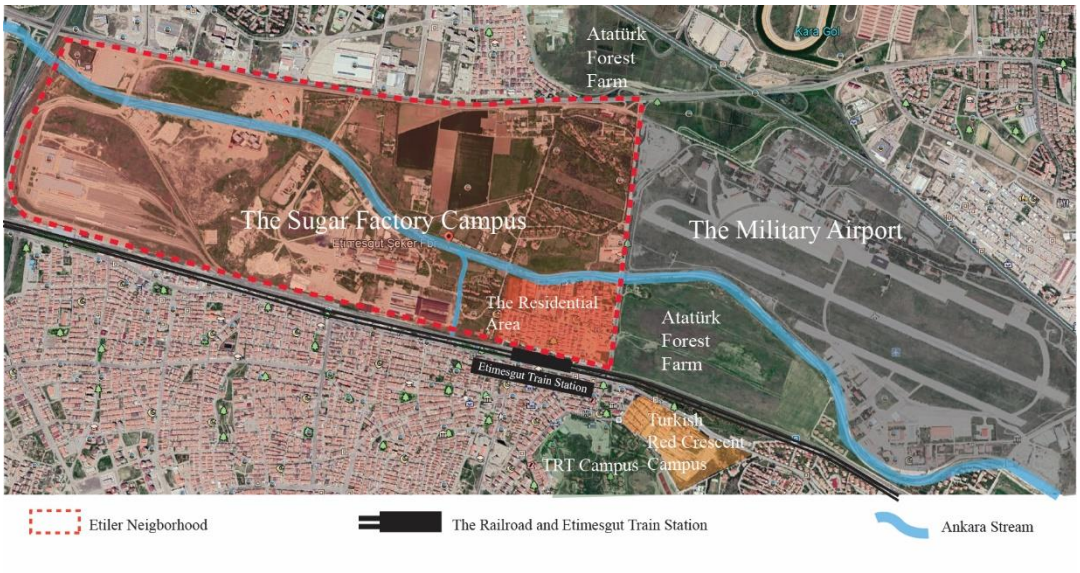


Figure 5.13. The Etiler neighborhood demarcation that includes residential areas and the sugar factory. The graphic was developed by the author based on a 2020 satellite image.

5.3.1 The Ankara Stream and the Residential Area

Etiler neighborhood residential area is surrounded by the sugar factory on the northwest, military area on the east, the railroad on the south, and the Ankara stream on the north (Figure 5.11). Thus, although it is close to the Etimesgut center, the neighborhood is relatively isolated when compared to the other neighborhoods. Due to its location, the Etiler neighborhood serves as a buffer zone between different geographies, urban infrastructures, and urban programs. The main body of the Ankara stream forms a concrete boundary due to the minimal relationship between the residential area and the stream. It flows in an open concrete culvert. A road bordered by a railing runs next to the stream. The road is dilapidated and lacks a sidewalk. This road is not very suitable for both pedestrian and vehicle traffic. It provides just a fast throughway. In other words, the stream banks completely lack an organic and access relationship with the residents. Similar to the rest of Ankara, it was a natural landscape until the 1950s and polluted gradually. Furthermore, slum development was rapid in the Etiler neighborhood. Thus, low-income families lived in the area. Until the 1990s, the neighborhood was almost entirely a shanty town.

Figure 5.14. The relationship between Etiler residential area and the Ankara stream. Photo by the author, December, 2020.

The odor problem decreased after the rehabilitation of the stream around the 2000s. However, the pollution persisted. Today, the majority of the slums are transformed into apartment blocks.

As the residential buildings were developed on one bank, the other bank included only the sugar factory property. The photo was taken from the bridge on Etiler street towards the sugar factory and exhibits the poor connection between the neighborhood and both stream banks (Figure 5.12). There is no spatial organization that allows the interaction between the residents and the water. There are two types of housing in the neighborhood: three-story apartments and squatter homes (Figure 5.13). Generally, low and lower-middle-income residents prefer the neighborhood. Especially in the vicinity of the stream, the slum buildings are denser. In contrast, 2-4-story houses are predominant near the railroad and Etiler street. They are new and well-built when compared to the squatter houses**.** The residents of this neighborhood accept these boundaries and are accustomed to live with the noise of the trains, the odor of the sugar factory, airplane noise, and the stink of the Ankara stream.

Figure 5.15. Resdiential areas along the Ankara stream in Etiler neigborhood. Photo by the author, December, 2020.

Figure 5.16. Ankara stream near the Etiler Street towards the Sugar Factory. Photo by the author, December, 2020.

Figure 5.17. The railroad next to the İstasyon street in Etiler neighborhood. Photo by the author, December, 2020

5.3.2 The Ankara Stream and the Etimesgut Sugar Factory

The Etiler Neighborhood includes both industrial and residential zones. The Etimesgut Sugar Factory is an enclosed environment with a unique history. The foundation of the Etimesgut Sugar Factory dates back to 1962[15]. Its proximity to the railroad[16] and Ankara stream were significant advantages for the factory in terms of raw material supply and treated wastewater discharge. According to the Uybadin-Yucel Report 1957, the site is flat at a lower elevation when compared to the urban center, preventing the polluted water to reach the center. The water intake is supplied easily by the stream and wells. Furthermore, sugar beet cultivation is significant in Ankara province. Thus, all these factors led to the selection of the district for the construction of a sugar factory (Uybadin & Yücel, 1957).

The sugar factory shaped the social and spatial characters of the district in addition to its economic contribution. According to Doğan, the foundation of several factories aimed to transform the agricultural society into a modern society in the early republican period (Doğan, 2009). The Etimesgut Sugar Factory was an example of that idea with the introduction of modern campus life. The factory campus included

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[15] In İzmir Economy Congress organized in February, 1923, Atatürk underlined the importance of economic and industrial developments (Yücel, 2015, pp. 19-20). Agricultural industry and agriculture were primary means of living in Turkey. Thus, the government supported the development of sugar industry. After the establishment of the parliament, sugar factories, the first of which was established in Uşak in 1926 were founded all over Turkey. In adddition to the promotion of industrial development, Karayaman argued that it aimed to involve a wider segment of the society in production through sugar beet farming[15] (Karayaman, 2012, p. 86) in the first decades of the republic.

[16] Historically, the first railroad lines were constructed during the Ottoman Period. Construction of the İzmit- Ankara railroad was started in 1889. The first train service was introduced in 1873 (Murat, 2018, p. 123). The linet hat started in İstanbul reached Ankara. According to Tekeli, construction of the railroad between İstanbul and Ankara boosted industrial development along the railroad (Tekeli, Ankara'da Tarih içinde Sanayinin Gelişimi ve Mekansal Farklılaşması, 2010, p. 135). Not only the sugar factory but also other factories are located along this railroad.

various spatial and social programs such as a gym, courts, a school, a movie theatre, and a guesthouse (Öztürk, 2019). Etimesgut Sugar Factory is located at an intersection between rural and modern lifestyles. The modern lifestyle established in the factory actually reflected the way of life that was desired to be adopted by the entire city and the country. (Öztürk, 2019, p. 21) However, these social activities were mostly confined to the campus since the establishment of the factory. Thus, the entertainment facilities did not actually serve most residents. Furthermore, these activities died off as the sugar factory lost its popularity. For example, no movies have been shown since the 1980s. In "Effects of Sugar Industry on Urban Development," the inadequacy of the relationship between the factory and the city was emphasized (Öngören, Sönmez, & Özkol, 2019). That was associated with the remoteness of the factory site to the urban center (Öngören, Sönmez, & Özkol, 2019) Yet, this could not be the only reason since the factory could not establish a close relationship even with the local residents. According to Öztürk, the entrance of the public to social areas in the sugar factory was free in the original 1958 plan (Figure 5.16). However, the implementation did not follow the original plan in 1962; the entrances were controlled. In the current utilitarian map, the three controlled gates could be observed in Figure 5.19. Thus, the gates prevented Etimesgut residents to access the social facilities. For example, in the 1980s and the 1990s, the security did not even allow the children of the workers to ride their bicycles on the campus. Nonemployees were not allowed to use the social spaces in the factory. However, the tea garden, the wrestling, football, and basketball arenas have been open to the public (Öztürk, 2019). Today, access to the Factory campus is still limited. Thus, the sugar factory provides closed social life facilities and protected the residents by a wall.

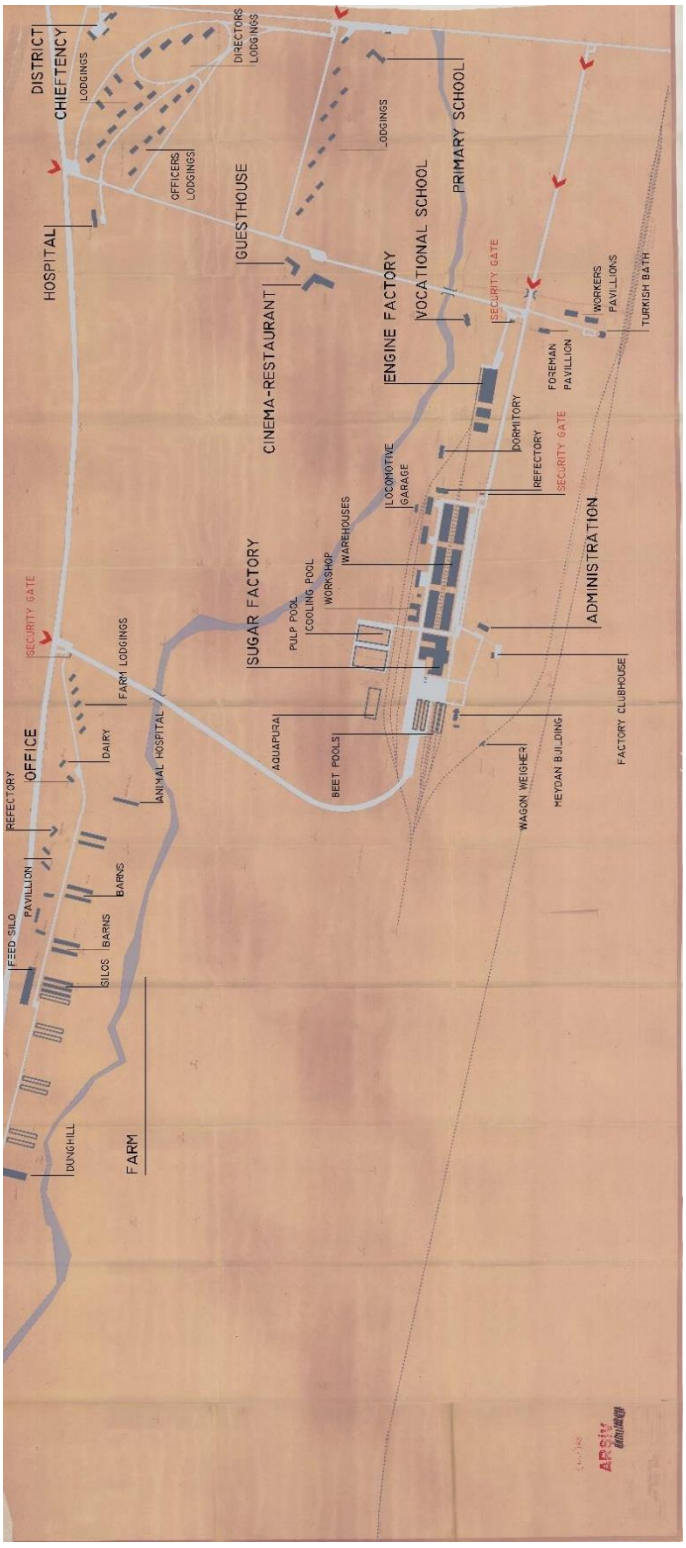

Figure 5.18. 1958 Sugar Factory site plan
(Etimesgut Sugar Factory Archives)

Sugar Factory did not only aim to provide social integrity but also to generate an integrated environment when it was first established. Although most are not used today, the campus hosted several parks, gardens, and social recreation areas (Figure 5.18). The plants, vegetable, and fruit products were sold between the 1960s and the 2000s (Öztürk, 2019). There was a coppice forest, lodging gardens, and greenhouses. These served as the lungs of the concrete Etimesgut. Thus, the Atatürk Forest Farm and the sugar factory campus created a continuous green infrastructure in Ankara (Figure 5.17). However, the residential areas created an obstacle that broke the green belt between the Atatürk Forest Farm and the factory campus.

Figure 5.19. The green belt between the Atatürk Forest Farm and the Etimesgut Sugar Factory. The graphic was developed by the author based on a 2020 satellite image.

The sports arenas and social entertainment facilities were located along the northern bank of the Ankara stream (Figure 5.19). However, there was no recreational water facility. The current relationship between the Ankara stream and the sugar factory is as flawed as the same between the stream and residential areas. The four photographs support that fact. In the first picture, the main Ankara stream could be observed (Figure 5.20). In 2009, the vicinity of the Ankara stream was improved. It still looks dirty but it no longer smells bad. As seen in the second and the third photographs, both banks of the stream were planted (Figure 5.20). Even walking or taking photos

is difficult along the river due to vegetation. Towards the south, the single tributary to the stream could be observed and it also looks dirty and lacks maintenance. Just before the railroad, the stream becomes narrow, flows into the concrete culvert, and then disappears in the fourth picture (Figure 5.20, the fourth picture).

Figure 5.20. Coppice forest, 2017 (Öztürk, 2019)

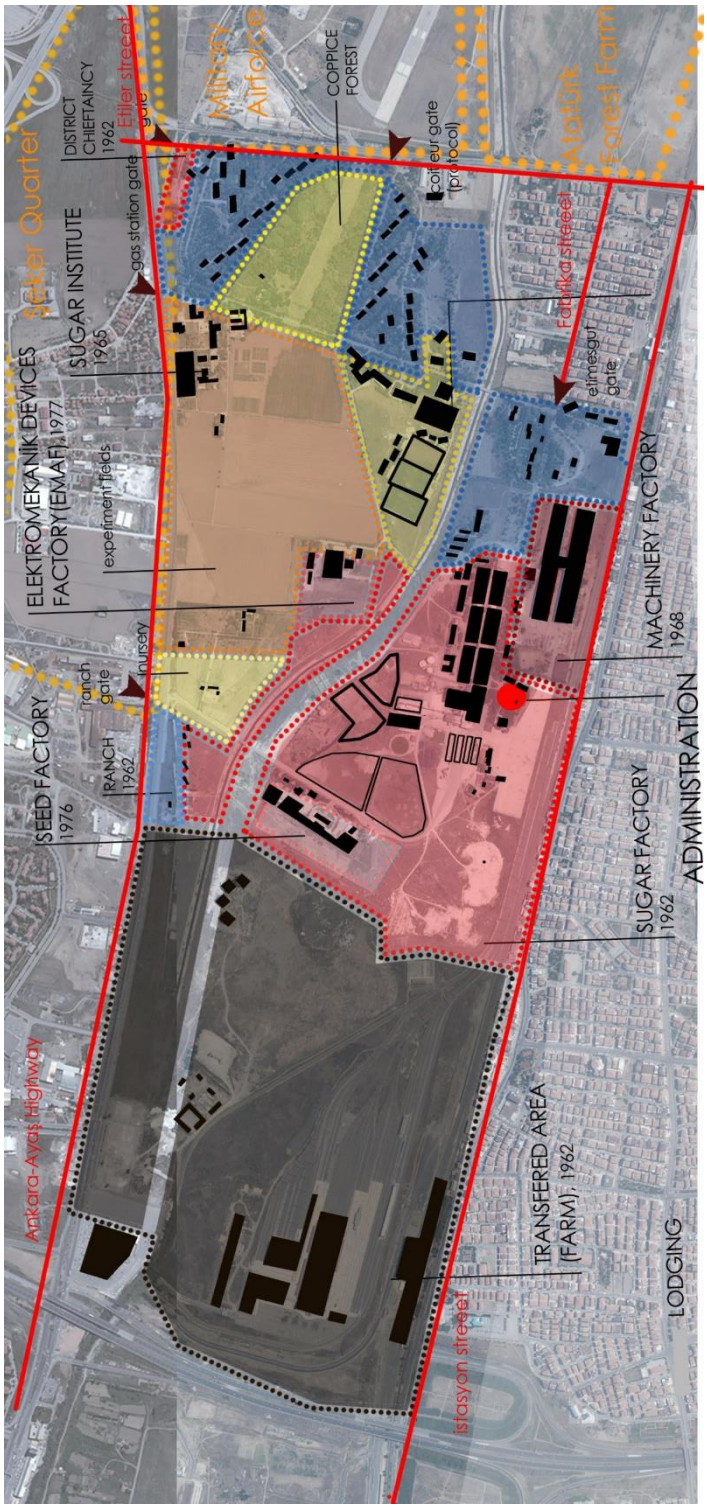

Figure 5.21. The current utilitarian map of the sugar factory. The yellow areas are the social zones (Öztürk, 2019).

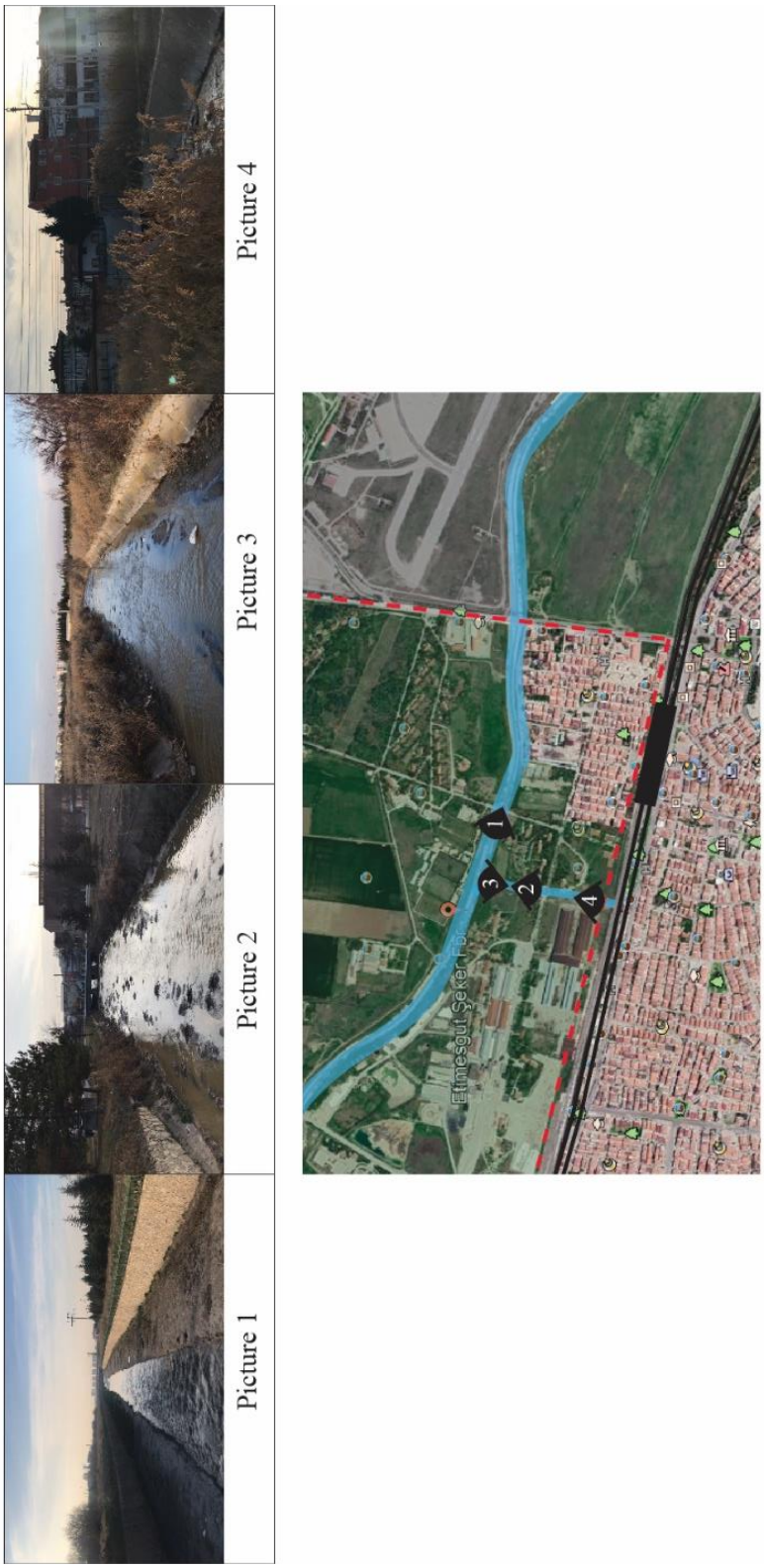

Figure 5.22. The current map of the Ankara stream near the sugar factory. Photos: Merve Öztürk, January 2021.

5.4 The Ankara Stream, the Atatürk Forest Farm, and the Military Airport

The Ankara stream flows through the Atatürk Forest Farm, the Military Airport, and residential areas, then reaches the sugar factory (Figure 5.17). The military airport and the Atatürk Forest Farm are located to the east of the Etiler neighborhood. The Ankara stream promotes the agricultural fields and farming needs. In the present study, Atatürk Forest Farm and Military Airport were analyzed since they form another boundary simşlar to the sugar factory in the Etiler neighborhood.

Atatürk Forest Farm was established in 1925 on 200 hectares of land purchased by Mustafa Kemal Atatürk and was called the "Forest Farm". It was expanded to 520 hectares after the acquisition of new land between 1925 and 1937 and was donated to the Treasury on June 11, 1937, by Atatürk. The "Atatürk Forest Farm Directorate" was established with the Code No. 5659 enacted on March 24, 1950. The name of the farm was changed to "Atatürk Forest Farm", and survived to the present day (Atatürk Orman Çiftliği Süreci, 2020). In the farm, ecological, historical, agricultural, breeding, botanical, biological, landscape, architectural, and urbanism activities have been conducted. (Sert, 2017) Thus, several theses, reports, academic research, and books have been authored about the farm due to its value for Ankara.[17] The Atatürk Forest Farm was registered as a 1st Level Natural Site in 1998, it became a 3rd Level Natural Site in 2012. (Atatürk Orman Çiftliği Süreci, 2020) Despite the

[17] There is abundant information on AFF in several research conducted by the Architectural Studio in METU indtructed by Ali Cengizkan. These studies are available in the following website: http://aocarastirmalari.arch.metu.edu.tr/tez-ve-arastirmalarda-aoc/

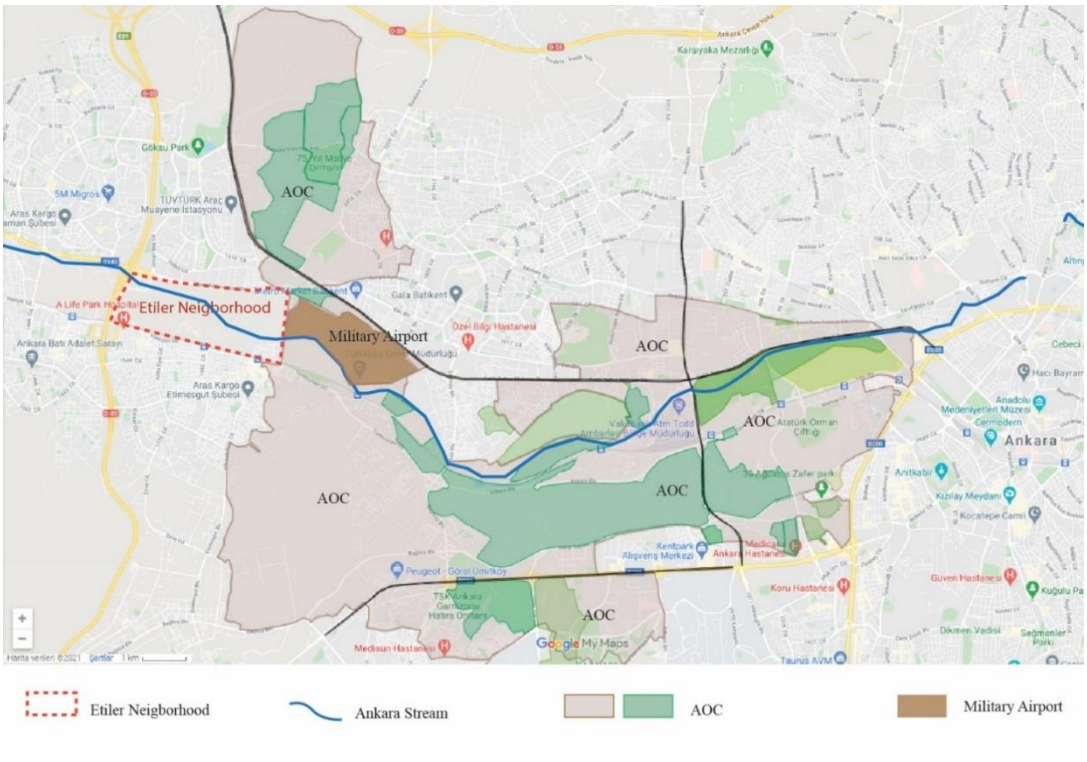

Figure 5.23. The current Atatürk Forest Farm and the Military Airport map (Hangi Açık Alan AOÇ, 2014). The current limits of Atatürk Forest Farm and the Airport are based on METU Architecture Faculty web site and the graphics are developed by the author.

tangible and intangible value of the Atatürk Forest Farm, it is not possible to predict the future of this land.

Over time, the land use has changed in the Atatürk Forest Farm. A certain part was used for industrial development. Etimesgut Airport was constructed in 1930 on previous farmland by the Turkish Aeronautical Association. In 1941, Etimesgut Türk Kuşu Aircraft Factory was established. The factory produced glider planes until 1954 (Tekeli, Ankara'da Tarih içinde Sanayinin Gelişimi ve Mekansal Farklılaşması, 2010).

Figure 5.24. Etimesgut Aircraft Factory (Yılmaz, 2021).

Today, the Ankara stream flows through the Military Airport (Figure 5.22). A location near Ankara stream was reasonable for irrigation purposes. In the present study, the reasons for the construction of a military zone in the district and its relationship with the Etiler neighborhood were investigated. The Etiler neighborhood section near the Atatürk Forest Farm includes green areas as seen in the aerial photos and satellite images (Figure 5.17). The first impression could deceive the observed since these zones look like public spaces, recreational areas, or parks. However, these areas are not open to public access.

The historical analysis of the unique Etiler neighborhood would reveal that it has been a critical industrial and agricultural zone. Ankara stream provided agricultural and horticultural facilities during the first half of the 20th century. The establishment of the Sugar Factory in 1962 and the aircraft factory in 1942 next to the former led to the domination of the area by industries. The sugar factory has always been one of the greenest and most attractive centers in the district. The analysis of the initial planning decisions concerning the sugar factory revealed that the aim was social integration in Etimesgut, and included various social programs. Ankara stream was employed only for the disposal of factory waste. It was not associated with social activities. On the other hand, there was no relationship between the Etiler neighborhood residential area and the sugar factory or the Ankara stream. However, the photographs and postcards demonstrated that the Hatip and İncesu streams used to be picnic and promenade areas during the first years of the republic. Thus, the contribution of the Ankara stream, tributed by these two streams, to social and cultural life and urban beauty should not be ignored. Today, the Ankara stream is polluted sewage and industrial waste channel and is not associated with the district. Etiler neighborhood is a remarkable space with its relationship with nature due to the facilities in the sugar factory and the Atatürk Forest Farm, considering the dense population in the area. Recognition and reclamation of the Ankara stream basin require further research due to the spatial, social, economic, and ecological potential and benefits in historical and spatial contexts.

CHAPTER 6

CONCLUSION: POTENTIAL STRATEGIES

On both micro and macro scales, water has been completely associated with the city since the first settlements. As mentioned in Chapter II: W*aterways in Urban Context*, water is a resource that interconnects several socio-technical networks, systems, and cultural meanings across time and space (Watson, 2019). The relationship between the water and the city is diverse and strong. This association started to weaken due to industrialization and urbanization since the 18th century. In the mid-20th century, several waterways were transformed into sewage channels, polluted, and buried under the roads. Particularly after the 1960s, several cities restored and reclaimed urban rivers and streams. Furthermore, the global climate crisis, in turn, led to dramatic urban transformations and altered the relationship between the city and natural resources.

The urban waterway infrastructure includes significant natural resources, wastewater systems, potential recreational areas, and economic incentives. Thus, urban rivers and streams possess a great potential to improve the social, economic, ecologic, and spatial properties of the cities as discussed in the third chapter. In previous international projects, it was observed that stream or river reclamations that led to the emergence of new spaces improved the social, economic, ecological, and spatial properties of the urban spaces. They constitute promising examples for the improvement of the relationship between several cities and urban water resources. Thus, the reclamation and restoration of the urban waterways should be reconsidered.

There are several waterways in Ankara. As mentioned in Chapter III, the streams provided beautiful landscapes before the 20th century, and they were designed as an integrated landscape fabric during the first half of the 20th century. However, the

urban waterscape was lost in the late 20th century. Bütüner and Sert emphasized the loss of the integrated approach and the diversity of the Atatürk Boulevard and the Hatip Stream Valley landscape especially after 1957 (Bütüner & Sert, 2021). The Ankara Stream also experienced a similar fate. Flood risk, epidemics, industrialization, and rapid urbanization led to a change in waterways similar to the other parts of the world. Thus, the streams were polluted and culverted into concrete channels. Etimesgut, a suburban district in Ankara, lost its relationship with the Ankara stream during the second half of the 20th century. In the first half of the 20th century, the Ankara Stream fulfilled agricultural and industrial water requirements in Etimesgut. However, based on the present study data, the stream was still clean in that pariod. Atatürk's mansion was constructed with a view of the stream (see Chapter V). However, the residents dried the wetlands and filled the land with dry soil in Etimesgut to avoid malaria. In the second half of the 20th century, certain sections of the Ankara stream was covered due to flood risk and high pollution. The construction boom and infrastructural problems broke the connection between the stream and the city. As a result, the residents started to avoid the banks of the stream. In other words, they forgot about the existence of the Ankara stream, which once flowed through the district, proving nice views.

Thus, the relationship between Etimesgut and Ankara Stream should be reevaluated. Based on the examples discussed in Chapter III, potential spatial, social, economic, educational, and ecologic strategies are suggested for the Etiler neighborhood in the Etimesgut district.

6.1 Ecologic Projections

Initially, the water quality should be improved in the Ankara Stream. Due to sewage and industrial discharge-induced pollution, the water quality in the Ankara Stream is quite poor. Rehabilitation of the water quality was prioritized in the Seine River, Lea River, Grorud Valley, Cheonggyecheon stream, and Little Sugar Creek reclamation projects. The separation of stream water and storm wastewater discharge could improve water quality. However, the pollution problem could not be solved only by

focusing on a cross-section, it should be scrutinized with a holistic approach in the province. Because the water flow is continuous, and regional interventions would not solve the pollution problem in the long term.

After hydrological improvement, the renewal of the ecosystem could ensure the reclamation of the lost environment in the region. To improve biodiversity, the area could be rehabilitated with the reintroduction of endemic plant and animal species. Furthermore, the district has a significant potential to connect with the green infrastructure due to the presence of green spaces in the Atatürk Forest Farm and the sugar factory. Thus, green and waterway infrastructure could provide an integrated environment in the district. This would contribute to the transformation of the city from a hunk of concrete into a more natural environment-friendly structure.

6.2 Spatial Projections

Due to easy access to the railway and highway networks, Etimesgut district has been a preferred development area despite its distance from the urban center. The Atatürk Forest Farm and the Etimesgut Sugar factory include green spaces in the district. However, the residential area cuts the flow of the green spaces. To ensure the continuity of green spaces, the landscape could be redesigned in the Etiler neighborhood. Finally, as seen in the Little Sugar Creek case, the Ankara stream and the surrounding area could serve as the lungs of Etimesgut.

Furthermore, the green and blue infrastructure could also be integrated. Currently, the Ankara steam flows in a semi-open concrete culvert, which is surrounded by an iron railing through the residential area in the Etiler neighborhood (Figure 5.12). The natural habitat is still preserved within the sugar factory property. The concrete culvert provides protection against floods; however, it also disconnects the communication between the stream and the residents (Figure 5.12). Instead, the development of a natural flood plain would both avoid floods, while improving the connection between the residents and the stream, as seen in the North Carolina case. Thus, the relationship between the stream and the city will be more natural and

organic, and the green infrastructure could provide a green riparian corridor in Etimesgut and Ankara, leading to the development of new public spaces. Thus, the whole Ankara stream could become an environmentally integrated part of Ankara.

6.3 Socio-Economical Projections

It is known that cities need breathing and socialization spaces due to over-construction and population growth. For example, the Seine River revitalization was one of the most significant social motivators for the Parisians. Because the waterways allowed a connection with nature and several social activity facilities such as kayaking, swimming, fishing, concerts, etc. Thus, the banks of the Ankara Stream could be reconsidered as a public space that provides social activities in Etimesgut. The Ankara stream could be transformed into a massive recreational public space for this purpose. As seen in the aerial photos, the building density has increased significantly in Etimesgut. Transformation of the Göksu Park was an example that allowed the connection between the residents and the water in Etimesgut. The high occupancy in Göksu-Park demonstrated the need of Etimesgut residents for such spaces. However, according to a previous on Göksu Park, the residents complained about the inadequacy of water-related social activities in the park (Sarıkaya, 2007). To determine the social activity preferences of the residents, further studies could be conducted by the government. This type of interaction with the occupants could lead to more efficient results for a future reclamation project. As mentioned above, surveys were conducted before the implementation of the Cheonggyecheon stream daylighting project. Thus, the occupants were able to participate in the transformation process and decisions.

The analysis of the Etimesgut Sugar Factory campus revealed various social and sports facilities in the campus such as a movie theater, a theater, wrestling, basketball, football arenas, a tea garden, and parks (Chapter V). Although the factory campus provides several social activities, it is mostly reserved for the campus residents. Only a few social activity areas are open to public access. As mentioned in Chapter V, this is due to the controlled campus access, which limits the connection

between the campus and other residents in Etimesgut. That also led to the separation of the modern social life on campus and the life in the Etimesgut district. It was observed in the Grorud Valley daylighting project that the new spaces allowed social integration between the immigrants and Norwegians. By supporting social activities and easing access to the sugar factory campus, the Etiler neighborhood section of the Ankara stream may become a social activity center.

While such activities support social life, they also create economic dynamics in the region. Furthermore, economic mobility could improve employment. Also, social-ecological and spatial developments in the district could increase the visitor demand. The review of the global examples demonstrated that the revitalization projects led to profound economic benefits. For instance, London Lea Valley and Korean Cheonggyecheon Creek revitalization projects have served as tourism commercials for the related cities. Although such projects are long-term or high-cost investments, they significantly contributed to the national economy in the long term. Thus, the long-term social and economic benefits of revitalization should be taken into consideration in Etimesgut.

6.4 Educational Projections

Agriculture courses were instructed to the students during the first years of the republic in Etimesgut (Figure 6.1). As a model village, Etimesgut was a critical space that focused on agricultural education. Furthermore, the sugar factory included a sugar institute where research and field experiments were conducted on sugar cultivation with the latest technological tools of the era (Öztürk, 2019). The experimental fields and the sugar institute include ample space on the campus (Figure 5.19- Figure 6.2). The flowers that would be planted or delivered to the offices were grown in the park-garden greenhouses. Not only the ornamental plants but also vegetable and fruit seedlings were also cultivated (Öztürk, 2019, p. 88). While the operations of the institute were serious until the 2000s, it is not quite active today. The decrease in agricultural activities and research was associated with

government policies that did not prioritize agrarian movements when compared to the early republican era in Turkey.

The revitalization site became a site for hydrological and botanical studies due to the Little Sugar Creek Daylighting project. The Etiler neighborhood could also become a site for hydrological, botanical, or agricultural studies, similar to the Little Sugar Creek in North Carolina. Furthermore, the Etiler neighborhood could be integrated with the Atatürk Forest Farm to provide a larger space for the above-mentioned transformation. This could also provide a site also for education in agriculture departments in colleges and even in primary schools. Thus, Etimesgut, which was first established as a model village, could continue to serve as one by becoming an educational campus where technological and scientific innovations could be employed.

Figure 6.1 Agriculture class students in Etimesgut (Yılmaz, 2021).

Figure 6.2 A greenhouse in sugar factory campus (Öztürk, 2019).

Finally, due to the current climate crisis, potential social, ecological, hydrological, and spatial reclamations should be reconsidered in the Etiler neighborhood. In the case of a revitalization project for the Ankara Stream, the possible projections and the challenges have been indicated in table 6.1. On the other hand, the railway infrastructure is another dominant characteristic of the district. In the article titled "A Railway as Urban Space: The Sincan- Kayaş Commuter Line", the relationship between the landscape on the Sincan- Kayaş commuter line and the surrounding environment was analyzed (Bütüner, Alanyalı, & Çavdar, 2017). The authors revealed that the relationship between the railway line and the streams and green areas, which developed together, was interrupted over time, especially in the late 20th century (Bütüner, Alanyalı, & Çavdar, 2017). Etiler neighborhood and Etimesgut district could further be investigated based on the above-mentioned relationship. Although the present thesis focused on the Etiler neighborhood, further studies could scrutinize lost streams and integrated blue and green infrastructure in

different neighborhoods of Ankara. Thus, re-establishment of the broken water-city relationship in Ankara and reconstruction of fragmented open spaces could be initiated to achieve a more efficient ecological and social urban flow. A multidisciplinary approach could be adopted in the implementation of the above-mentioned potential. Because a practical transformation project would only possible through the collaboration of architects, landscape architects, urban and regional planners, biologists, hydrologists, and engineers.

Table 6.1. Possible projections and challenges for Ankara Stream revitalization.

	Scale	***Possible Projections***	***Possible Challenges***
Ankara Stream	Neighborhood scale	Ecological Projections • Renewal of ecosystem • Water quality improvement • Increasing bio- diversity • Green and blue infrastructure integrity Spatial Projections • Neighborhood scale: Integrity of the Sugar Factory, Atatürk Forest Farm, and the Etiler Neighborhood • Building scale: Integrity of the houses with the Ankara Stream Socio- Economic Projections • Social and sport activities' integrity in factory campus with the Etiler Neighbohood • New recreation and public areas • Economic contribution due to the emergence of new social and commercial areas Educational Projections • Agricultural • Hydrological and • Botanical education possibilities integrated with the Sugar Factory and Atatürk Forest Farm	• Long term returns • Gentrification Risk after the revitalization • High cost project • Noise and dust during the construction

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