

Water Heritage for Sustainable Cities

Proposals for the Revalorization of the Valens Aqueduct in Istanbul

edited by
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NIT URBAN HERITAGE LAB

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Proposals for the Revalorization of
the Valens Aqueduct in Istanbul

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Preface: Linking Water Heritage and Water Crisis

Fokke Gerritsen
Netherlands Institute in Turkey

Fresh water is as critical for human survival as it is scarce, and one of the most pressing aspects of the current climate crisis is the water crisis that cities and communities across the globe are increasingly faced with. As long as there have been cities, reliable access to fresh water has been on the minds of urban populations and the impressive historical structures for water supply, distribution and consumption that can be found in many cities attest to the great investments made in past centuries in water infrastructure. These two statements may seem to belong to two very different dimensions of life, no more than loosely connected by the terms water and cities. Nevertheless, the 2022 NIT Urban Heritage Lab Water Heritage for Sustainable Cities took as its point of departure the assumption that appreciation for urban water heritage and awareness of the water crisis can be connected in mutually beneficial ways.

The validity of this assumption was explored in the course of the program both on theoretical and on practical levels, ultimately with the aim of developing informed strategies that can help make contemporary urban life sustainable in times of climate crisis through the use of tangible and intangible water heritage. Concretely, focusing on Istanbul as a megacity facing increasing water shortages and as a historical capital with monumental aqueducts, cisterns, water distribution facilities, bath houses and fountains attesting to close to two millennia of water supply efforts, the 2022 NIT Urban Heritage Lab developed ideas and plans for the re-use of the Valens Aqueduct. 'Re-use' in this context refers not to connecting the ancient aqueduct to the modern pipes and pumps that bring water to the city, but to any other kind of use. This includes uses that give residents a sense of connection to their local

predecessors of centuries ago, a sense of belonging to their urban surroundings or even a sense of ownership of the tangible and intangible heritage among which they lead their lives. And it includes uses that highlight the increasing difficulties of cities like Istanbul to prevent water shortages in a time of water crisis and increase awareness of the drastic changes necessary to keep urban life sustainable.

In this volume we share with you the insights, ideas and plans for reuse that have been developed to date in the NIT Urban Heritage Lab. The four proposals that form the core of this volume use the aqueduct as an inspiration, as an educational tool, as a stage for water festivals and art exhibitions, as a viewing point and as an object to be viewed and enjoyed from nearby green spaces and pedestrianized streets. They use the aqueduct as a setting for community-led cultural and economic activities, as a rainwater harvesting installation as well as in numerous other ways. The proposals are the fruits of the collaboration of students and junior professionals from multiple disciplinary backgrounds and different nationalities, carried out over a short time as part of an education program. Although not designed for immediate implementation, they are ready to serve as a rich source of inspiration for scholars, professionals, planners, and policy makers.

Context to the proposals is provided by chapters on the history of Istanbul's water supply, a survey conducted to assess the public appreciation of the Valens Aqueduct, and on gamifying water heritage. Two reflections on the proposals complete the volume.



*Course participants and instructors at Güzelce Kemer Aqueduct
Source: NIT Archive*

Water Heritage for Sustainable Cities: An Overview

Özgün Özçakır, Middle East Technical University
Fokke Gerritsen, Netherlands Institute in Turkey
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Introduction

The conservation, management, and sustainable development of historic urban landscapes, as well as their transformation, are necessary to address urban challenges. In this process, research institutions can contribute by providing the most recent academic insights through collaborating with various societal partners and establishing a forum for the exchange and discussion of existing and new knowledge. Teaching professionals and researchers at the start of their careers about sustainable transformation through knowledge-sharing platforms will contribute to a broader recognition of sustainability and sustainable development.

With this in mind, and following the successful 2021 UHL course Industrial Heritage for Sustainable Cities (Gerritsen et al., 2023), for the autumn of 2022, the Netherlands Institute in Turkey (NIT) turned to the topic of water heritage, and specifically the tangible and intangible heritage of urban water supply systems. A series of online and in-person meetings, under the title Water Heritage for Sustainable Cities, had a two-fold aim: to offer an education program to selected graduate students and junior professionals and to establish a platform to discuss best practices and challenges among academics, professionals and organizations active in the field of water heritage.

The Water Heritage for Sustainable Cities program aimed at bridging the gap between theory and practice to tackle the challenges for the sustainability of urban heritage places. Therefore, the participants in the program developed four proposals for the transformation and reuse of an iconic water heritage site in Istanbul, the Valens Aqueduct. These emphasize the role of sustainable development in

addressing contemporary urban challenges in multilayered cities like Istanbul, and demonstrate the potential of novel interventions in achieving urban sustainability.

Education Program

From September to December 2022, NIT and its partner institutions offered a graduate-level course entitled “NIT Urban Heritage Lab: Water Heritage for Sustainable Cities.” With a focus on Istanbul’s rich water heritage, the course investigated past experiences and current and future challenges of urban water supply. It questioned how public appreciation for water heritage could be increased, and it explored how water heritage, as represented by the tangible and intangible trace of the age-old challenge of providing urban communities with water, can act as a driver for sustainable development and raise awareness of contemporary water issues worldwide. These and similar kinds of issues and dilemmas that require a multi-disciplinary approach are what heritage specialists will increasingly have to deal with in a world in which our landscapes will fundamentally change due to continued urbanization and the impact of the climate crisis (Labadi, 2022).

A group of 20 participants affiliated with Turkish and Dutch institutions, selected from a large number of applications, took part in the course. The course participants represented diversity in nationality, disciplinary background and interests. Among the participants were young professionals and students of architecture, urban planning, conservation of cultural heritage, heritage studies, history, art history, art and archaeology.

The course provided them with insights into global practices for transforming and reusing water heritage places. Scholars and experts from the Netherlands and Türkiye (two countries with a rich past in terms of water-related developments) discussed historical and contemporary topics relating to water.

The Valens Aqueduct formed the common thread throughout the course and the participants investigated the material and immaterial history of this imposing landmark in today's historical peninsula of Istanbul. Recognized by many inhabitants of the city as an aqueduct (see Arslan et al. in this volume), it no longer has a function in the city's water supply. It was originally built in the fourth century as part of "the longest Roman waterway" and its biography includes multiple phases of use, disuse, partial collapse and repair, as part of water supply systems that brought water from sources far inland in Thrace, in an ever-changing urban context throughout multiple imperial constellations. And whether in active use or not, it always triggered the imagination of writers and artists (see Verhoeven, this volume).

In an eight-week long group assignment, the participants developed proposals for action for the re-valorization of this multi-layered water heritage object. Their brief included research on the historical and cultural significance of the aqueduct, analyzing its contemporary urban context and the potential for planning solutions to increase (pedestrian) accessibility and visibility, and developing and designing items to increase the public's engagement with water heritage and its awareness of contemporary water challenges and need for sustainable development. Given freedom in what these 'items' could be, the participant groups included plans for

rain-harvesting installations feeding green spaces, water and art festivals, pedestrianization of the surroundings areas and apps for heritage walks. The proposals can be found in shortened form as chapters in pages 28 to 86 in this book.

Platform for Debate

The program also brought researchers and practitioners from different disciplines together for interdisciplinary debates on the transformation of water heritage places, focusing on sustainability, circularity, and inclusivity in theory and practice. In that regard, the program aimed to provide a platform to discuss sustainable transformations of water heritage in an international academic setting and to create an environment for exchange between scholars, professionals, governmental agencies, and community organizations. Furthermore, to reach a broader audience and create greater impact, most of the online meetings were open to the interested public.

In parallel to the Water Heritage for Sustainable Cities program, researcher Mariëtte Verhoeven of Radboud University in Nijmegen, held an Embassy Science Fellowship at the Netherlands Consulate-General in Istanbul and at NIT to develop an integrated model for the preservation of and public engagement with water heritage in Istanbul. Embassy Science Fellowships are funded by the Netherlands Organization for Scientific Research (NWO) and the Netherlands Ministry of Foreign Affairs. In addition to contributing to the course, Mariëtte Verhoeven used the fellowship to build a network of relevant people and organizations in Istanbul, and organized a one-day workshop Engaging with Istanbul's Water Heritage, during which experts from the Netherlands

and Türkiye exchanged views and developed common ideas. Output of the fellowship included an open access article (Verhoeven, Gerritsen & Özçakır, 2023) and a video report posted on YouTube (<https://www.youtube.com/watch?v=9L3CB8yYJ1k>).

Program overview

“Water Heritage for Sustainable Cities” ran between September and December 2022 and was conducted in a hybrid (both online and face-to-face) format and consisted of four parts.

Part 1: Weekly online public lectures and discussions presented by leading specialists from the Netherlands and Türkiye (September 2022);

This first part of the course was a four-week-long online lecture series. Every week the course focused on a particular theme on the current issues of the water heritage in the Netherlands and Türkiye.

Part 2: A three-day intensive program in Istanbul with site visits and on-site assignments (20, 21 and 22 October);

During the second part of the education program, the course participants met with the instructors in Istanbul for an intensive program of in-person lectures, field trips, on-site surveys, and workshops. Field trips were organized to the Valens Aqueduct as well as the aqueducts in the north of Istanbul. The course participants witnessed the transformation of the aqueducts and their surrounding areas in their own contexts. The Valens Aqueduct and its surroundings were our case study and the main focus of the second part of the course. The participants were asked to form four groups to prepare a final project proposal on the transformation of the aqueduct. The three-day-long, intense, on-site meeting in Istanbul

concluded with group presentations on their initial ideas for transforming the Valens Aqueduct.

Part 3: Developing proposals for action related to the Valens aqueduct heritage site in today’s Istanbul with online presentations and discussions by the experts on participant’s work (October-December 2022);

Throughout the third part of the education program (October, November, and December 2022), the participants continued to work on their final projects, and online gatherings were organized for progress meetings where they received feedback on their projects. They also attended weekly online public lectures by leading researchers and designers from the Netherlands and Türkiye during this period. The projects on the transformation of water heritage places were mostly presented in the third part in line with the idea that they might be inspirational for course participants during the development of their projects for the Valens Aqueduct.

Part 4: Public presentation of the course participants’ project proposals (16 December 2022).

At the conclusion of the course, the participants presented their projects on the sustainable transformation and reuse of the Valens Aqueduct. This book presents the projects that the course participants developed through “Water Heritage for Sustainable Cities” to answer the contemporary heritage and sustainability challenges that urban heritage places confront. As such, the book introduces a wide array of solutions based on the participants’ research questions considering the values and problems of the aqueduct.

Reference List

Gerritsen, F., Özçakır, Ö., Arslan, A., Kayasü, S., Yurdagül, S. (2023). *Industrial Heritage for Sustainable Cities: Proposals for the Transformation of Istanbul's Unkapani Flour Mill*. Netherlands Institute in Turkey.

Labadi, S. (2022). *Rethinking Heritage for Sustainable Development*. UCL Press.

Verhoeven, M., Gerritsen, F., & Özçakır, Ö. (2023). Revitalizing Istanbul's Water Heritage: The Valens Aqueduct. *Blue Papers*, 2(1), 154–163. <https://doi.org/10.58981/bluepapers.2023.1.15>

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Last but not least, the course participants deserve the highest appreciation for their hard work and enthusiasm through the education program.



Course participants presenting their initial ideas during the Istanbul program
Source: NIT Archive

Water for the City: Istanbul's Water Infrastructure in History

Mariëtte Verhoeven
Radboud University

Emperor Constantine the Great (r. 306-337), in 324, was guided primarily by political, strategic and commercial motives in choosing to establish the new capital of the Roman Empire, Constantinople, on the site of ancient Byzantium. The location, on a peninsula surrounded by the Bosphorus and the Propontis (now Sea of Marmara), was well defensible and was at a crossroads of important trade routes. From the standpoint of water supply, the choice was less fortunate because the city lacked fresh water. The dependence on the supply of fresh water from outside the city was and still is decisive and characteristic of water management at this location.

Already before Constantine, a water supply line was constructed by Emperor Hadrian (r. 117-138). The source of this so-called Hadrianic line were springs located at Cebeciköy, at a distance of c. 20 km north-west from the lower east end of the peninsula, and further north at the Forest of Belgrade. When Emperor Septimius Severus (r. 193-211) rebuilt ancient Byzantium into Colonia Antonina, the baths of Zeuxippos were connected to the Hadrianic line and Constantine built on the infrastructure of Colonia Antonina but expanded the city towards the hills in the west, where he also erected a new wall. This expansion must also have affected the city's water use and supply. We know from an oration by Themistius for Emperor Valens (r. 364-378) that Constantine and his son Constantius (r. 337-361) undertook initiatives to build a new water supply system (Crow et al., 2008, p. 224). However, the completion and inauguration of a long-distance system consisting of channels, bridges and tunnels is attributed to the prefect Clearchus who, under Emperor Valens, brought "the long-prayed for water" to the city via the so-called Valens line (Crow et al., 2008, p. 225). The source of the Valens line were the springs at Danamandıra and Pınarca

at a distance estimated at 1,000 stades (185 km) by Themistius and over 200 km by modern researchers.¹ The Valens line provided water for, among others, a large Nymphaeum constructed by the city prefect Clearchus who, according to the Chronicle of St Jerome, was also responsible for the construction of the long-distance system (Crow et al., 2008, p. 225). In conjunction with the Valens line, a system that relied on the force of gravity to lead water over long distances through the landscape, the cistern of Modestus was also built, for the storage of water.

Further expansion of the city, marked by the construction of a new land wall, took place under the Theodosian emperors in the fifth century. The wall was built because of increased threats from outside by enemy 'barbarians' and the increased number of inhabitants.² That this growth was accompanied by an increase in water use is evidenced by the mention of eight thermae, four cisterns, four nymphaea, and 153 private baths in the *Notitia Urbis* dating from c. 450 (Crow et al., 2008, p. 229). Two of the cisterns were the large, open reservoirs of Aetius and Aspar, located in the new part of the city between the Constantinian and Theodosian Wall. The water collected in these open cisterns was probably used primarily for agricultural purposes while the underground cisterns supplied the city with drinking water. Apparently, the springs at Damandıra and Pınarca could not supply enough water because the Valens line was extended at this time to springs at Pazarlı, near Vize. The total length of the water supply system, which ran parallel to the Black Sea coast through Thrace, nowadays estimated to be at least 426 km and possibly as much as 564 km and therefore was rightly named "the longest Roman water supply line" by Kazım Çeçen (Çeçen, 1996; Crapper, 2020; Ward et al., 2017).

The most important source attesting to the regulation of water distribution and the maintenance of the Valens water line are seven laws issued under Emperors Theodosius I and Arcadius at the end of the fourth century (Crow et al., 2008, p. 227-229). From these laws we know, among other things, that the diameter of the pipe providing water to a property was determined by the size of the estate; that all taxpayers were liable to contribute labour and materials to repair the system, and that there were severe penalties for diverting water for irrigation and for taking water from an aqueduct rather than from a reservoir.

When the Avars besieged Constantinople from Thrace in 626 and made an unsuccessful attempt to capture the city via the land walls, the Valens line was cut off. Until the restoration under Emperor Constantine V (r. 741-775) in 766, the city must have been supplied with water only via the Hadrianic line.

From the Chronicle of Theophanes for the year 765-766, we get a good understanding of how this limited capacity affected the water supply to the city and of the deployment of manpower needed to restore the Valens Line:

"There ensued a drought, such that even dew did not fall from heaven and water entirely disappeared from the city. Cisterns and baths were put out of commission; even those springs that in former times had gushed continuously now failed. On seeing this, the emperor [Constantine V] set about restoring Valentinian's [sic] aqueduct, which had functioned until Heraclius and had been destroyed by the Avars. He collected artisans from different places and brought from Asia and Pontos 1,000 masons and 200 plasterers, from Hellas and the islands 200 clay-workers, and from Thrace itself 5,000 labourers

and 200 brickmakers. He set taskmasters over them including one of the patricians. When the work had thus been completed, water flowed into the City." (Crow et al., 2008, p. 236)

In the centuries that followed, the long-distance system was maintained and repaired when necessary. However, Emperor Manuel Comnenus (r. 1143-1180) is said to have decided, after a period of drought, not to repair the system that had already partially collapsed (Crow et al., 2008, p. 239). An early fifteenth-century source tells us that the Valens aqueduct still carried water that was used in gardens and orchards. It therefore seems that at least a section of the Valens line was still operating, probably primarily for agricultural purposes.

When the city was conquered in 1453 by the Ottomans under the leadership of Sultan Mehmet II the Conqueror (r. 1451-1481), the population was an estimated 70,000 and the now more limited water supply system would probably have been sufficient. According to Tursun Bey, Mehmet II's biographer, the sultan ordered the restoration of the Byzantine water supply system (Crow et al., 2008, p. 242). The restoration involved the Hadrianic line from Cebeciköy to the valley under the aqueduct bridge between the fourth and third hills now known as the Valens aqueduct (Turkish: Bozdoğan Kemer) where Mehmet II built a group of public fountains called Kırkçeşme (forty fountains). From his time also dates the Ma'zul kemer aqueduct bridge.

The Kırkçeşme water supply line was further expanded by the architect Sinan between 1554 and 1563 and it became the most extensive Ottoman water supply system. This system had thirty three aqueduct bridges, five of which were monumental with several tiers of arches. As part of the water supply system,

the Ottomans developed water towers (*suterazi*) to regulate water pressure and distribution centres (*taksim*). Although both were known in the Roman world, no examples have been found in Istanbul from the Byzantine period. Also typical of the entire Ottoman period is the large number of public fountains (*çeşme*) and water distribution kiosks (*sebil*) that were added to the water infrastructure of the city.

The Past in the Present

The most visible remnant of Istanbul's multi-layered past in terms of water supply and use is the so-called Valens Aqueduct (Turkish: Bozdoğan Kemer). The 971-meter-long aqueduct arched bridge between the fourth and third hills of the historic peninsula of the metropolis Istanbul was part of the once hundreds of miles long Valens line whose other surviving, ruinous, remains are largely in difficult to access forested areas in Thrace.³ The aqueduct was depicted numerous times on Ottoman-period city panoramas and was the subject of early photographers. Since the 1940s, the long-defunct aqueduct has had traffic speeding under its arches along the Atatürk Boulevard. The Kırkçeşme fountains were demolished during the construction of this major axis for car traffic.

The Byzantine construction phase is still visible in a number of places, among which the by now vague traces of a Christogram on one of the arches' key stones. From the Ottoman period the lines of Ottoman ceramic pipes survive as well as an inscription mentioning the renewal of five arches under Sultan Mustafa II (r. 1695-1703).

Work on the Valens Aqueduct concentrating on conservation and consolidation has been executed between 2018-2022 on behalf of the Istanbul Water

and Sewerage Administration (ISKI).

Of the cisterns dating back to Byzantine times, the 'footprints' of the open reservoirs of Aetius and Aspar remain. The former is now a football stadium and the latter a park with sports fields. Some of the underground cisterns are well preserved and open to the public. The most famous is the recently restored Basilica Cistern (Turkish: Yerebatan Sarayı), which dates back to the time of Emperor Justinian (r. 527-565).

On the outskirts of the metropolis several impressive but now defunct aqueducts remain from the Ottoman era including the Mağlova Kemer, the Uzunkemer and the Güzelcekemer, all by the architect Sinan. In the city itself, the remains of dozens of water towers from different periods of the Ottoman era can be seen, as well as sixtyseven water kiosks and hundreds of public fountains, both often part of a mosque complex. Some of the public fountains, most of which had fallen out of use, have been brought back into use in recent years. Together, all these remains testify to Istanbul's rich and multi-layered water heritage.

Reference List

Bono, P., Crow J. & Bayliss, R. (2001). The water supply of Constantinople: Archaeology and hydrogeology of an Early Medieval city. *Environmental Geology (Berlin)*, 40(11–12), 1325–1333. <https://doi.org/10.1007/s002540100365>

Çeçen, K. (1992). *Sinan's water supply system in Istanbul*. T.C. İstanbul Büyükşehir Belediyesi : İSKİ İstanbul Su ve Kanalizasyon İdaresi Genel Müdürlüğü.

Crapper, M. (2020). The Valens Aqueduct of Constantinople: hydrology and hydraulics. *WaterHist* 12, 427–448. <https://doi.org/10.1007/s12685-020-00254-4>

Crow, J., Bardill, J., & Bayliss, R. (2008). *The Water Supply of Byzantine Constantinople*. Society for the Promotion of Roman Studies.

Ward, K., Crow, J. & Crapper, M. (2017). Water-supply Infrastructure of Byzantine Constantinople. *Journal of Roman Archaeology*, 30: 175–95. <https://doi.org/10.1017/S1047759400074079>

Endnotes

¹ 215 km according to Bono et al. (2001) and 250 km according to Crapper (2020).

² David Jacoby estimated maximum 90,000 inhabitants at the end of the reign of Constantine (337); maximum 190,000 inhabitants during the reign of Theodosius II, which ended in 450. Jacoby, D. (1961). La population de Constantinople à l'époque byzantine: une problème de démographie urbaine. *Byzantion. Revue Internationale des Etudes Byzantines*, 31, 81–110. (p. 83, note 1)

³ The aqueduct extends 971 meters in length but is interrupted about 50 meters in the section between the Şehzade mosque and the Vezneciler dormitory for girls.



Valens Aqueduct (Bozdoğan Kemerleri) Photo: Mariëtte Verhoeven



Güzelce Kemer
Source: NIT Archive

Gamifying Istanbul's Forgotten Water Heritage

Onur Atay
Urban.koop

Architectural heritage, or on a more accurate scale, urban heritage offers a diverse range of opportunities for representation. It spans from perceivable spatial or material attributes associated with a certain era to daily practices that have unfolded around these heritage places. Such practices, often discernible from the physical remains, can elevate the examined object into a monument, as emphasized by Alois Riegl, in his renowned article, "Modern Cult of Monuments" (Riegl, 1982). In the context of infrastructural heritage, which is considerably more complex to interpret compared to basic urban heritage, grasping the on-site value is not very straightforward. Infrastructure is often not visible at first glance, making it challenging to construct a spatial or an experiential narrative around that object. Consequently, any process of monumentalization remains incomplete within the context of those structure systems and buildings.

Istanbul, as one of the oldest mega cities with a history dating to over five millennia maintains a continuous urban fabric in the peninsula, for more than fifteen centuries. From the historical center of the peninsula, called Suriçi today (Walled City in English), to the fringes of its expanding urban sprawl, the city undergoes constant changes and transformations driven by practical needs, cultural considerations, tourism, and medium to long term property-based investment plans. The city's urban area spans two continents, while still undergoing substantial transformation projects within its core. The northern part of the city, primarily the preserved green zone in the region, has now become a topic of urban development discussions. This area, which encompasses nearly a quarter of the northern part of the city, is especially green and still harbors a wealth of fresh water resources. It was once the site of the

most grandiose constructions of the pre-modern era, excluding the recently built Istanbul Airport. The area features large aqueducts, built or reinforced by Byzantine and Ottoman leaders of the time, along with a number of stylish dams dating to the eighteenth century. Apart from the regular picnickers and hikers, this area is not a popular visiting area for the typical tourist flow and the city residents, gaining recognition mostly for its greenery.

This is where serious gaming comes into play; to inspect a structural setting that was once a vital link between the city and its water resources, devoid of urban context or social history narrative. Since the northern part of Istanbul is completely and visually detached from the city's historic urban core, representing the value of structural heritage and its transfer to people is challenging. These structures, which vary from monumental aqueducts merging in green landscape to technically advanced dams or water towers that are mostly visibly neglected, are best understood individually, based on their size and condition, which is remarkably fine since these structures do not have daily encounters with the city's intense urban life. Although the city greatly benefitted from these structures and the overall water distribution system(s), which transported water from eastern and northern sources to the city, these structures remain less prominently represented compared to the other historical areas of the city. This oversight leads to overshadowing of the history of Istanbul's water distribution systems, once regarded as the greatest of the world. Moreover, these systems do not present a visible narrative to the viewer due to subtle interconnection between the structures.

As a part of a commissioned tour by a cultural institution, Salt Research, and a part of their ongoing

exhibition on ‘water stories’ in 2021, my project partner Volkan Altınok and I sought to develop a concept that can provide different stories in a single narrative within a gamified framework. This idea eventually led us to use participatory techniques that we utilize in our professional capacity as urban practitioners engaged in participatory public programs. The challenge of conveying a substantial amount of knowledge to help individuals better comprehend the context during a tour is formidable in itself. We aspired to assemble distinct roles into a cohesive story that participants could embrace while navigating the tour. These roles span various temporal contexts within the contextual narrative, involving aspects of water use and water distribution, across different scales, social strata, and historical epochs. The characters are designated in order to represent the diverse duties and customs in the formal and informal water distribution routines, such as the character of *Suyolcu*, formal officers that frequently examine water infrastructures and report their conditions. Another character, *Erbâb-ı Miyâh* (or *Ashâb-ı Miyâh*) discovers and owns any water resource and allows its distribution under certain regulations imposed. Each role has a unique character card, with its own advantages and disadvantages, which the participants can leverage as they progress through the story.

Participants assume these roles in order to become part of the story, and the decisions they make will change the direction of the story at each step. These decisions are also justified by rolling dice(s), through a smartphone-based virtual application operated by the game master (GM), who serves as the guide facilitating the storytelling and gameplay. The strategic, role-based decision-making and the gamified participation encourage attendees to immerse

themselves in the game. This eventually reinforces the knowledge transfer between the facilitators and the participants, with the selected characters aiding participants in understanding the historical case from a social point of view, thereby evaluating the information from a humanly perspective.

During the first on-site implementation of the game in 2021, an outcome that exceeded initial expectations was the collective response of the participants. Their engagement transcended mere pedestrian exploration or sightseeing, as the gamification approach compelled them to actively engage with the narration and question subsequent steps during the tour. Participants also contributed suggestions that align with their assigned roles, enriching the dialogue within the fictive storytelling.

Moreover, the difference in urban comprehension among individuals, especially from a generational standpoint, is also an important issue to be highlighted. The game primarily focuses on digitalization and gamification, to initiate a medium to welcome participants with diverse perspectives. As a side note, it is also important to note that conducting a tour that aims to transfer a wealth of historical knowledge during a walking excursion needs accompanying tools to maintain participants’ focus, especially in the case of younger generations, who may exhibit reduced attention spans during collective activities.

This gaming practice, adopted from the ‘role playing’ concept, predominantly embraced by the fantasy literature aficionados, continues to evolve. It is expanding to encompass a broader range of historical content, and new characters are being integrated into the story, thereby enriching the overall context of the tours. Implementing a role playing game

during a tour is challenging; however, advanced virtual applications have proven to be invaluable in digitalizing this kind of role-playing game during an event based on walking and mobility.

This approach also redefines sightseeing tours by transforming the role of the tour guide. Rather than merely acting as a pre-installed digital tour guide, the guide now functions as an initiator and a facilitator, profoundly engaging participants. Moreover, the methodology also enables participants to question their place in history, thereby fostering a more profound knowledge transfer between guides and participants.

Last but not least, this unique approach, which frames a tour as a game, has the potential to expand our understanding of not only the less-visible aspects of heritage sightseeing but also generic urban tours. It has the power to emotionally reinforce learning practices and help the participants simultaneously learn, and experience the subject matter.

Reference List

Riegl, A. (1982). *The modern cult of monuments: Its character and its origin*. MIT Press.

+

100

1000



SUYOLCU
Silahı: Lökün + Çekiç (-20)
Süper Gücü: Tamir, Denetim, Adalet
Su Kaynağı: Kırkçeşme Su Hattı
Su Kapasitesi: 300 lt/gün
Su Tüketimi: 25 lt/gün

Su Nezareti'nin temelini Suyolcuları, Suyolcu esnafı oluştururdu. Bunlar su yolları ile maslakların tamiri, suların düzenli şekilde akması işleri ile ilgilenerek, su gelen ev, hamam vb yerlerden aylık onarım ücreti alırlardı. Su yolcuların çeşitli semtlerde koğuşları vardı. Sürekli burada bulunurlar ve nöbet tutarlar, herhangi bir aksaklıkta gerekli onarımı yaparlardı.

+

30

2000



SEBİLCİ DERVİŞİ
Silahı: Kırba + Şifa Tası (+10)
Süper Gücü: Su iletimi + Şifa
Su Kaynağı: Süleyman Han Çeşmesi
Su Kapasitesi: 25 lt/kırba
Su Tüketimi: 80 lt/gün

"Yolda kalanlara, yoldan geçenlere sevabına su dağıtan Dervişler, dua eder, dua alır fakat sadakayı da reddetmezdi. Kandil akşamları cami avlularında, diğer günlerde de sokaklarda ve mesire yerlerinde dolaşırlardı."

The "Suyolcu" was primarily responsible for monitoring water infrastructure and providing basic maintenance if needed, while the "Sebilci Derviş" was a spiritual volunteer commonly providing water for travelers and around mosques during the Holy Nights.

19

Assessing Contemporary Perception and Appreciation of the Valens Aqueduct

Aysel Arslan, Netherlands Institute in Turkey
Hatice Ayataç, Istanbul Technical University
Eda Ünlü Yücesoy, Istanbul Technical University
Yonca Atabay, University of Amsterdam

In the fall of 2021, NIT launched an online survey entitled Perceptions of Istanbul's Historical Monuments in collaboration with senior researchers from Istanbul Technical University.¹ The survey was designed to find out people's perception of the Valens Aqueduct, a monumental structure at the heart of the city, underneath which runs one of the busiest streets of Istanbul, the Atatürk Boulevard. In addition, the survey aimed to understand whether people's perceptions would differ if they were provided with the history of the structure and its importance to the communities of Istanbul throughout the centuries.

We created two versions of the survey, the *General* version and the *Knowledge* version in Turkish and English, and then sent the two versions randomly to those taking it via internet. The survey was distributed through NIT's social media and emailed to interested parties with a request to circulate it. While most of the survey was the same, there was one significant difference: the *Knowledge* version

provided information about the aqueduct, while the *General* version did not. In total, 239 people were surveyed, but only 108 completed it.² It seems that the *Knowledge* version was less attractive to the survey takers. While 51% completed the *General* version of the survey, only 39% who opened the *Knowledge* version finished it.

The respondents were evenly distributed by sex, with 53 males, 53 females, and two who did not specify. The majority of the respondents were between 18 and 35, followed by 35 and 50, and a relatively lower number of participants were over 50 years old (Figure 1 left). The majority of the participants (60%) resided in Istanbul, and approximately 90% lived in Türkiye. Most of the respondents had a higher educational background (Figure 1 right), but the survey had limitations as there were fewer participants with primary and secondary educational backgrounds, potentially because of the method of online distribution.

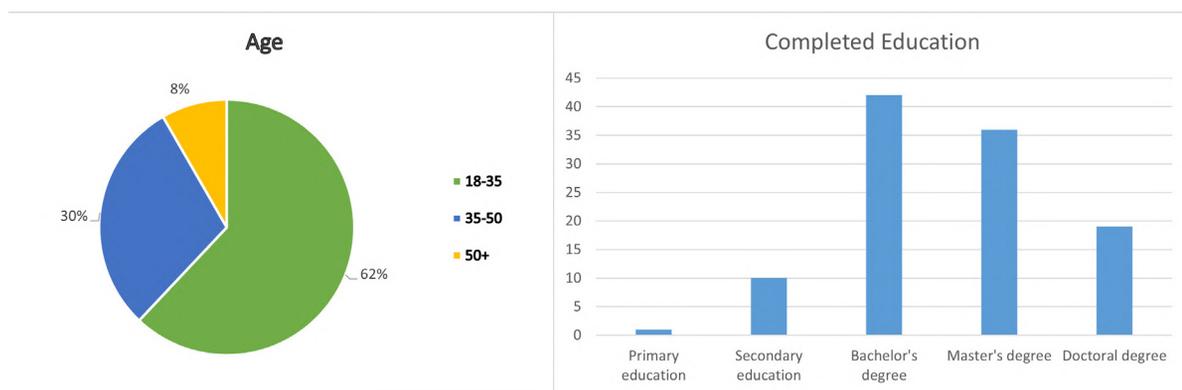


Figure 1: Age distribution (left) and the educational background (right) of the survey participants



Figure 2: Valens Aqueduct (Source: Maris Teteris, CC-BY-3.0)

The *General* version of the survey presented an image of the Valens Aqueduct (Figure 2) and inquired about the respondents' familiarity with it. The results indicated that almost everyone was familiar with the structure and knew its name and/or function as bringing water to the city. When asked for further information, several respondents showed that they were aware of its history, function and current state, and they learned about the aqueduct through various media.

On the other hand, the *Knowledge* version only showed an image of the water provisioning route, including the aqueduct, briefly explaining its importance in providing water for ancient Constantinople and the changes it underwent during the Ottoman period.

Subsequently, both versions were provided to participants to evaluate the historical structure based on their sentiments toward it (negative or positive) and whether they think the now-defunct aqueduct contributes to the quality of life in Istanbul. Remarkably, survey findings unveiled that people's

perceptions of the aqueduct leaned predominantly toward the positive spectrum when engaging with the *General* version (Mean = 4.62/5.00, N = 62, both languages) and the affirmative ratings did not significantly change when provided with details about the monument's historical and cultural significance in the *Knowledge* version (Mean = 4.80/5.00, N = 46, both languages).³

The survey results reveal that individuals typically find delight in residing near aesthetically pleasing historical monuments such as the Valens Aqueduct and marvel at its ingenuity. While the mean scores in both versions were quite positive, those who rated lower in the *General* version cited traffic congestion as a reason for their more neutral or negative sentiments toward the structure. Even if only a small fraction of respondents felt this way, it is clear that Atatürk Boulevard and the heavy traffic passing through between the arches of the aqueduct create a physical and mental barrier for many people to appreciate it fully.

The Valens Aqueduct stands as a profound

testament to the multilayered heritage etched within Istanbul's very fabric. "I remember passing underneath it, either by car or on foot. I like it because it reminds me of the history and layers of the city I live in and I realize 'Oh right, I live in Istanbul!'" (Female, 18-35 years old, lives in Istanbul) one individual shared, reflecting upon their heartfelt encounters with the monument. Another recounted their initial arrival in Istanbul: "The first day I arrived in Istanbul, I passed beneath the arches of this imposing structure. And it was a landmark that told me at once how important the historical peninsula was. I took photos of it" (Female, 18-35 years old, lives in Istanbul). While Atatürk Boulevard may be congested with vehicles, passing through the aqueduct fills people with a sense of passing through a threshold, boundary, or a doorway leading to the old city, "A monument I have loved to walk under since childhood, it feels like a gateway to old Istanbul" (Female, 36-50 years old, lives in Istanbul) one fondly reminisced. Another respondent reflected on their travels through the area with a similar idea, "For a short period, I had to go through these arches to go to my sister's home. Whenever I did this, I felt like I was going to a special part of Istanbul. As if I was crossing a boundary" (Female, 18-35 years old, lives abroad).

The lively nature of the neighbourhood was also present in the respondents' memories. Many drank tea in the cafes nearby, shopped at the Women's Market (Kadınlar Pazarı), attended festivals in the area, or climbed the monument when they were children. The responses show that people predominantly associate pleasant memories with the aqueduct. "I walked on top of it, it is very dangerous, but I love it very much" (Male, 36-50 years old, lives in Istanbul) one respondent reminisced fondly. Another respondent remembers their chats while drinking tea by

the aqueduct, "It was 300-400 meters away from our university, so I cherish the conversations we had and the tea we drank under the aqueduct between classes as fond memories" (Male, 18-35 years old, lives in Istanbul). Nearby cafes still make it possible for people to drink tea by the arches of the structure, (Verhoeven, Gerritsen & Özçakır, 2023, p.157), and associating this ancient structure with such activities helps increase people's interaction with and appreciation of the Valens Aqueduct.

Many individuals expressed that the aqueduct positively impacted the quality of life in Istanbul. Notably, those with access to detailed background information awarded slightly higher ratings, yet there was no discernible difference in the responses gathered from the *General* and the *Knowledge* versions.⁴ Given the aqueduct's current lack of utilitarian function and its negative impact on traffic and access to certain streets, we were curious to ascertain public opinion on potential alternatives. Inquiring if the structure might be removed if it was replaced by something that better served contemporary needs of the urban population, and if so, what they would prefer instead, nearly half of respondents in both versions adamantly emphasized the importance of preserving the historical monument in its current form; the very notion of removing it and transforming the area into something else was inconceivable. Turning the surrounding area into a park emerged as the secondary choice. The least favoured alternatives included residential housing, a zoo, or a shopping mall, none of which garnered approval from the respondents. Such responses bear particular interest amidst Istanbul's ongoing housing crisis, wherein numerous citizens struggle to secure affordable housing. Even so, erecting new residential buildings in place of the defunct aqueduct remains an

unthinkable proposition for survey participants. If the transformation were inevitable, the respondents preferred the area to become a cultural or communal hub for the public, such as a park, archaeopark, museum, or public library.

The majority of the participants seem to find historical monuments like the aqueduct interesting⁵ while those who were not provided with information about the historical significance of the aqueduct again scored slightly lower. When asked to further elaborate on their score, the responses mainly focused on the fact that such monuments give people a sense of identity and belonging, a concrete way to connect with the past and the prosperous history of Istanbul. One of the respondents briefly explained it as “Historical monuments allow me to reflect on time; I have always been fascinated by how short human lives are compared to these monuments. I imagine that they were commissioned to bring us the knowledge and secrets of times we could not witness; the feeling of discovery I experience when I walk within or outside them is ineffable” (Female, 18-35 years old, lives in Istanbul).

Despite the significant number of positive responses to the previous question, the respondents evaluated the historical monuments’ impact on the quality of life in Istanbul as low.⁶ The survey inquired why they rated the quality of life in Istanbul in general positively or negatively. The positive responses again focused on how these monuments give them a sense of belonging, living somewhere with profound history, and that historical monuments are aesthetically pleasing and bring tourism to the city. Still, several respondents found these monuments inaccessible to the local communities and underlined that there are two sides to this question:

“They make life in the city somewhat more difficult in terms of technological difficulties, accessibility, etc. For example, living in a historical house leads to an inferior quality of life when compared to today’s housing technology. However, they provide a high quality of life in terms of the memory and visual heritage of the city” (Female, 36-50 years old, lives in Istanbul, rated the quality of life in Istanbul 3/5). Traffic and lack of conservation/proper restoration were also listed as reasons for the lower quality of life in Istanbul.

Lastly, the survey asked whether they wanted to learn more about Istanbul’s historical monuments and, if yes, what the best way to do that would be. The responses showed that people generally preferred mainstream ways of learning about historical monuments such as museum exhibitions, visiting a monument as a museum, or taking part in a citizen science project. While digital applications such as mobile apps, virtual or augmented reality applications, and three-dimensional models also appealed to them to some extent, learning about historical monuments through computer games was the least appealing option. Nonetheless, there seems to be a general interest in learning about historical monuments in the public through various media.

Discussion and Conclusion

Despite our efforts to disseminate it widely, the Perceptions of Istanbul’s Historical Monuments Survey reached a limited part of the population. This is especially clear when we evaluate the educational background of the participants. Most respondents obtained a Bachelor’s degree or higher, demonstrating that the online survey did not permeate to

the population with lower education. Naturally, a myriad of factors contributed to this limitation. First, initially conceived as a face-to-face questionnaire to be conducted on the street, the survey method was eventually altered into an online survey due to the COVID-19 pandemic. This significantly hindered the accessibility of the survey for those who do not actively use the internet or social media, especially among the elderly population. Moreover, even when they were well-versed in using social media, people needed to show enough interest in the cultural heritage of Istanbul to seek out and fill out the survey. Consequently, this constraint in the survey method led to a bias towards participants already interested in and perhaps knowledgeable about Istanbul's historical monuments to some extent.

This survey serves as an exploration of the general sentiment of Istanbul residents towards the Valens Aqueduct and a first look into whether providing information about the aqueduct changes that sentiment. The significantly high points scored in this survey suggest that most respondents were very positive about the Valens Aqueduct. This might also be due to the prior interest in the historical monuments of Istanbul mentioned above. Nonetheless, the difference in how people rated the questions about their feelings about the aqueduct between the *General* and *Knowledge* versions of the survey is not statistically significant. There was a clear difference between the two versions, but further research should investigate with a larger and more diverse sample size if knowledge is a contributing factor to the appreciation of the Valens Aqueduct by the residents of Istanbul. For the questions that asked the participants to rate how they feel about the Valens Aqueduct, how it affects the quality of life in Istanbul, or whether they find monuments like

Valens interesting, respondents scored higher, indicating more positive feelings and elevated interest if they were provided with the historical information about the Valens Aqueduct. Moreover, respondents were less likely to give 1 point, meaning that they felt negative or were uninterested, out of 5 if they took the *Knowledge* version of the survey. Although it is difficult to ascertain from this limited survey alone, it seems possible to increase positive opinions/feelings about historical monuments when people become more knowledgeable about the history and significance of these structures.

To conclude, the survey results show that the Valens Aqueduct is an integral part of the identity of Istanbulites. Alongside other historical monuments, it provides a sense of belonging, continuity, and connection to the city's rich history and has a significantly positive impact on those living in Istanbul. Many residents are eager to further engage with the aqueduct in different ways, and any opportunity to bring the public to the monument would positively impact the understanding and appreciation of this significant monument.

Reference List

Verhoeven, M., Gerritsen, F., & Özçakır, Ö. (2023). Revitalizing Istanbul's Water Heritage: The Valens Aqueduct. *Blue Papers*, 2(1), 154–163. <https://doi.org/10.58981/bluepapers.2023.1.15>

Endnotes

¹ The survey was approved by Istanbul Technical University Social Sciences Ethics Committee on 8 July 2021.

² 200 responses to the Turkish versions (*Knowledge* version 101 (39 completed) – *General* version 99 (52 completed)); 39 responses to the English versions (*Knowledge* version 17 (7 completed) – *General* version 22 (10 completed)).

³ A student's *t-test* was conducted to understand whether there was a significant difference between the respondent's perceptions of the aqueduct when they took the *General* version or the *Knowledge* version of the survey. The results suggested that the difference was not statistically significant ($p > 0.05$)

⁴ Mean=4.19/5.00, N=61 for the *General* version both languages, as opposed to Mean=4.26/5.00, N=45 for the *Knowledge* version in both languages; student's *t-test* $p > 0.05$; the difference between the means is not statistically significant

⁵ Mean=4.82/5.00, N=46 for the *Knowledge* version in both languages; Mean=4.77/5.00, N=62 for the *General* version in both languages

⁶ 4.48/5.00, N=45 *Knowledge* version in both languages; 4.39/5.00, N=61 in the *General* version in both languages

Project Proposals

Reconceiving the Source of Life of the City Through Intervention – Intersection – Interaction – Integration

Zeynep Akgül, Nihan Bulut, Öykü Çömez, Eser Epözdemir, İdil Ece Şener

Introduction

The aim of the study is to revalorize the Valens Aqueduct by revealing how sustainable and resilient water solutions of the past can be a possible inspiration for future solutions. We propose reintroducing its functional and contextual meaning through the design of a rainwater collection system and an overpass integrated into the structure as it stands today. Additionally, the Aqueduct's historical, ecological, and hydrologic importance will be highlighted with supporting documentation and socially engaging art installations. The overpass will not only create a ground for interaction between the public and the structure by connecting people to art installations at different heights and places but will also provide increased accessibility between the two sides of Atatürk Boulevard.

Moreover, the content of the study includes a prior evaluation of the historical water network and the Valens Aqueduct to understand the system and its relationship with the urban context in different ways ranging from regional to human. The purpose of the evaluations is to reveal the values and existing challenges of the Aqueduct within the current urban context in order to determine the overall meaning and propose a vision for future decisions.

Analysis of the Water Network and the Valens Aqueduct

Istanbul's Water Heritage: the Valens Aqueduct as an inspiration

In this study, The Valens Aqueduct, being the most important remain of Istanbul's historical water supply system, is considered a source of inspiration for creating opportunities for the future of citizens and urban life through the deployment of water heritage. In the past, the city of Constantinople was laced with a network of aqueducts and cisterns which provided the source of life to the historical peninsula (Harmancıoğlu & Altınbilek, 2020). This freshwater network was like the veins of the city and helped the city to grow and become one of the most important cities in the world (Crow, 2022).

Throughout the centuries, the system was abandoned and damaged as technological and economic priorities shifted, and the city underwent major urban transformations in different periods. Today, the knowledge about the ecological, hydrological, and historical importance of the historical water supply system of Istanbul needs to be transferred to its citizens, visitors, authorities, and researchers.

Today, many elements of the historical water network, such as the physical remains of open water reservoirs, aqueducts, cisterns, and fountains, are still visible (Figure 1). However, the knowledge and awareness that these elements were once part of an extensive water network has been lost so that they are now seen as individual objects whose relationship to water is also not always evident. Therefore, the creation of a water biography of Istanbul where all the citizens and visitors can contribute and retell the water stories of the city, such as how these systems were constructed, who worked on them, who benefited from them, and many more, are important in order to connect the citizens to the Valens Aqueduct and its history.

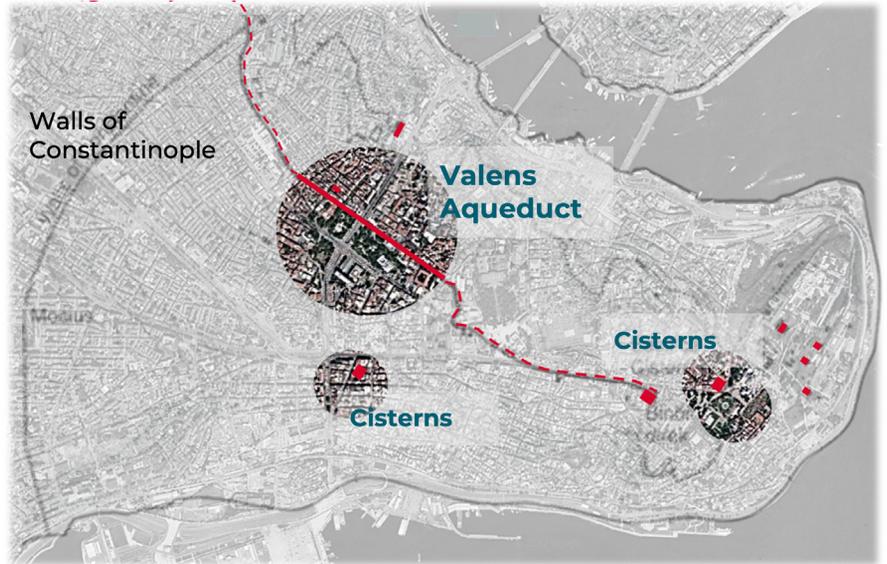


Figure 1: Schematic locations of the water heritage places in the historical peninsula of Istanbul today

The Relationship of the Valens Aqueduct with the Neighborhood

A closer examination of the Valens Aqueduct and its neighborhood today reveals that the structure has many physical and functional connections to the surrounding area (Figure 2).



Figure 2: The Valens Aqueduct and its surroundings

There is a strong relationship between the aqueduct and the street. As different functions have been attributed to the spaces created by the arches, people utilize them in a variety of ways in their daily lives. Often, the arches serve as shelters, parking lots, transition areas and socializing spaces where people sit and talk while

drinking tea and coffee. However, at other locations, solid parts of the structure became walls of the buildings that were built against the Valens Aqueduct (Figure 3).

These different types of arches, solid and void, and their relationships with the environment and the community have been examined extensively. Accordingly, the arches were divided into categories based on their three physical characteristics: shape, configuration, and permeability (Figure 4).

The study reveals that the arches vary in height and width in terms of their shape. The tops of some arches are pointed, while those of others are round. Changing architectural styles between the arches may indicate that they were constructed in different time periods.

The Valens Aqueduct contains single-story and two-story arches, depending on the configuration. Some arches are equal, while others are larger on the ground level and narrower on the upper level. This variety of elevation provides opportunities for different interventions, which is essential for this study. The permeability of some of the arches was also examined as it varies according to the height and width of the arches. A number of these arches are unpassable due to their small size, while others are used for parking or waste disposal due to their much larger size. Moreover, some are entirely blocked or elevated to prevent access.

RELATIONSHIP BETWEEN STREET AND VALENS AQUEDUCT

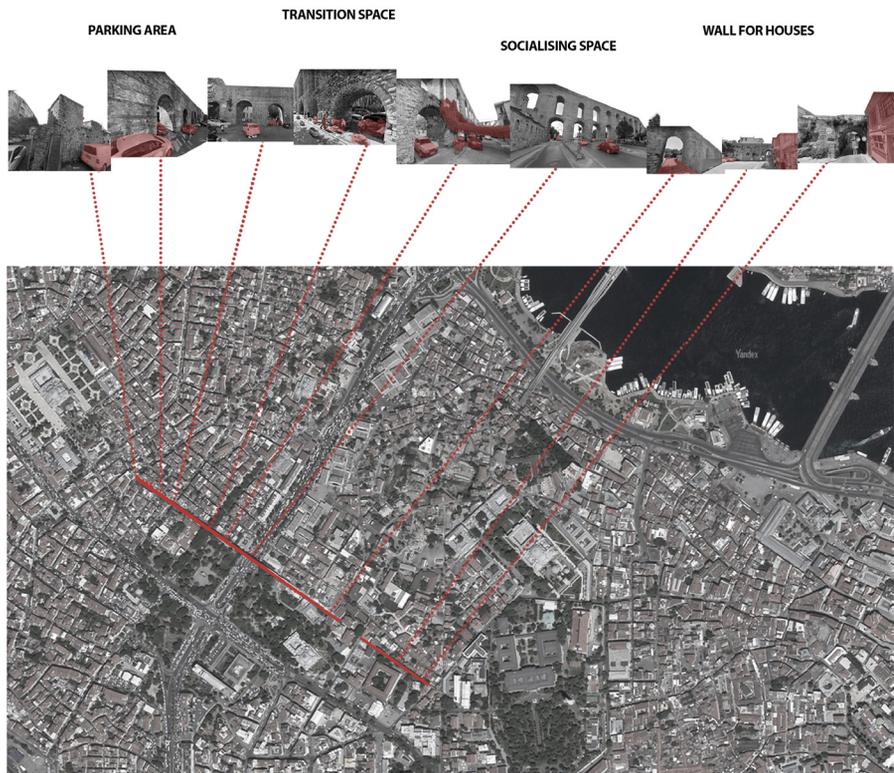


Figure 3: Evaluation of the Valens Aqueduct

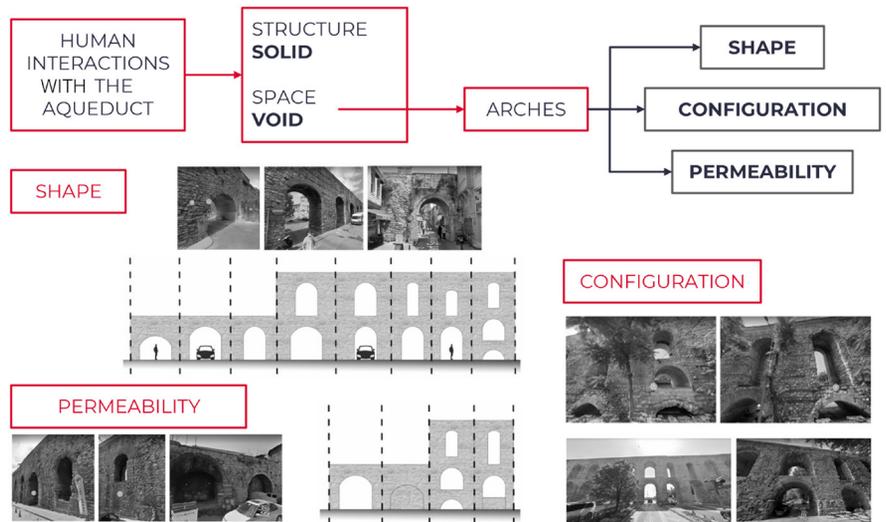


Figure 4: Categorization of the arches on the Valens Aqueduct

Evaluation of the Values, Significance of, and Vision for the Valens Aqueduct

Evaluation of the Valens Aqueduct

In light of the analyses described above, the Valens Aqueduct needs to be appreciated for its values and potential in the current urban context to offer solutions for its revalorization in urban life and sustainability for the future. Therefore, to be recognized as a cultural heritage with values determined by international standards such as the Burra Charter (Australia ICOMOS, 2000), the Aqueduct needs to be evaluated in terms of its existence as a historical water network structure in relation with different urban areas.

First of all, the Valens Aqueduct has an undeniable historical value with a history dating back more than 1,600 years, traces of which are still physically present (Sarıkaya Işık, 2019). Furthermore, the aqueduct is a visible witness to the fact that fresh water was brought to the city and the effort that was put into it. This association directly links with a hydrological value, but it also enables the creation of an ecological value since the existence of water allows an ecosystem to flourish.

Moreover, the Valens Aqueduct has an architectural value due to the structure being a product of engineering effort and a technological showcase. This technological showcase also indicates the economic and political concerns of its time. Therefore, a symbolic value can be attributed to say that the Aqueduct is a symbol of authoritative power and architectural knowledge.

Today, despite these values, the Valens Aqueduct as an heritage object faces some challenges. The general public does not have enough correct information about the Valens Aqueduct, and there is a divergence with the urban tissue compared

to its past glory. It is difficult to identify what the main purpose of the aqueduct was and where it ended. Among other things, some parts of the Valens Aqueduct have almost disappeared in the dense city.

To better understand the challenges associated with the Valens Aqueduct and expand on the values, four urban nodes along the structure are determined and examined by focusing on the contextual changes, such as the function of the area and the use of the arches. The first urban node is the Women's Bazaar located in the western part. It represents a commercial value of the area as there are commercial places such as delicatessens, restaurants and butchers. However, it is worth noting that challenges are evident in this area, primarily stemming from the pervasive odors of food and persistent noise level in the vicinity of the Women's Bazaar.

The second node is Atatürk Boulevard which opened during the Republican era of Türkiye in the 1940s. Saraçhane Park, which provides a recreational value, is located along this boulevard. Therefore, Atatürk Boulevard is an important axis intersecting the Aqueduct system, but it also causes traffic and pollution problems.

The complex of Şehzade Mosque, surrounded by several schools and dormitories, is the third node. Since education is a substantial component of the node, it offers educational value but parts of it are also used as a garbage dump.

The fourth node is the area of the Kalenderhane Mosque. Mosques and several religious schools can be found here, giving the place its religious value. The fourth node is also where there is a disruption in the structure, which is about 50 meters.

The values of the Aqueduct and the urban surroundings it is located in, as well as the challenges that can be turned into opportunities through proposals, have been revealed in the sum of all these positive and negative characteristics (Figure 5). Based on these assessments, it becomes imperative to formulate a vision to

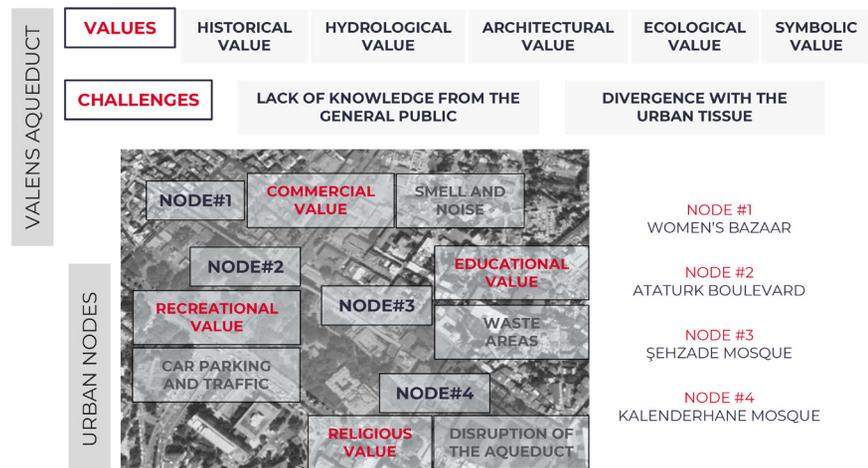


Figure 5: Evaluation of the Valens Aqueduct's values and challenges in regard to the structure and the urban nodes

enable future actions that take into account the significance of the Valens Aqueduct.

Significance of the Valens Aqueduct

The values of the Valens Aqueduct constitute the significance of the structure for the city of Istanbul. As we have shown, the aqueduct embodies historical, architectural, hydrological and ecological values. Moreover, the various values of the urban nodes around it contribute to the significance of the Valens Aqueduct. In light of these considerations, we use the term “the source of life of the city” for the Valens Aqueduct to refer to this structure and we summarized its values in a statement of significance.

This statement emphasizes the link between the water network and the city as well as how water brings life both figuratively and literally. From here onwards, the vision for future proposals can be formulated around the relationship between water and the city in the face of challenges, including water scarcity, urban sprawl, lack of inclusivity, access, and public participation.

Vision for the Future of the Valens Aqueduct

To face the determined challenges of the evaluation, future proposals need to reconceive the Valens Aqueduct from a unique perspective and prepare strategies accordingly. Therefore, the vision has been translated into four action steps.

The strategy is to intersect the future interventions with the historical water network, which followed the natural landscape, to offer a ground for public interaction with the Valens Aqueduct, which will provide integration into urban life. In summary, these four actions are: intersecting with the existing system, realizing different interventions, interacting with the public, and integrating the structure into the city. Therefore, the vision can be stated as "reconceiving the Valens Aqueduct through the acts of intersection, intervention, interaction, and integration" (Figure 6).

The envisaged interventions will occur on the solid and void parts of the Valens Aqueduct, which are the buttresses and arches, respectively. Particularly, the implementation of modular units inside the arches will be a critical factor in the proposal. Meanwhile, the sustainability of the structure and the project depends on public engagement. Thus, informing the public about the history and multi-layered character of this water heritage object needs to be achieved through installations inside the modules, which can trigger events in the urban nodes as well.

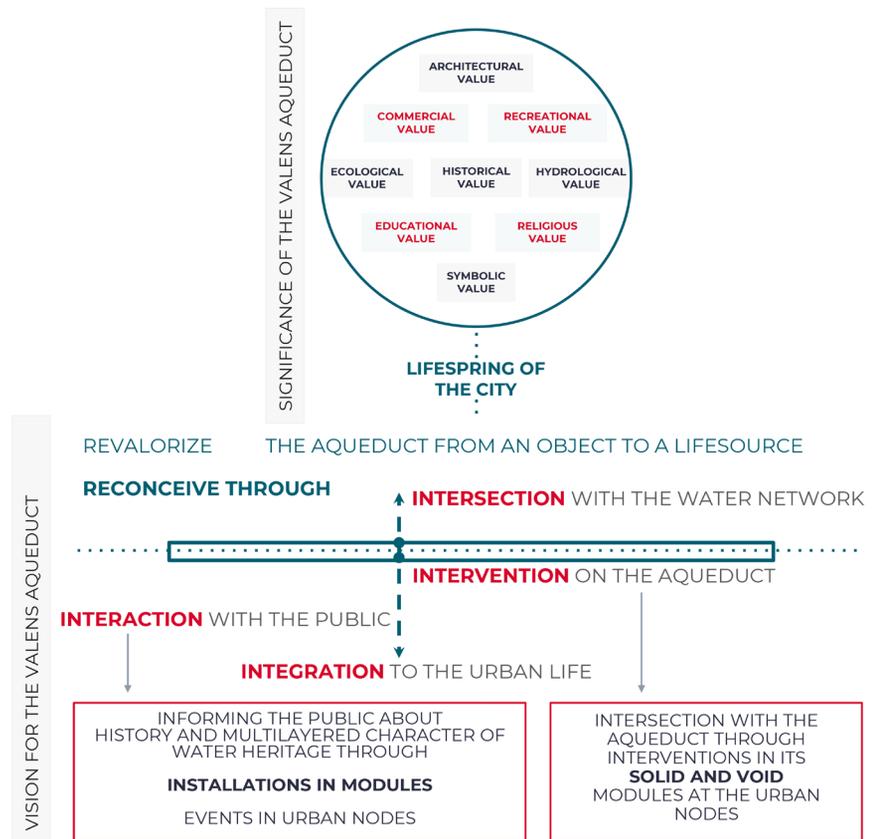


Figure 6: Visualization of the statement of significance and vision for the Valens Aqueduct

Proposals to Reconnect with the Water Network and Urban Life

According to our vision, project proposals are developed with the aim of relating the Valens Aqueduct to the historical water network and contemporary urban life. To relate to the water network, the water channel existing on top of the Aqueduct, which is currently not in use, can be re-functioned. Although the water network has been broken and connecting the whole network and making it work as it used to seem unrealistic today, some new constructions can be added to complete the Aqueduct's second storey. By doing that, a small-scale water system can be rebuilt and used to inform the public about the aqueducts, the way they work, and the significance of historical water systems. In that sense, rainwater collection is being considered as a way to reuse this small network since it would be an effective way to highlight water scarcity problems, raise public awareness in this matter, and support the usage of greywater for the needs of the surroundings, recreation, and installations.

Since the Valens Aqueduct is significant for its structural composition, the interventions are made to prioritize its authenticity, and some basic precautionary principles are taken as a basis. Firstly, the interventions to be made should be

detachable/reversible, non-damaging the aqueduct physically, and designed in a way that will not visually dominate the structure. Secondly, when reusing the water canal, a minimum of interventions should be made on the existing part of the structure, and transparent materials should be used to show the function of the Valens Aqueduct to the public in the proposed completed part. In that regard, on the existing second storey, changing the cover stone of the aqueduct into a permeable one can be implemented to ensure rainwater gets into the canal. For the part to be completed, a lightweight structure can be used, and the facade of the new system can be constructed by using glass for transparency (Figure 7).

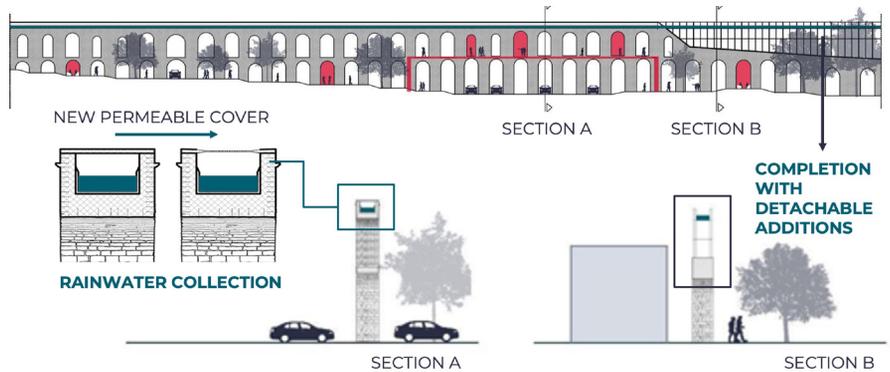


Figure 7: The elevation drawing by Temiz, G. (2019), edited by the author.

Considering the place of the Valens Aqueduct in the city, Atatürk Boulevard is the point where the urban movement intersects with the aqueduct the most. Although the monumental presence of the Valens Aqueduct gives the impression that it creates a barrier at this intersection, it stands out as a highly permeable structure. On the contrary, it appears that the boulevard itself creates a barrier effect between the urban nodes. This boulevard prevents interaction of the public with the aqueduct. In addition, two large parks located south of the Valens Aqueduct are the areas where public engagement can be achieved the most. However, there is no connection between them because of the boulevard. Thus, the aqueduct has the potential to connect these two green areas and reinforce the social integration of its surroundings. To make this possible, an overpass is proposed to span along the width of the road on the second storey next to the structure (Figure 8).



Figure 8: Proposal for designing an overpass near the Valens Aqueduct

Several principles should be taken into consideration to design the overpass. The overpass should have a self-carrying structure that would not affect the structure of the Valens Aqueduct. The architectural details of the connection to the aqueduct should be designed as the overpass will cause no harm to the existing construction materials. Additionally, the material chosen for the overpass should be transparent, allowing it to coexist visually without overshadowing the Valens Aqueduct (Figure 9).



Figure 9: Using the second storey of the arches by reaching them via an overpass

Another principle of the proposal is accessibility; reaching the overpass should be easy for every person in any physical condition. Therefore, elevators on both ends can provide anyone passage through the upper elevation. Once someone reaches the overpass, the potential to use the upper arches of the Aqueduct as panoramic view spots would be possible as well (Figure 10).



Figure 10: Modules designed to inform the public and raise awareness of water heritage

The last proposal, which could better target the challenges of the Valens Aqueduct in terms of public awareness and engagement, is placing interactive modules into the arches of the structure. Creating a relationship with the public, who experience the arches in their daily life with unawareness of the significance of the Valens Aqueduct, can be achieved with such modules (Figure 11).

The design of these modules is based on the same principles as other proposals;

Figure 11: People re-experiencing the Valens Aqueduct through the modules



it should be detachable and reversible with a self-carrying system and transparent materials (Figure 12). Also, the modules can be placed according to the needs of the urban nodes and installations, as they can be modified or removed according to different scenarios like public events or calls (Figure 12).

Figure 12: The design of the module

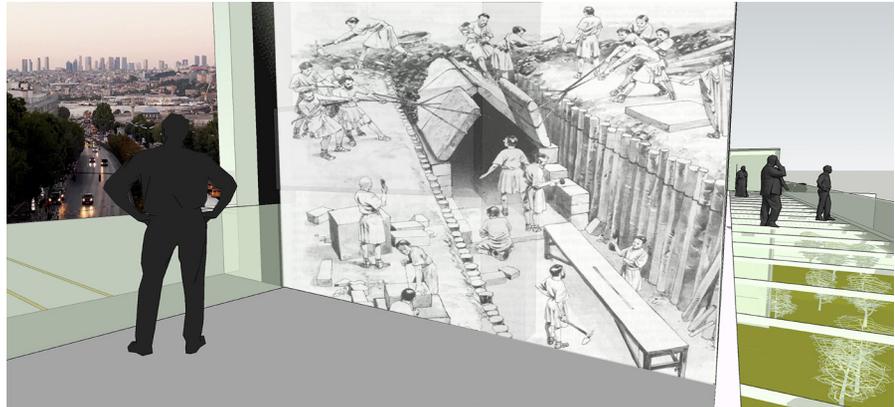


The proposed interventions focus on remembering the original function of the Valens Aqueduct and contributing to the preservation of its authenticity and architectural value. The proposal is shaped by asking questions such as what water heritage means and how the historical background of the Valens Aqueduct can be integrated into the water supply of today's Istanbul and its inhabitants (Figure 13).

There are even further questions to consider when dealing with the future of the Valens Aqueduct: how can we underline whether it is possible to use history and art as tools to disseminate water heritage and whether this heritage can be a part of today's daily life; and how can art be an inclusive element to enhance water heritage?

The proposal tries to answer these questions with two additional ideas, which are: placing video screens and creating a yearly artistic open call. Using the strength of solid and void with arch-shaped replaceable modules, the artworks and screens will raise awareness of Istanbul's water heritage. On the screens, there will be

Figure 13: Modules designed to inform the public and raise awareness of water heritage



documentaries and animations about daily life scenes of the Byzantine and Ottoman eras and more recent periods; how was daily life when the Valens Aqueduct was active, how was it built, what kind of engineering solutions were used, and if some still remain today in terms of engineering and architectural elements, how many people worked during the constructions, what were the main challenges, what they eat and how they were dressed, and any other questions focusing on the sociological issues. There will also be scenes depicting the historical landscape of past centuries from the same location at the top of the Valens Aqueduct. Those scenes will give ideas to the audience about how the landscape and environment have transformed over the years and how they affected the Valens Aqueduct (Figure 14).

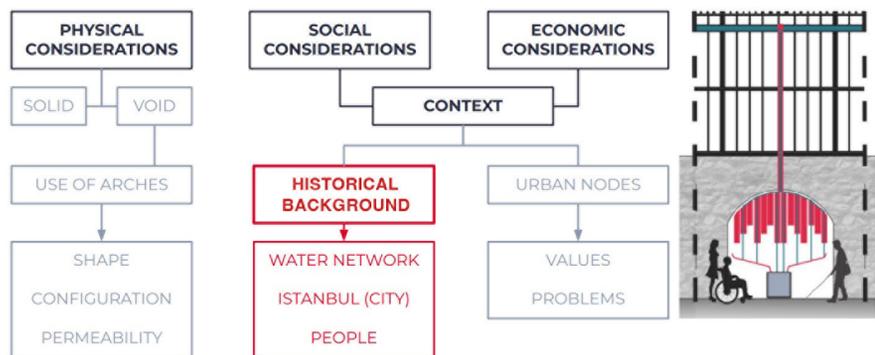


Figure 14: Considerations for the context of the installations

The open call process for the selection of art installations will be conducted by a liberally gathered selection committee from a democratic point of view. From the open call announcement to the selection of the artworks, it will include every interested professional without any discrimination. Through these artistic interventions, the aim is to merge water heritage with today's art scene and investigate the possibilities to contribute to creating awareness of water heritage from an artistic point of view. Last but not least, as history and heritage are for everyone, all the suggested interventions will be applied in an accessible way according to the universal design principles, including elevators, ramps, the braille alphabet, and sign language interpretations.

Conclusion

To conclude, this study focuses on the relationship between water and people in Istanbul through the lens of the Valens Aqueduct. However, since the aqueduct no longer has its original function, it simply stands as an imposing structure in the current urban context. With this proposal, rainwater collection is introduced to evoke its original function. In addition, social interactions of people with water and the aqueduct are strengthened through new art installations, documentation, and urban events. The innovative and inclusive character of the proposals envision creating public awareness about the existence and functionality of the Valens Aqueduct as cultural water heritage.

The proposals also aim to perceive the Valens Aqueduct from an artistic perspective, because in the water biographies, it is recognized as an integral part of Istanbul's urban heritage. In this context, the factors determining the intervention decisions are to conserve the Valens Aqueduct as well as possible and to expose it to the least physical intervention. At the same time, the priority is to use contemporary and modern materials and construction systems that would not overshadow the monumental character of the building.

It is envisaged that this monumental building located in the multi-layered metropolis Istanbul will be revalorized by integrating it into daily life through artistic interventions and therewith contributing to a future of sustainable living.

Reference List

- Australia ICOMOS. (2000). *The Burra Charter: the Australia ICOMOS charter for places of cultural significance 1999: with associated guidelines and code on the ethics of co-existence*. Burwood, Vic: Australia ICOMOS.
- Crow, J. (2022). Waters for a Capital: Hydraulic Infrastructure and Use in Byzantine Constantinople. In S. Bassett (Ed.), *The Cambridge Companion to Constantinople* (Cambridge Companions to the Ancient World, pp. 67–86). Cambridge University Press.
- Harmancıoğlu, N. & Altınbilek, D. (2020). *Water Resources of Turkey*. Springer. World Water Resources Volume 2. <https://doi.org/10.1007/978-3-030-11729-0>
- Sarıkaya Işık, F. (2019). *Byzantine heritage depicted: the Aqueduct of Valens in the historical topography of Istanbul* [Unpublished master's thesis]. Middle East Technical University.
- Temiz, G. (2019). *Valens Kemerli tektonik ve bağlamsal karşılaşmalar*. Aura İstanbul.

Pursuing Water through a Historical and Permeable Ecological Corridor: An Open-Air Museum Concept

Alvise Cecchetti, Beste Nur İskender, Gamze Özmertyurt, Merve Okkalı Alsavada, Müge Yaylıcak

Historical Background

The Valens Aqueduct is one of the most iconic historical monuments of the skyline of the historical peninsula of Istanbul. Located in the Saraçhane region, within the borders of Fatih district, it was built by the Roman Emperor Flavius Julius Valens in 373 AD and therefore it is also known as the Valens Aqueduct or, in Turkish, Bozdoğan Kemerı. This monument represents the final sector of a long-distance water supply line that in ancient times provided Constantinople and then Istanbul with fresh water. The Valens Aqueduct as it stands today is a 971 m long aqueduct bridge between the city's fourth and third hill (Stephenson & Hedlund, 2016).

The long-distance water supply line of more than 400 kilometres was interrupted multiple times by natural catastrophes or war acts and its reparation costs were sometimes too high for the empire's treasury. After centuries of decline and non-use, after the conquest of Constantinople in 1453, the final section of this water line, the Valens Aqueduct, was repaired and re-used while new water systems and water lines were planned. Among the new lines that were built during the Ottoman times, Kırkçeşme or Forty Fountains, built by the architect Sinan remains one of the most important. This system reused also previous infrastructures, so reparations of the Valens Aqueduct became necessary. This operation allowed to increase water flow and to distribute water to the Kırkçeşme neighborhood (so called because of the many fountains built there under Sultan Süleyman), located along the Valens Aqueduct on the Golden Horn side (Karakuş et al., 2018).

Between the 1920s and 1940s the Republican government approved the construction of a new wide road to link the historical peninsula with the Beyoğlu neighbourhood across the Golden Horn. This new road, Atatürk Boulevard, passes under the Valens Aqueduct, creating a sort of symbiosis effect in a densely populated and urbanized neighbourhood with Kalenderhane Mosque, Şehzade Mosque, and the Women's Market (Kadınlar Pazarı) in its immediate vicinities. As green areas, there are two city parks, Saraçhane Park and Fatih Memorial Park.

Multi-layered heritage approach

Nowadays, despite the restoration and consolidation works made in the past, the Valens Aqueduct stands as an overpass on one of the busiest roads, without informing the public about the rich history of this monument. Our investigation of the Valens Aqueduct aimed at a better understanding not just of its historical value, but also of its use and perception by the local population and its impact on the urban fabric. Hence, we have taken in consideration the Valens Aqueduct not just as an object isolated from the surrounding city, but visualizing it as a part of the wider context in the past and present.¹This approach creates an interrelation according to which the context and the surrounding environment affects the revival of the historical site. At the same time, the revival of the Valens aqueduct leads to new and stimulating effects on the surrounding environment.

When we deal with historical sites, it is common to frame them as a witness of the past and interact only with the superficial meaning that they bear, while

historical sites also tend to accumulate many narratives as time goes by. The result of this process is a “layering” of memories where the layers on top are those narratives that are more recent and hence, more easily understandable by contemporary users. As a consequence, when we think of a specific historical site, it may happen that we might overlook some of the older memories.

For the purposes and the scope of this project, we focused on four points, or “layers,” that match our idea of social and historical revalorization: history, water, landscape and ecological sustainability. By history, we mean the historical importance of this monument by implementing different types of information sources within the area we have taken into account in this project. By water, we aspire to give a renewed attention to the historical and social function of the Valens Aqueduct that for many centuries provided water to Istanbul. We think that a major interaction with Istanbul’s past water heritage can be helpful in terms of informing the population about contemporary water scarcity that is affecting vast areas in the Mediterranean and Middle East, including the metropolitan city of Istanbul. Hence, by revitalizing the aqueduct surroundings, we can create an ecological “buffer zone”, giving more space and importance to this monument, currently “compressed” between a high-traffic road and a dense residential area. This would create a new “layer” to the Valens Aqueduct, improving the knowledge about this monument, raising awareness on current ecological issues in Istanbul, and reducing the traffic pressure in the area. This would lead to the creation of a diffused open-air museum within the frame of an ecological corridor.

Main problems of the area

Based on the observations and photographs taken during the field trip to the project area, some problems and focal problem points were determined. These are, in summary, as follows:

- Disregarded architectural heritage
- Car-oriented urban mobility
- Environmental pollution
- Heavy traffic volume and traffic noise (vehicle-oriented road regulations)
- Illegal car parking (parking under and near the aqueduct)
- No qualified green areas in the surrounding parks (reinforced concrete parks)
- Limited pedestrian access (barriers, misplaced information points on the sidewalks)

Main goals

Our strategies have been forecasted from 2022 to 2050:

- 2022-2030 (short-term): Improving the water heritage in line with the principle of using the protection of historical buildings
- 2030-2040 (medium-term): Adapting the water heritage to social life

- 2040-2050 (long-term): Creation of a permeable urban connective tissue

Strategies and actions to be achieved were evaluated on the principle of sustainability. Therefore, our targets are defined by taking into account the natural environment, built environment and socio-economic environment factors, which represent the three main pillars of sustainability. As a consequence, our main goals are:

- Increasing the visibility of water heritage
- Strengthening the socio-spatial ties between water heritage and today's society
- Reconnecting separated parts of the historical urban fabric
- Sustainable land use

Stakeholders and Focus Groups

In order to determine who would benefit the most by this project, the main stakeholders were firstly envisioned in local governments (Istanbul Metropolitan Municipality (IBB), Istanbul Water and Sewerage Administration (İSKİ) and related district municipalities), ministries (Turkish Ministry of Culture and Tourism), social enterprises and non-governmental organizations.

For our project we decided to focus on three groups of beneficiaries: university students (especially from Istanbul University), traders (workers at the Women's Market), tourists and hotel workers. Indeed, we believe that different socio-economic groups should be addressed within focus groups and stakeholders. Considering the families, children and spouses of the focus groups, our aim is to develop appealing strategies also in relation to age differences.

Main Challenges

The main challenges that may be encountered within the framework of the strategic plan were identified and the highlights were as follows:

- Urban development
- Public participation
- Private propriety
- Transportation
- Climate crisis
- Water deprivation/scarcity

Strategies from Macro to Micro Scale

We divided our project area in different scales. Urban scale was considered as macro scale, neighborhood scale as meso scale and human scale as micro scale.

- Urban Scale Solutions for the Project Area:
 - Ecological corridor

- Historical and cultural routes
- Neighbourhood Scale Solutions for the Project Area
 - Kalenderhane Mosque and surroundings' rehabilitation
 - Creating squares, playgrounds and socializing areas
- Human Scale for the Project Area
 - Creating vista points in historical places
 - Pop-up pedestrianization solutions

Reading the Valens Aqueduct Area by Space Syntax Approach

Space syntax comprises a range of analytical techniques employed to investigate the spatial arrangements and patterns of human behaviour within buildings and urban environments. Additionally, it encompasses a theoretical framework that establishes a connection between physical space and social dynamics. Space syntax is founded on two fundamental principles. First, space is not merely a background to human activity; rather, it is an integral component of it; secondly, space is first and foremost configurational. In other words, the interactions and dynamics occurring within a particular space, be it a room, corridor, street or public area, are significantly influenced by the interrelationships between that space and the broader network of interconnected spaces (Hillier & Hanson, 1984).

The space syntax methods (e.g., axial analysis, angular segment analysis, convex space analysis, isovist etc.) allow for the reading of the functioning of the urban system in connection to characteristics such as syntactic relation systems (e.g., integration-segregation, characteristics of integration and the control of cores, and control value determination, intelligibility and predictability) (Hillier et al., 1987). In this study, “angular segment analysis” has been used as a main spatial form analysis. “Angular segment integration” measure has been used to evaluate the potential movement of the street network around the Valens Aqueduct. It measures how close each segment is to all others with regard to the sum of angular changes that are made on each route (Hillier & Iida, 2005).

The Valens Aqueduct is chosen as a location for catchment analysis. The reason to use metric step depth is that this study focuses on the effect of pedestrian movement around the Valens Aqueduct in terms of walking distance away from the aqueduct. Many studies suggested that within 5 to 10 minutes walking distance covers the 300-400 meters that pedestrians would accommodate between destinations. Hence, the analysis radius is decided as 300 meters in this study.

The analysis results show that while the closest area to the aqueduct has lower integration value at the local scale, there are also big differences between the west and east part of the area. While the Women’s Market has high integration values, Saraçhane Park, Şehzade and Kalenderhane Mosques have less integration into the area, which means the street segments of these areas are less close to all other segments in terms of the sum of angular changes that are made on each route. Due to the lack of pedestrian infrastructure facilities and spatial layout network qualities, Atatürk Boulevard creates a barrier effect in the area (see Figures 1 and 2).



Figure 1: Catchment Analysis (Metric Step Depth Analysis)



Figure 2: Angular Segment Integration Analysis r300m - Existing Pedestrian Network

Proposal for a Pedestrian Area

The existing pedestrian network is redesigned by transforming potential unused and leftover spaces and car parking areas, connecting them by different routes and revalorisation of existing pedestrian paths as a part of the proposed ecological corridor in this study. Figure 3 shows the newly designed pedestrian network.



Figure 3: Proposed Pedestrian Network and Potential Areas for the Revalorisation of Pedestrian Path



Figure 4. Angular Segment Integration Analysis r300m - Proposed Network

The comparison of analysis results between the existing and proposed network shows that the integration of the area, green spaces and historical buildings (mosques) and the aqueduct is increased (see Figures 4 and 5), and the potential of co-presence is increased by reconfiguration of the existing network.

Figure 5: The Comparison of the Means Values of Angular Segment Integration Analysis (Before: Existing Pedestrian Network, After: The Proposed Pedestrian Network)

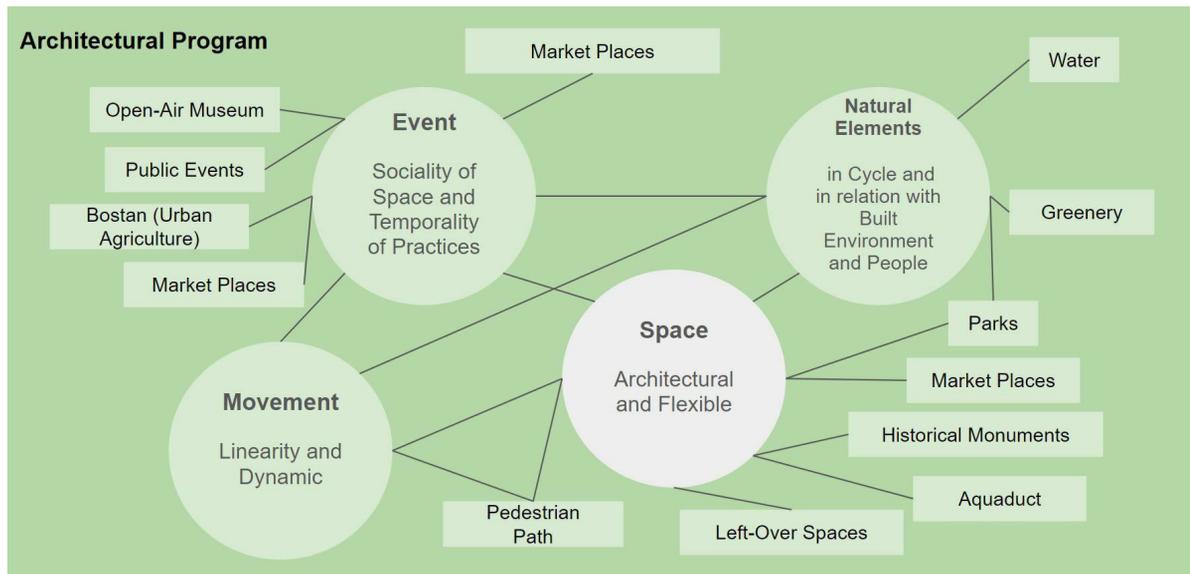
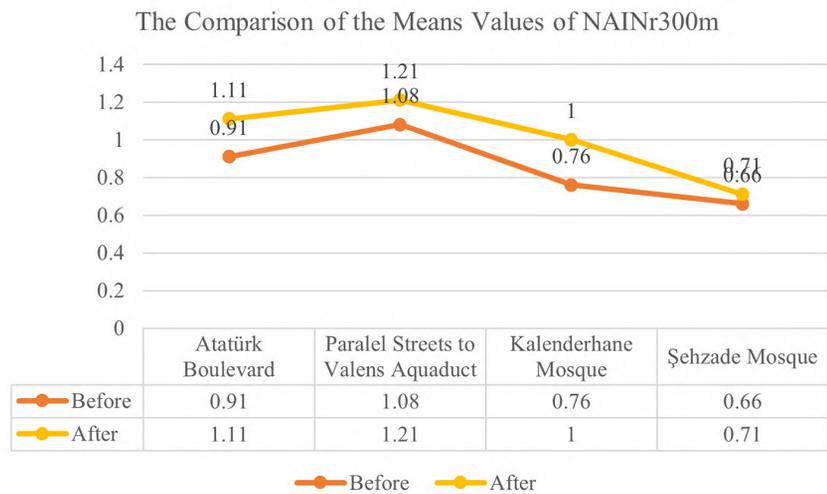


Figure 6: The Diagram of Space-Event Program

Ecological Corridor

The proposed ecological corridor perforates the solid, dense, dry urban area and can be defined as a spatial system that contains programmed activities, a system of lines that directs the movement of people, a series of new planes and platforms bringing water back to the area and spaces that can be appropriated by local people in unexpected ways. Three systems of spaces and paths in the ecological corridor work together to create an urban area for different types of activities and bringing water back to the area.

In this sense, movement types are really important not just for people but also for natural elements in the city's ecology. Therefore, it is planned to construct new walking narratives for people and new cycling narratives for the water. People are able to articulate what they do and why they do it.

According to Lucas (2020) "the idea of narrative is an important structuring and ordering practice, so people can simply understand the alternative experiences possible within any given space". Hence, we chose to adopt as theoretical frame for our spaces "peritropism", which means "a series of variations in a path, grouped together as a set to vary route to a regular destination (see Figure 7).

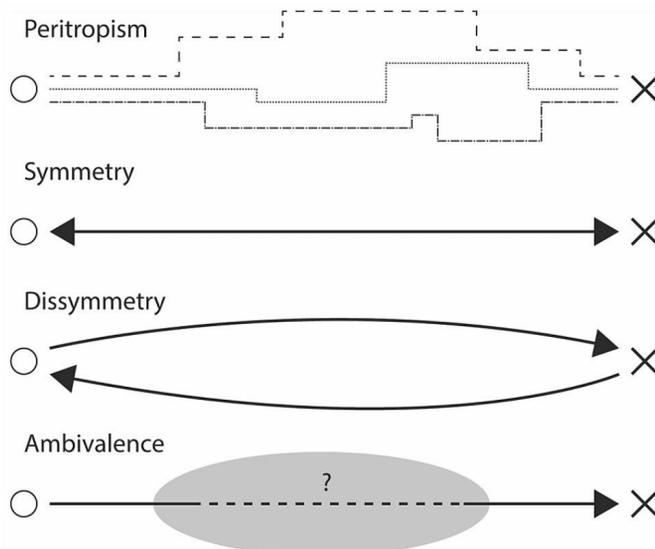


Figure 7:
Diagrammatic Rendering of
Augoyard's forms of movement
(Lucas, 2020)

Figure 6.3. Diagrammatic renderings of Augoyard's qualities and forms for everyday walking.

Figure 8 shows the proposed ecological corridor that is an initial part of this ecological corridor and it can be extended to the historical peninsula as a future plan.



Figure 8: The Proposed Ecological Corridor

This proposal offers places, green spaces, playgrounds, open air social areas, performance and liminal spaces that the space-event-program forecasts (see Figure 9). Instead of adding new permanent structures or forms, it is offered temporary and provisional space articulations that support local economy and social life. The project also offers redesign of the main roads and streets for pedestrians to enhance the life of the Valens Aqueduct space (see Figure 10).

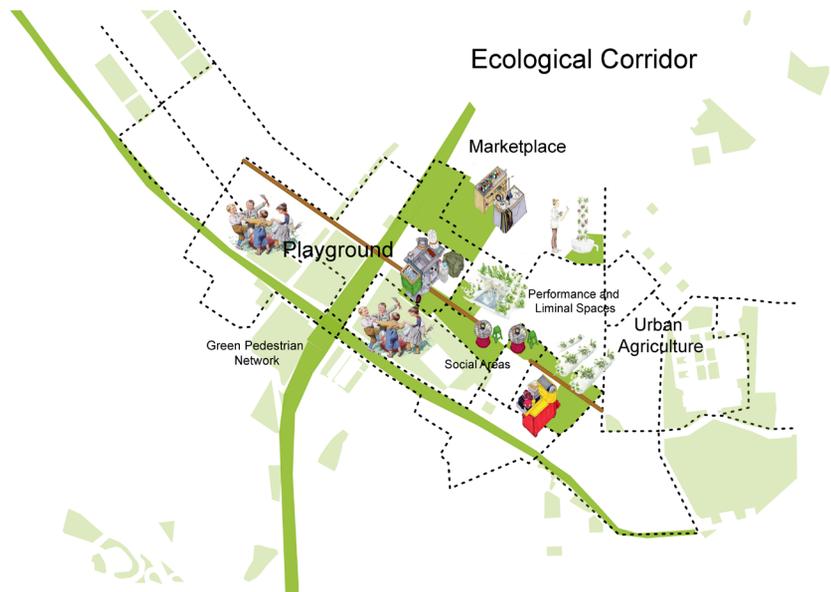
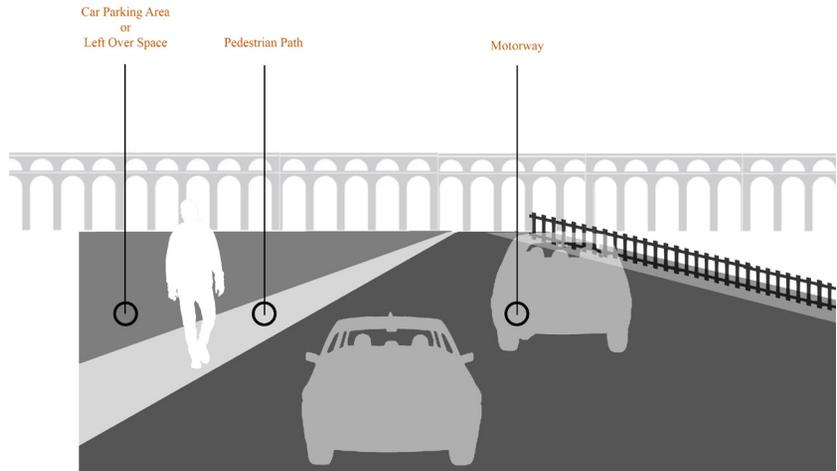


Figure 9: The Collage of Space-Event Program of the Proposed Ecological Corridor

Existing Streetscape and Public Realm



Proposed Streetscape and Public Realm to enhance the life of Aquaduct Space

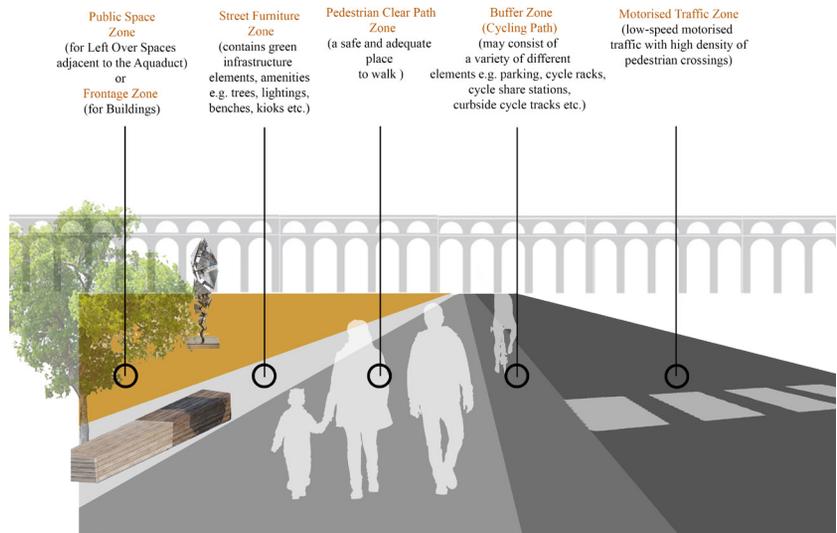


Figure 10: Proposed Streetscape and Public Realm (to enhance the life of the Valens Aqueduct space)

Open-Air Museum Concept

Thanks to an open-air museum within the ecological corridor, it will be possible to explain the multi-layered structure of the Valens Aqueduct and its surroundings to people and thus provide sustainable protection. The water supply system of the aqueduct and the historical relationship between the aqueduct and its surroundings are explained to people that can experience it in different ways. Hence, a sustainable conservation approach can be adopted in a society that is

aware of the value of this monument (Figure 11).

Within the frame of revaluation / refunctioning studies, our project aims to increase the functionality of the aqueduct according to the protection-use principle. For instance, we envision the organization of workshops and the creation of installation shows, historical green routes and the use of digital art elements such as sound and visual effects. While doing this, it will be possible to ensure continuity in day and night activities by focusing on different user groups in different time periods (e.g., Family, youngsters, students, children, tourists, elderly people...)²

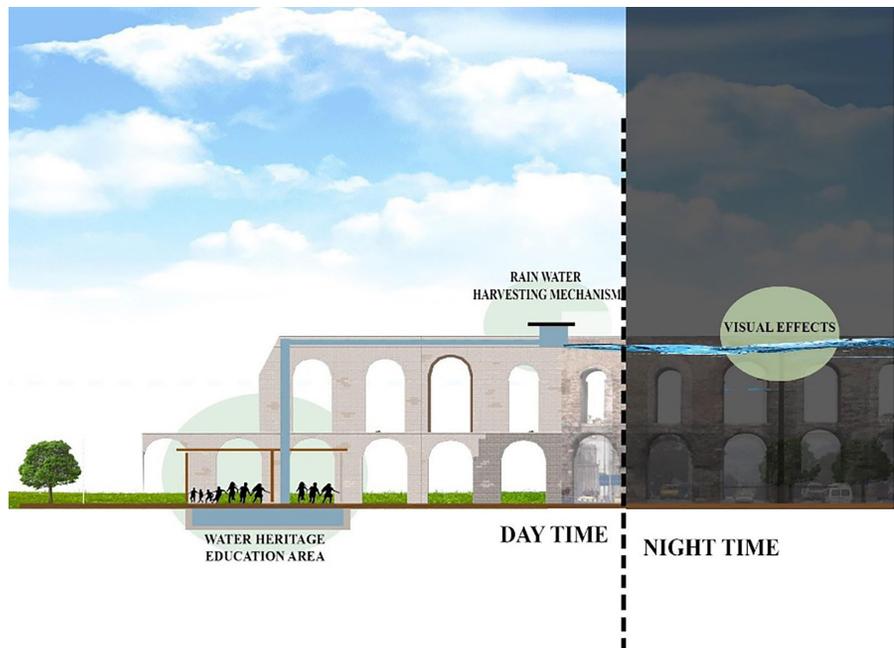


Figure 11: Some Activities Included in The Open-Air Museum Concept

Micro Climate Analysis

The purpose of this analysis is to understand the temperature differences experienced in the selected area within the scope of the project, to choose the right landscape plants suitable for the area, to determine the shaded areas created by the existing trees and to use design elements suitable for the climate in line with the project goals. In the analysis process, Istanbul Metropolitan Municipality City Map data was used.

Istanbul, located on both the European and Asian continents, has a transition climate between the Black Sea and the Mediterranean, and is one of the cities that receive the most precipitation in the Marmara Region. The project area is in the Fatih district, located in the south of Istanbul where the Mediterranean climate is more dominant. This region has a hot-humid climate type. First of all, according to the results of the height analysis, the project area does not have serious elevation and low points due to its proximity to the sea level, therefore, serious changes in the microclimate do not occur (Figure 12).

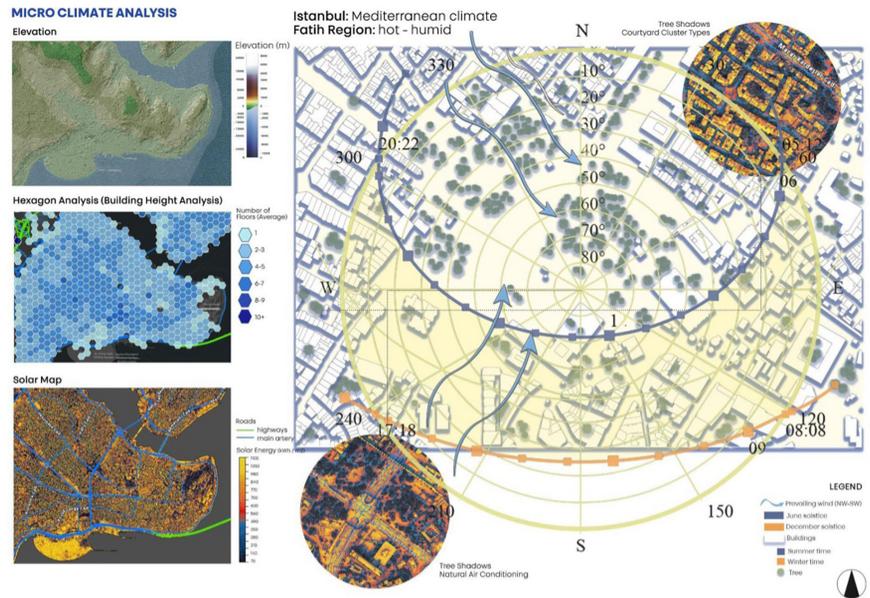


Figure 12:
Microclimatic Analysis

The hexagon analysis, obtained by spatial clustering of the existing building heights in Istanbul, has revealed that three, four and five-storey buildings in the project area are dense and of the courtyard cluster type. In this area, which has a dense housing stock, natural shaded areas are important for alleviating urban heat islands. Therefore, historical courtyard-type settlement clusters create natural urban spaces that should be preserved as green as they affect the climate in a positive way. In addition to these, temperature differences in the bright and shaded areas were calculated by looking at the solar map of the Fatih region.

The location of the existing trees and their shading during the sunbathing process were visualized by closely examining the project area. Based on this analysis, it was revealed that Fatih and Saraçhane parks, located near the Valens Aqueduct, act as a cooler in the region by balancing the microclimate. In addition, when the prevailing wind directions, which are another factor affecting the climate, are examined, they are the northwest and southwest prevailing winds. The Valens Aqueduct, which facilitates the passage of wind thanks to its arches, forms an uninterrupted wind corridor along Atatürk Boulevard and is located within the wind circulation of the project area.

Landscape Planning

Landscape planning includes creating green infrastructure systems for the green ecological corridor, which is attempted to be created within the scope of the open-air museum concept. Some landscaping solutions have been proposed in the project area, which will improve the microclimate and work in integration with the sewerage system called pine water and gray water. The solutions to be implemented for this purpose are:

- Creating rainwater ponds, urban gardens with a choice of rain-attracting plants.
- For sustainability and climate crisis awareness, collecting rainwater and using it in green areas such as parks, landscape areas, urban gardens.
- Reforestation of Fatih Memorial and Saraçhane Parks to turn them into qualified green areas.

Benefits of Green Infrastructure

- Providing Habitat
- Mimics Full Sweet of Hydrologic Processes
- Evapotranspiration
- Infiltration And Aquifer
- Improving Soil
- Health To Sustain Infiltration
- Aesthetic Enhancement (Environmental Consulting & Technology, Inc., n.d.)

Plant Selection

Considering the climate of the project area and the plant species that can grow in Istanbul, examples of some plant groups that do not need much water and have developed roots are given below.

Trees: *Cerciscanadensis* L.

Shrub: *Cyrillla racemiflora* L.

Perennials

- *Aster novae-angliae* L.
- *Coreopsis major walter*
- *Heuchera americana* L.
- *Lobelia cardinalis* L. - growing by the water
- *Lobelia siphilitica* L. - growing by the water
- *Osmunda cinnamomea* L. - growing by the water

Urban Gardens (Bostans)

Bostans, which was presented as a design idea, have been the public gardens used in Istanbul throughout history. From the mid-16th century on, Istanbul's produce gardens are frequently mentioned in archival and narrative sources. Bostan, the term used in the survey from 1734, referred to a plot growing vegetables and, to a lesser extent, fruits for the market (Shopov, 2020). The unidentified car parking areas around the Valens Aqueduct were determined. Due to its proximity to Unkapanı Sarnıcı and aqueduct, the 16 March car park was chosen as the designated area to be converted into a bostan. Our goal indeed would be to be close to those historical monuments, which can testify the use of water for social purposes. The management and operation of the bostans will be carried out in cooperation with the local residents living in the area. On a voluntary basis, the products grown can be sold to consumers in the Women's Market. Thus, it will

contribute to both social and economic sustainability. The historical cistern, on the other hand, will be used as a resource to provide water that will be beneficial for the bostans by evaluating the possibility of reuse. The cisterns can be used as warehouses, museums and for water tourism, as in examples from other cisterns in Istanbul and abroad (Enriquez et al., 2017).

A Close Look: the Eastern Part of the Valens Aqueduct

The eastern part of the Valens Aqueduct was deemed appropriate to explain in short scale what our project will look like. Close to Kalenderhane mosque there is a separate short section of the aqueduct, delimited by a fountain at one end of the aqueduct and a cistern at the other end. Therefore, it is a very suitable area to show the system that explains how the water carried by the aqueduct from a source is transferred to the fountain that will enable its use, like the revival of a traditional system (Figure 13).

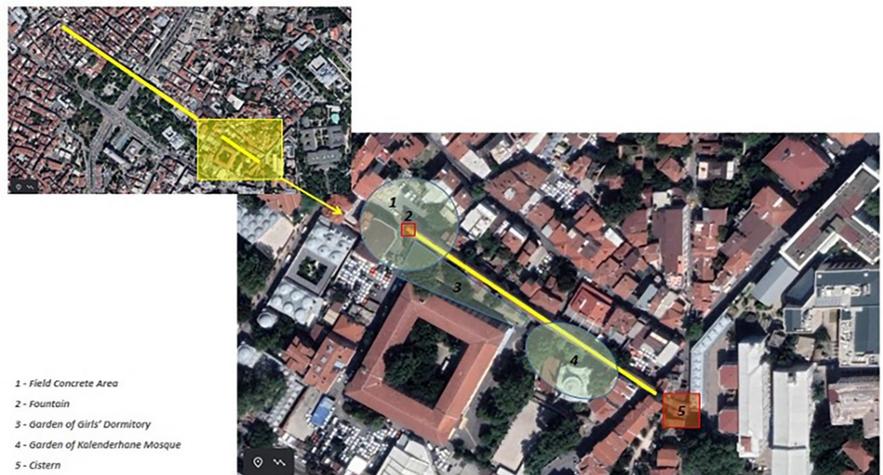


Figure 13: The eastern part of the Valens Aqueduct

In this area, it would be possible to suggest a project in which the working system of the aqueduct is explained with some installations, with concrete areas transformed into gardens that would require a reduced use of water. The fountain here can be useful both to explain the system and to make the system reusable even for a small area.

Although it is connected to two different streets, the garden of the girls' dormitory is a special area that requires security. Therefore, a workshop area that can be used in a controlled manner on certain days when it is not used by dormitory students can be suggested for this area. The provisional target audience for these workshops regarding the efficient use of water, its importance, the historical importance of this area is composed by students and children, but in the future, it can be adjusted.

In the garden of Kalenderhane Mosque, an area with information on the aqueduct and water use in public spaces can be suggested, perhaps with some

digital uses and animations, associating it with the Roman bath remains. For this, people who are focused on understanding the society such as architects, architecture students, city designers and all segments of the society can be selected as the target audience.

Conclusions

After our fieldtrip to the Valens Aqueduct in October 2022, we all agreed on creating a project that could enhance the historical value of the aqueduct while not disregarding the natural and social environment around it. Our attention to nature and our will to create an ecological corridor that would give the opportunity to transform abandoned or disregarded spaces in the surroundings of the aqueduct will hopefully lead to redefining and improving present green areas. At the same time, the aqueduct will benefit from this new set, becoming a historical scene to raise awareness about the current water scarcity in Istanbul, and water problems and risks in Türkiye through installations. The revalorisation of the Valens Aqueduct both from a historical and urban point of view will create the adequate atmosphere for the sustainable development of this area through an open-air museum connecting heritage, environment and people. This urban revalorisation will also take the shape of an economic contribution to local people by preserving heritage and creating environmental sustainability.

Reference List

- Enriquez, J., Tipping, D. C., Lee, J. J., Vijay, A., Kenny, L., Chen, S., ... & Steenhuis, T. S. (2017). Sustainable water management in the tourism economy: Linking the Mediterranean's traditional rainwater cisterns to modern needs. *Water*, 9(11), 868.
- Environmental Consulting & Technology, Inc. (n.d.) *Green Infrastructure and Plant Selection*. Retrieved from <https://www.ectinc.com/>
- Hillier, B. (2007). *Space is the Machine: A Configurational Theory of Architecture*. Space Syntax.
- Hillier, B., Burdeau, R., Peponis, J., & Penn, A. (1987). Creating Life: Or, Does Architecture Determine Anything? *Architecture & Comportement/Architecture & Behaviour* 3(3), 233–250.
- Hillier, B., & Hanson, J. (1984). *The Social Logic of Space*. Cambridge University Press.
- Hillier, B., & Iida, S. (2005). Network and Psychological Effects in Urban Movement. In A. G. Cohn & D. M. Mark (Eds.), *Spatial Information Theory* (pp. 475–490). Springer Berlin Heidelberg.
- Karakuş, F., Urak, Z. G., & Özcan, Z. (2018) The Historical Water Systems of Istanbul and Their Preservation Problems: The Case of The Kırkçeşme Water System. *Gazi University Journal of Science* 31(2): 368–379.
- Lucas, R. (2020). *Anthropology for Architects: Social Relations and the Built Environment*. Bloomsbury Publishing.

Shopov, A. (2020). The Vernacularization of Sixteenth-Century Ottoman Agricultural Science in its Economic Context. *Living with Nature and Things: Contributions to a New Social History of the Middle Islamic Periods*, (pp. 639–681). Vandenhoeck & Ruprecht.

Stephenson, P., & Hedlund, R. (2016). Monumental waterworks in late antique Constantinople. In B. Shilling & P. Stephenson (Eds.), *Fountains and Water Culture in Byzantium*, (pp. 36–54). Cambridge University Press.

URL Links

[1] https://www.ehow.com/how_6688216_reuse-old-water-cistern.html

[2] <https://heritageandmemorystudies.humanities.uva.nl/index.php/excursion-2018-2019/layered-heritage/>

Endnotes

¹ To realize this idea, we were inspired by the podcast on Layered Heritage realized by Iris Volkers and Kelly Hazejager about their case studies: the Miramare Castle and the San Giusto Castle in Trieste: <https://heritageandmemorystudies.humanities.uva.nl/index.php/excursion-2018-2019/layered-heritage/>

² Some of them can be created by taking as example some activities already present on internet: https://www.ehow.com/how_6688216_reuse-old-water-cistern.html

The Valens Aqueduct as an Urban Living Lab: Integrating Networks, Enhancing Interfaces, and Revealing the Identity

Cem Almurat, Gökhan Okumuş, İtminan Tasneea, Özge Özeke Eski, Sıla Akman Aşık

Introduction

One of the main challenges for revalorizing the Valens Aqueduct is its discontinuous, disconnected, isolated, neglected, and ambiguous situation, standing in the middle of a megalopolis. To address these issues, we initially investigated how we could reverse its discontinuity to continuity, disconnection to connection, invisibility to visibility and make it accessible for everyone, as well as how we could reinterpret the historical and existing water, heritage, and pedestrian networks of the aqueduct.

Water issues, namely rising concerns about lack of freshwater and flood risks worldwide, create an urgent need to connect water and heritage; therefore, the relationship between water heritage and sustainability has been a rising topic in recent years. Due to the energy crisis, the world tends to experience conflicts and natural disasters, and traditional methods to access water should be available as a “safe,” “green,” and “sustainable” option in the future. The challenge is also to develop new technologies based on traditional knowledge and experience in water management.

Alongside the global environmental issues and the need for a sense of belonging and reconceptualization of the Valens Aqueduct, our proposal aims to create a model to encourage the local actors to take part in the process of establishing a better environment that will contribute to the sustainable development of Istanbul in terms of water issues through the binding potential of urban heritage. Ultimately, we aim to revitalize the Valens Aqueduct as the “exchanger and catalyzer” of urban life.

The “Urban Living Lab” (ULL) and three potential policies will be presented as our comprehensive proposal to conceptualize our vision for the Valens Aqueduct and its heritage. The ULL appears as an “exchanger” in our main framework, referring to its function as a platform that connects and addresses the heritage and sustainability issues related to the Valens Aqueduct and other water heritage. It is also a “catalyzer,” signifying to relate the aqueduct to the urban life and urban space, especially to initiate participation and increase livability.

In this context, the principles of the Historic Urban Landscape (HUL) approach will be our project’s primary theoretical basis for building the Urban Living Lab, which is the core of our proposals. HUL refers to the urban area formed by the historical layering of cultural and natural values and attributions, extending beyond the notion of a “historical center”, in order to include the broader urban context and its geographical setting. (UNESCO, 2011, p. 8) UNESCO Recommendation of Historic Urban Landscape suggests a landscape approach for identifying, conserving, and managing historic areas within their broader urban contexts by considering the interrelationships of their physical forms, spatial organization and connection, natural features and settings, and social, cultural, and economic values. The HUL’s approach covers the site’s physical characteristics, social and cultural values and perceptions, economic processes, and the intangible dimensions of heritage related to diversity and identity.

This approach addresses policy, governance, and management concerns involving various stakeholders, including local, national, regional, international, public, and private actors in urban development. Considering that the accelerating

pace of change in the HUL approach is mainly linked to economic and political changes (gentrification, tourism uses, real estate pressures, etc.) (UNESCO, 2011a), there is an urgency for the conservation, management, and sustainable development as well as transformation of historic urban landscapes as an attempt to resolve these urban challenges. Overall, the HUL approach proposes a practical guiding process for creating an Urban Living Lab, as the core of our proposals for revalorizing the Valens Aqueduct with its values (schematized in Figure 1).

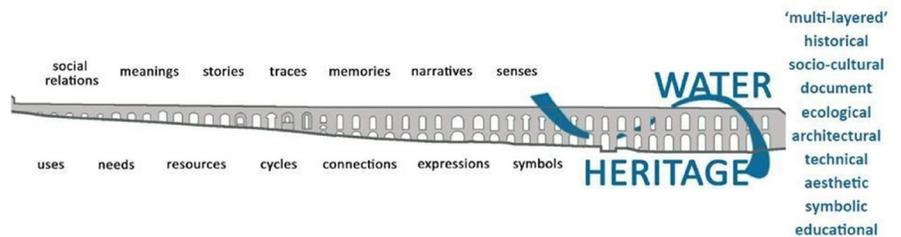


Figure 1: Cultural Significance of the Valens Aqueduct

The Valens Aqueduct as an Urban Living Lab

The livable city refers to an environmentally sustainable and culturally diverse urban area. Following the principles of the Historic Urban Landscape approach, Urban Living Lab is designed as an open lab to experiment with new alternatives to protect Istanbul's water and cultural heritage.

Based on the definition of the Amsterdam Institute for Advanced Metropolitan Solutions (AMS), Urban Living Labs provide a co-innovative setting where multiple stakeholders jointly test, develop and create urban solutions (Steen & Van Bueren, 2017). Urban Living Labs are dedicated places providing evidence on new solutions and technology, helping larger implementations. Five key characteristics of Urban Living Labs are (McCormick & Hartmann, 2017):

1. Geographical embeddedness: Urban Living Labs are placed or embedded in a geographical area - predominantly not virtual platforms.
2. Experimentation and learning: Urban Living Labs test new technologies, solutions, and policies in real-world conditions in highly visible ways.
3. Participation and user involvement: Co-design and stakeholder engagement often appear in all Urban Living Labs approach stages.
4. Leadership and ownership: Having a clear leader or owner is crucial for Urban Living Labs, although a delicate balance exists between steering and controlling.
5. Evaluation of actions and impact: Evaluation underpins the ability of Urban Living Labs to facilitate formalized learning.

Moreover, the AMS proposes a model to handle who, where, why, and what questions for an Urban Living Lab with nine aspects defining it, namely: innovation, learning, urban sustainability, development, co-creation, iteration, P-P-U-K (collaborations between public actors, private actors, users, and knowledge institutes), decision power, and context.

The ULL's primary purpose is to be an open place to design, test, and learn together in real time and space. Via this approach, raising awareness and creating policies for cultural heritage and urban sustainability will be institutionalized, centralized, and systemized for further development. By design, our proposed Urban Living Lab will serve as a forum for a greater involvement of citizens to share their ideas and visions for not only the Valens Aqueduct and water heritage but also the city of Istanbul and its multi-layered heritage.

Analyses, Principles, and Actions

Designing an Urban Living Lab in a densely occupied area with interwoven historical layers is challenging. The first step to creating a comprehensive, cohesive, and relevant urban renewal project is to apply several analyses and identify a set of principles and strategies based on these analyses to understand the contextual relationships better.

The multi-scalar approach is especially crucial for heritage sites such as historic urban landscapes. Within this scope, primary decisions were made based on analyzing and evaluating issues at the urban and structural scale. In addition, we defined scales and boundaries, as shown in Figure 2, which includes different zones around the Valens Aqueduct. We further analyzed the area's historical importance, context, ownership, and permeability analysis.

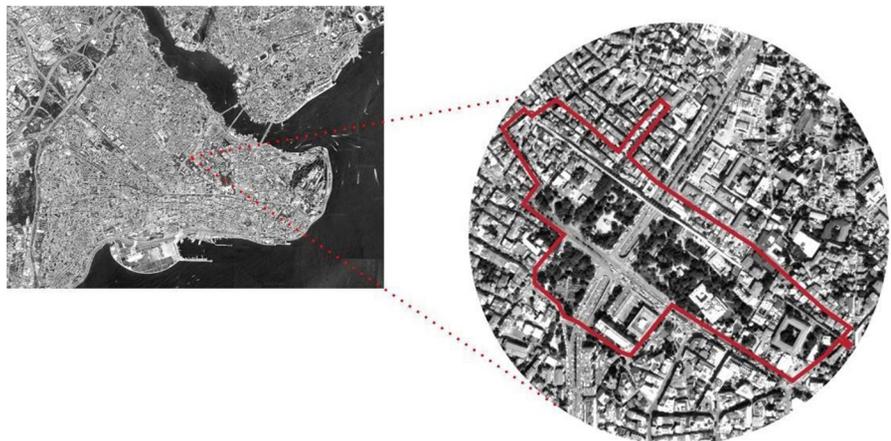


Figure 2: Upper scale Historic Peninsula & site scale of the Valens Aqueduct and its surroundings

To assess the Valens Aqueduct and its surroundings, we devised five specific intervention zones (Figure 3): The first is the predominantly residential zone, and the second is the parks and open spaces. The challenge here for pedestrians is the obstacles like fast traffic and fences. The third zone is the commercial zone where the Women's Bazaar is, and the fourth zone is the living quarters alongside the aqueduct. The fifth zone is the most multi-layered heritage area with its historical and religious water-related buildings such as fountains, water gauge, shadirvan, etc., where water use is ascribed to different meanings.

In the current situation, our analyses show that the site is segregated because

of the highways, the blocked arches, and empty lots used for car traffic and parking. Despite this segregation, Fatih and Saraçhane parks have great potential since they enable visual and physical connections with the Valens Aqueduct. Moreover, the context study helped us to identify the interrupted networks, mark the critical buildings, and determine the urban fabric surrounding the Valens Aqueduct. This analysis, accompanied by the ownership analysis, showed that the Istanbul Metropolitan Municipality (IBB) and the Directorate General of Pious Foundations owns most historical buildings in the zone. These decision-making public institutions are considered to collaborate, interact with, and be integrated with other actors and stakeholders.



Figure 3: Characterization of the site according to the analyses

Despite having the potential to be a permeable thoroughfare, the Valens Aqueduct acts as an edge in most areas around it. There are disconnected public spaces and viewpoints surrounding the aqueduct, which have a huge potential and value to be optimized for interventions. The Reşat Nuri Sahneci art theater can be enlisted as an actor and collaborator to introduce a cultural center and activities in the area. Moreover, a lot of impermeable and semi-permeable arches have the scope to enhance pedestrian access on both sides of the aqueduct.

When the concept of Urban Living Lab is associated with contextual relationships, water-natural environment, water-urban sustainability, water-urban development, water-cultural heritage, water-art, and water-education appear as overarching themes for the ULL and its prospected features. Regarding the central policies for the ULL, accessibility for all, connecting the aqueduct with the urban scape, and incentivizing participation will be the basis. They were developed parallel with these policies while designing action areas, forms, and intervention types.

The Urban Living Lab model uses the following policies to open a platform for greater involvement of various stakeholders and issues: accessibility, connecting

the aqueduct with urbanscape, and incentivizing participation (Figure 4). These policies were crafted to guide the design of action areas, forms, and intervention types, within this framework. The projects and ideas within this framework are sometimes an intervention at the building scale, sometimes a project or proposal for the building and its surroundings, and sometimes an upper-scale proposal that sees the study area as a 'hub' for the historical peninsula. This approach proposes new urban living methods based on environmentally sensitive strategies designed to promote sustainability and improve the quality of urban life. This way, the policies, and strategies can be adopted with a participatory management approach by taking the perspectives of all relevant stakeholders into account. Thus, the Valens Aqueduct and its surroundings as a historic urban landscape are also considered an opportunity for sustainable development of urban areas through their integration into urban policies.

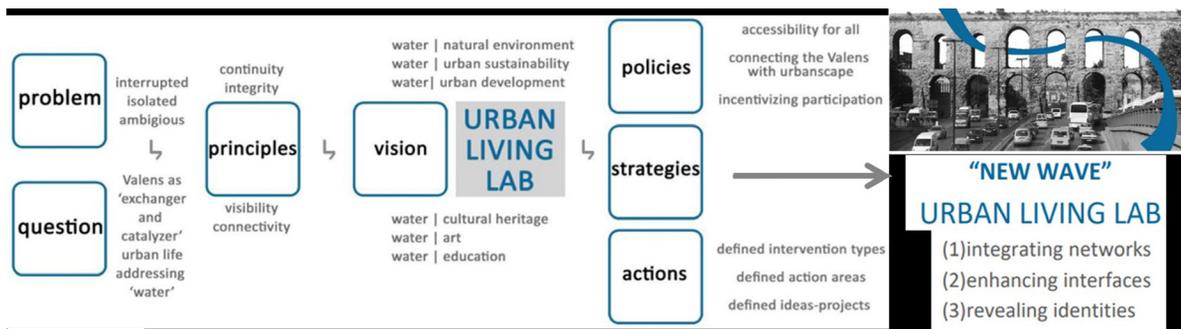


Figure 4: Principles, Visions, Policies, Strategies, and Actions

Accordingly, the Urban Living Lab is created as an umbrella concept for an organization taking place in the surroundings of the Valens Aqueduct. The main goal of this organization is to develop a heritage network, contribute to urban sustainability, and improve social interactions and relations between the relevant authorities.

As shown in the diagram (Figure 5), innovation refers to the parks as open labs for universities and start-ups to learn how to protect water and heritage together. Some application areas will be monitoring the urban water footprint, use of gray water and rain harvesting, water purification, refill points providing drinking water, and exploring sustainable materials and resilient plants. Moreover, learning activities will focus on cultural heritage, water heritage, and urban sustainability. Via this approach and our initial proposals, we aim to raise awareness of cultural heritage and urban sustainability, focusing on water issues to attract the stakeholders' interest.



Figure 5: Urban Living Lab model for the Valens Aqueduct and its surroundings

Proposals

As initial projects of the Urban Living Lab, we came up with three project proposals: (1) organizing parks as an experiment platform, (2) an app as an experiment inventory, and (3) the Valens Aqueduct as a monument to be experienced. With the help of these three projects, co-creation activities will take place in the area, such as place-making activities, urban gardening, workshops on water heritage, and experiencing the Aqueduct with the urban sketchers' movement. These activities will be held regularly and evaluated to improve future activities. We propose quadruple-helix (Carayannis et al., 2012) collaborations between public actors, private actors, users, and knowledge institutes and pronounce Istanbul Metropolitan Municipality (IBB) as the enabler of the project to orchestrate the Urban Living Lab ecosystem.

1 - Enhancing Interfaces - The Core of the Urban Living Lab

Saraçhane and Fatih parks are the core of the Urban Living Lab and the primary interfaces to be enhanced. They are co-learning platforms of the Urban Living Lab and are connected with the Istanbul Metropolitan Municipality (IBB) headquarters, Saraçhane Archaeopark, and the Istanbul University Department of Aquatic Sciences. At these parks, we propose to open up a place for all users to design, test, and learn together. Connections to these parks are essential. That is why we propose removing the fences and improving the crossings and physical connections via two pedestrian routes shown in Figure 7; the blue dotted line heritage route and the green dotted line experiment route. We propose co-using Gazanferaga Madrasa, Şehit Ali Paşa Library, Reşat Nuri Scene, and the Istanbul Metropolitan Municipality (IBB) headquarters for indoor activities such as meetings, workshops, courses, etc. (Figure 12). The connection of the parks with the Women's Bazaar and Archaeopark is also critical because cultural heritage and involvement of locals are one of the main themes of this organization.

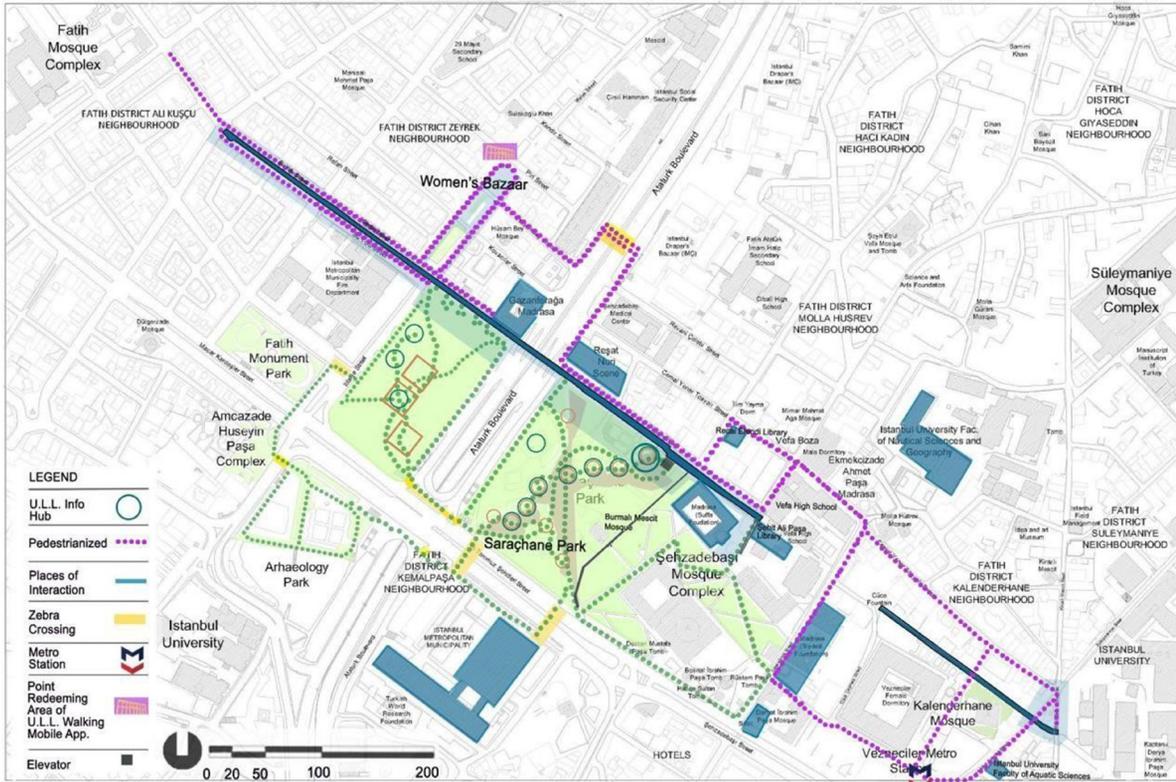


Figure 6: Proposal Plan

We propose some place-making strategies adopted from the literature to open up space for the Urban Living Lab to experience and experiment outdoors. These solutions should be reversible and flexible for the sustainability of a dynamic setup. One of these elements is a circular playground for children to enhance their interaction with each other. The other solution is modular and reversible structures to sit, perform or gather on them or planting beds to test resilient soft pavements and plants. We see this modular urban furniture as an accelerator for place-making activities. Moreover, urban sustainability is one of the most critical aspects of the Urban Living Lab. Hence, it shapes place-making decisions such as separate containers for waste, green basin trails, and activity podiums.

We are aware that the change will happen step by step. Thus, we also have some recommendations to the Istanbul Metropolitan Municipality (IBB), as the envisioned enabler of the ULL to improve the urban life in Istanbul starting from the pilot sites at the ULL. These recommendations are initiating workshops and art installations at the interfaces of the Valens Aqueduct to increase awareness of water heritage and ecological crisis and improving urban safety and sustainability by traffic calming measures, pedestrianization trials, and providing drinking water in the parks with defining pilot areas within the Urban Living Lab (Figure 13, 14, 15).

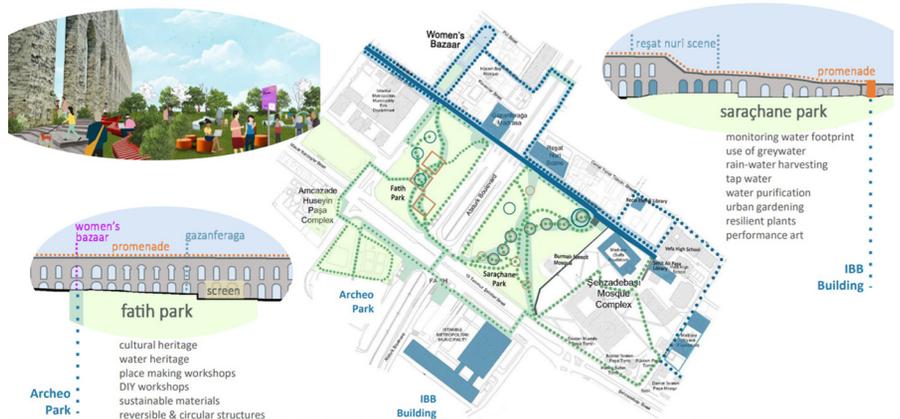


Figure 7: Saraçhane and Fatih parks are the core of the Urban Living Lab where the catalysis happens through cultural exchange

2 - Integrating Networks: Through Mobile Walking Application

Under the Living Lab, our second proposal is to incorporate innovation and launch a walking app. With the vision to integrate networks, our app, “WALK APP,” will connect locals and tourists to the city’s water heritage and historical sites through walking routes.

WALK APP will enhance pedestrian mobility and take users to explore different heritage sites. It will also promote urban sustainability by lowering the carbon footprint and catalyzing the economic wheel of the local markets through an exclusive reward redeeming option.

With the “WALK APP interface,” users can choose the walking route based on the category of heritage points they want to explore. Once the route is selected, press start and let GPS lead the journey. Throughout the journey, there will be different check-in points and street markers to ensure one is on the right way all around the walking route of the city. When the user checks into these stops, the user earns walking credits that can later be redeemed for services at the local shops and cafes in the Women’s Bazaar of Zone 3 and Cemal Yener Tosyalı Caddesi of Zone 4, only to accumulate the users around the Valens Aqueduct and encourage activity (Figure 8).



Figure 8: Urban Living Lab: WALK APP

Rather than building a new app, it may also be plugged into existing mobile apps like Yürü Be İstanbul by the Istanbul Metropolitan Municipality (IBB), Kardes, Sweatcoin rewards cryptocurrency for walking, or CharityMiles, where users can exchange their walking hours into currency for donation. The system can be financially sustainable, and the possible profit can be used for the Urban Living Lab's further development (Figure 9).

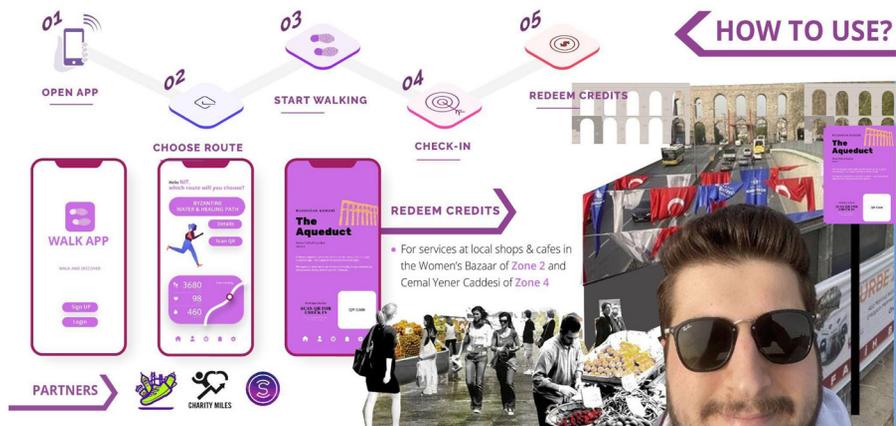


Figure 9: Brief description of the app user interface and system

For instance, when the user chooses “The Byzantine Water and Healing Path,” a walking path will be introduced to the user that takes him around the Historical Peninsula, starting and ending at the Urban Living Lab HUB in Saraçhane Park around the Valens Aqueduct. The path will enlighten the user on the Byzantine period’s water cisterns used for spiritual healing and show how the Valens Aqueduct sits in the middle of it. Thus, not only do users learn about the long-lost significance of different water heritage sites of Istanbul but also experience the Valens Aqueduct like never before through the living labs when they begin and end their journey (Figure 10)!



Figure 10: "Byzantine Heritage and Healing Path" - A prototype walking path designed in ULL

Similarly, other heritage sites belonging to different historical layers will demonstrate the changing meaning of water through walking routes in our app to ensure water-related narratives, experiences, and technical background of the past are being passed on to the next generations and address the (dis)continuity of history.

3 - Revealing the Identity

Our third proposal is about experiencing the Valens Aqueduct as a monument. Physical and organizational intervention proposals aim at maintaining the historic urban landscape's intangible values. Since the identity and cultural significance of the aqueduct is the consequence of society's connection to urban heritage, our target here is to strengthen the bond between society and the heritage to save the aqueduct from being ambiguous while attributing new values to enhance identity by following contemporary paradigms. Thus, we consider the Valens Aqueduct as “a promenade” as in the past, as “an accompanist, a catalyzer, an influencer” for all, and “an annual events’ place” of the ULL in the context of water and heritage issues.

To expand on these points a little more, one of the values of the aqueduct stems from the memories of the inhabitants going up to the Valens Aqueduct, and pedestrians still strongly desire to be on top of the monument. Therefore, proposing a promenade on top of the aqueduct is significant for the continuity of society's memories by providing a connection between the two sides separated by Atatürk Boulevard for the integrity of the area.

Thus, we propose a controlled promenade on top of the aqueduct to experience unique views of the monument. The control is provided by the elevator (Figure 11) used for a small fee and spending on the future development of the ULL. We believe that the Valens Aqueduct as a promenade will regain its symbolic value. It will also enable visitors to monitor the changes happening around the monument via the Urban Living Lab.

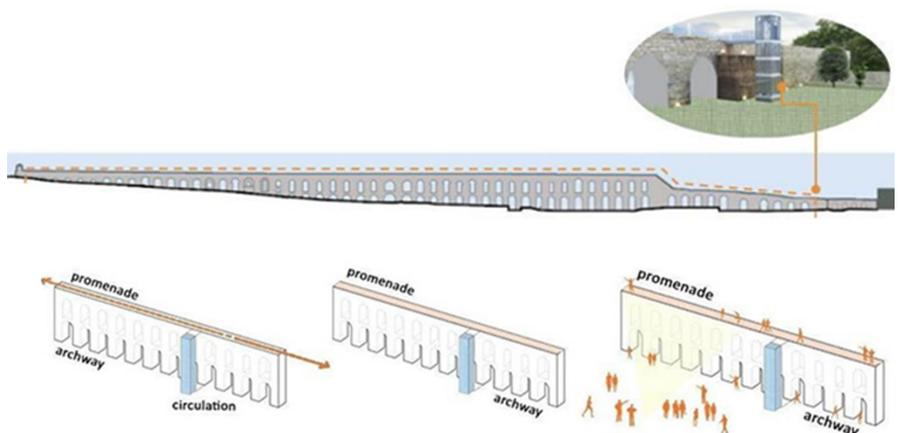


Figure 11: Promenade proposal for the Valens Aqueduct and the proposed location of the elevator

The impact area of the Valens Aqueduct under the organization of the living lab is expected to exceed the study's boundaries, as seen in the Proposal Plan (Figure 6). In other words, besides the core of the lab in the parks, pedestrianization in marked purple lines is aimed at transforming the neglected physical property of the aqueduct into a positive, enriching spatial use and cultural depth. Proposed lines are also heritage-experiencing lines starting from Fatih Mosque, passing through the branch of the aqueduct reaching to Şehzadebaşı complex, connecting to Vezneciler Metro Station, and if continued, to Süleymaniye or Beyazıt Mosque complexes (Figure 6).

Pedestrianization will also contribute to reducing carbon emissions by reducing the use of automobiles and, thus, the need for parking spaces in the historical peninsula, encouraging public transportation and movement. Another proposal to encourage pedestrian movement is traffic calming measures like speed humps and zebra crossings in the yellow marked points. In addition, the Urban Living Lab organization includes other cultural heritage layers integrated with the aqueduct by using madrasas and mektebs (currently used as libraries or NGO cultural/educational centers) for lab research, workshops, presentations, etc. as part of the collaboration as shown in the dream images (Figure 12).

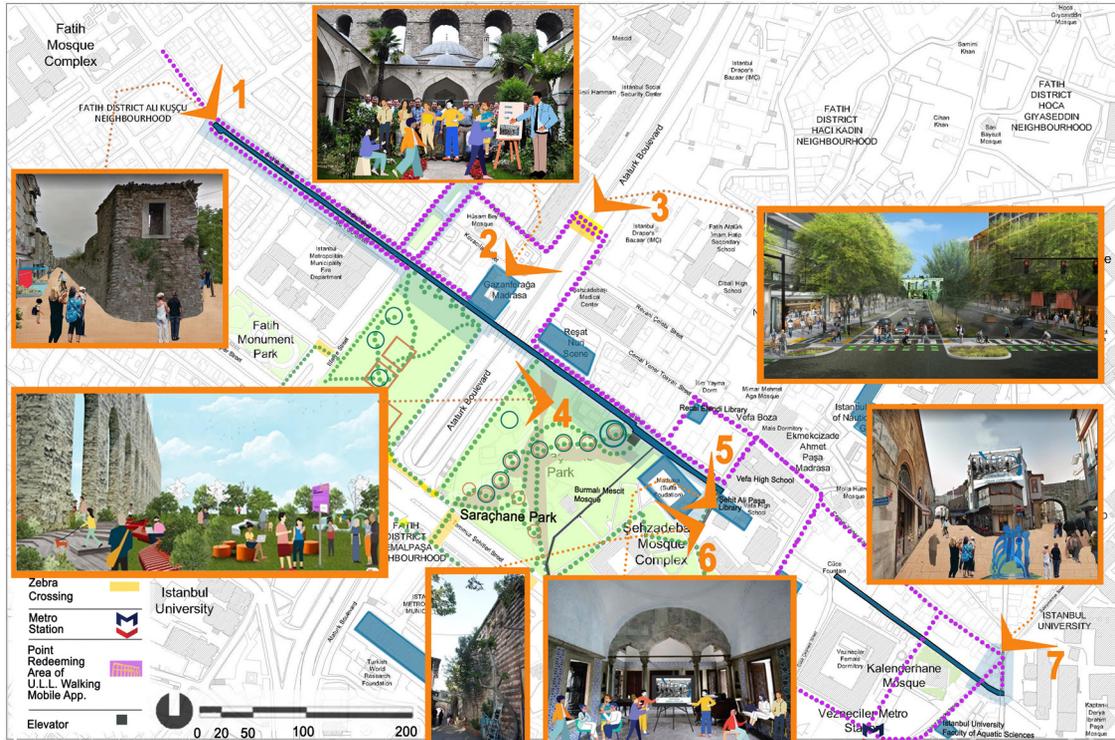


Figure 12: The (dream) vistas on the key master plan: 1. Pedestrianization on Suyolu and Serdab Streets (collage made by manipulating the image retrieved from Google Maps Street View, 2018 February), 2. An event of ULL in Gazanferaga Madrasa (collage made on image retrieved from here), 3. Zebra Cross on Atatürk Boulevard, 4. The core of ULL, 5. An event in Şehit Ali Paşa Library, 6. The branch of the Valens Aqueduct, adjacent to the courtyard of Şehit Ali Paşa Library, 7. Enhancement and graphic communication points around the Valens Aqueduct.

Lastly, we propose three annual events that will last for a week, starting on 22nd March World Water Day, 25th September Global Day of Climate Action, and 18th April World Heritage Day, the theme of which was “Heritage and Climate” in 2022. It is proposed to project stable remarkable questions like “How many liters of water did you use today?” or “Where does the city’s water come from?” and the name of the events for vehicle drivers in the middle part facing the traffic flow (Figure 15). On the other façades facing the parks, 3D light shows, and infographics will be projected, telling the story of water or the area’s historical context. Events include outdoor workshops, performances, and exhibitions in related themes by invited artists on reversible platforms and surfaces, creating different atmospheres forming a new modest 21st-century, non-interventionist layer in the site (Figure 15).



Figure 13: Vista #3: Atatürk Boulevard (aqueduct placed on the image retrieved from <https://dcist.com/story/20/10/07/richmond-highway-national-landing-amazon/>)

Conclusion

The Urban Living Lab (ULL) connects water and heritage in the city with a primary focus on water heritage and sustainability. It incorporates various cultural layers within the district, highlighting their relation to water. By exploring the changing meanings of water across different historical layers, ULL preserves water-related narratives and technical knowledge for future generations.

From a heritage perspective, the goal is to make all layers and values of the site visible through minimal intervention in the Valens Aqueduct and its surroundings. Regarding sustainability, ULL creates a water-sensitive environment, essential for innovative building technologies based on traditional water management knowledge. It aims to be an inclusive, participatory, and productive space addressing urban water issues.

The historical peninsula is cosmopolitan and crowded, with diverse stakeholders. Major groups targeted for interventions and active participation include locals, tourists, students, academics, NGOs, immigrants, bureaucrats, and merchants. Istanbul University and nearby faculties generate academic mobility. The peninsula attracts immigrants, particularly Syrian refugees, forming communities near the aqueduct. Busy areas like IMC Bazaar and Grand Bazaar are close to

the aqueduct. The cosmopolitan structure presents challenges and opportunities to engage these diverse backgrounds and make them stakeholders in the city's cultural heritage.

Figure 14: Vista #7: Enhancement and graphic communication points around the Valens Aqueduct (collage made on the image retrieved from Google Maps Street View, 2018 January; (The Sculpture: Water Guardians from Toronto retrieved from <https://www.livabl.com/2015/11/photo-tourstunning-public-art-installations-toronto.html>)



ULL aims to establish a solid connection to the past and nature, stimulate academic discussions, and develop cultural heritage knowledge and awareness. Societally, it fosters a shared historical consciousness, engaging stakeholders through physical areas and highlighting the aqueduct's importance. It has an educational role in preserving cultural heritage, addressing water issues, sustainability, and climate change. Furthermore, stakeholder involvement is crucial for the ULL's sustainability. They should feel a sense of responsibility and increased interest in cultural heritage, creating additional values.

Although hypothetical, proposals can be shared to raise awareness of water heritage's value to improve urban life in Istanbul, starting from the pilot sites. Gradual change is expected, and recommendations to the Istanbul Metropolitan Municipality, as enabler of the ULL, include traffic calming measures, pedestrianization trials, providing drinking water in parks, and initiating workshops and art installations to raise awareness of water heritage and the ecological crisis.

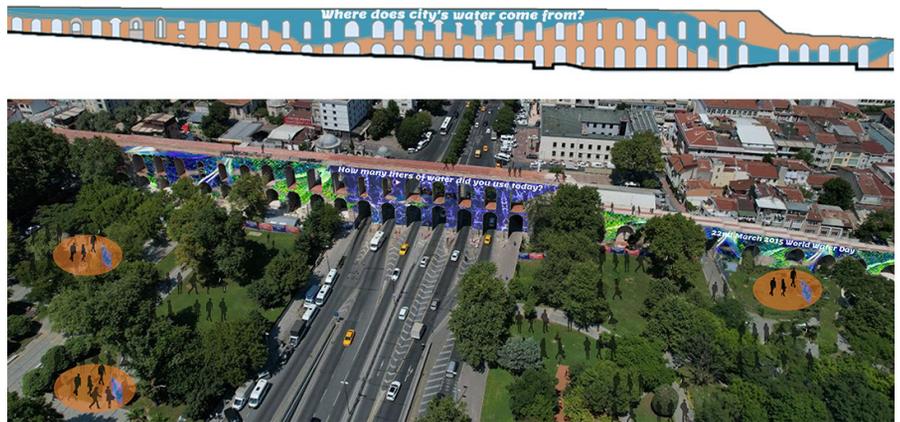


Figure 15: Annual events on specific days / Stable light projection on the Valens Aqueduct

Reference List

Carayannis, E. G., Barth, T. D., & Campbell, D. F. (2012). The Quintuple Helix innovation model: global warming as a challenge and driver for innovation. *Journal of Innovation and Entrepreneurship*, 1, 1–12.

McCormick, K., & Hartmann, C. (2017). *The Emerging Landscape of Urban Living Labs: Characteristics, Practices and Examples*. Lund University.

Steen, K., & Van Bueren, E. (2017). The defining characteristics of urban living labs. *Technology Innovation Management Review*, 7(7), 21–33.

UNESCO. (2011). Recommendation on the historic urban landscape. In *Proceedings of the Records of the General Conference 36th Session*. [Online]. <https://whc.unesco.org/document/160163>

Images for Collages:

Carroll, J. (2014, September 22). *The top 10 public art installations in Toronto*. blogTO. https://www.blogto.com/arts/2014/09/the_top_10_public_art_installations_in_toronto/

Here's what a reimaged Richmond Highway could look like through National Landing. DCist. (2018, June 7). <https://dcist.com/story/20/10/07/richmond-highway-national-landing-amazon>

Gazanfer Ağa Medresesi Eğitim ve Kültür Merkezi. Facebook. (n.d.). <https://www.facebook.com/gazanferagamedresesi/photos/pcb.2566326540078485/2566326166745189/?type=+3&theater>

Google Maps Application Street Views

The Past. (2023, January 18). *World Archaeology: "The City Thirsts": Water in Istanbul: Past, present, and future*. <https://the-past.com/feature/the-city-thirsts-water-in-istanbul-past-present-and-future/>

Field of Flowing Memory: Bringing Water Back to the City

Dilara Ayşegül Kökten, Gökçen Özalp, Sunay Paşaoğlu, Imke Seising, Tuğçe Sözer

Introduction

The Valens Aqueduct was and will be a strong marker of Istanbul's city image as it is one of the most important cultural heritage objects that has been changed, altered and transformed over the centuries. Although the aqueduct is no longer in use and has been replaced by modern water infrastructure solutions, it still conserves its monumental value within the area and an urban context.

Group Flow has created this project within the scope of NIT Urban Heritage Lab: Water Heritage for Sustainable Cities Course 2022 to explore how water heritage can act as a driver for sustainable development and raise awareness of contemporary water issues worldwide. To achieve the goal of creating sustainable water heritage, our group has studied the historical and infrastructural identities of the Valens Aqueduct. Because the primary function of the Valens Aqueduct was bringing water to the city, the project takes water as its primary agent. It shapes its motto around bringing water *back* to the city by creating a field of flowing memory.

How we can bring water back to the city is the main research question of this project because water is renewable but a finite source and the supply of fresh water and the lack of it are still urgent issues that call for immediate actions. To answer this question, the project defines sub-notions, i.e. problems, potentials and needs, pertaining to the Valens Aqueduct's historical and infrastructural identities by investigating these two identities on macro, meso and micro scales. Then, it offers different solutions for different scales.

Research Design

The primary goal of this project is to bring water to the city on various scales and to reintegrate water and the Valens Aqueduct to the city. Thus, the primary agent of the project is water, and the sub-agents are its relations with urban space.

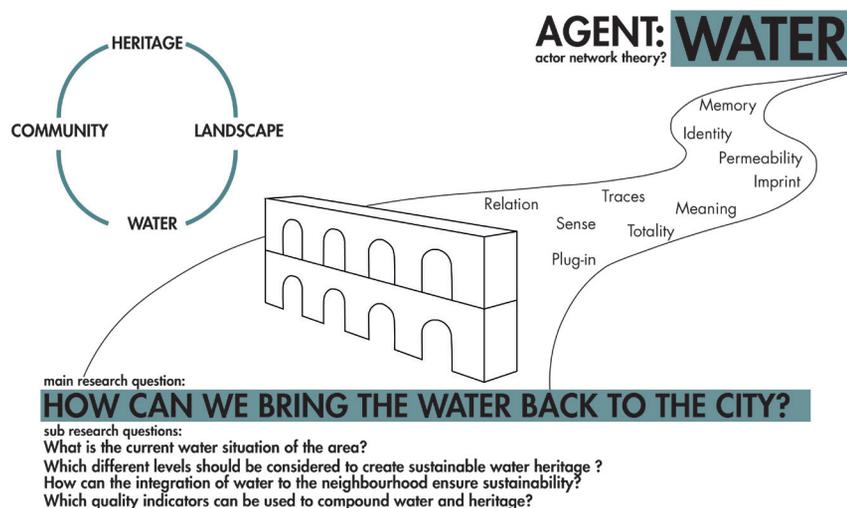


Figure 1: Research Design

The word cloud below contains all the agents that shape the project of bringing water back to the city (Figure 2). The relationship between water, heritage, community, and landscape must be established to achieve this goal.

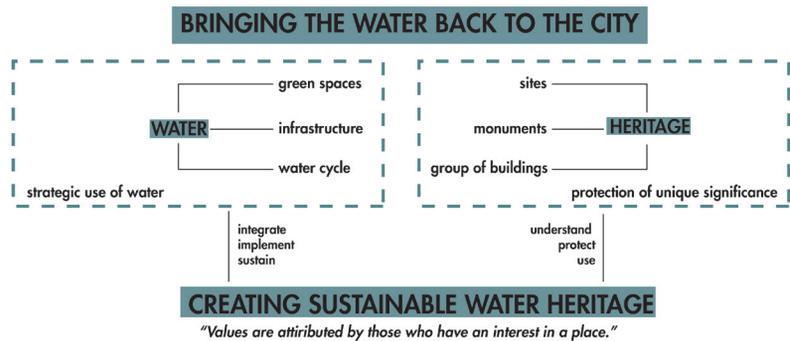


Figure 2:
Methodological Framework

Methodological Framework

This project uses a research-by-design approach and focuses on two aspects, namely water and heritage. These two aspects form the baseline of the project's methodological framework.

The water aspect is defined by green spaces, water infrastructure and water cycle as the main components of water-sensitive urban design to result in a strategic use of water. With these elements, the purpose is to integrate, implement and sustain the water.

On the other hand, the heritage aspect focuses on the area's critical physical elements, such as sites, monuments, and groups of buildings, to protect the Valens Aqueduct. Understanding, protecting, and using this unique significance is vital to operate with these elements.

Operational Framework

The operational framework of the project proposes a holistic approach where the city becomes a part of the water cycle.

The current water infrastructure system collects the water from the city, takes it out of the city through the concrete underground piping system and treats it in large facilities. Clean water is generally distributed via a water distribution network after being treated or stored in artificial bodies located outside the city. Furthermore, this unsustainable and insufficient system does not involve the Valens Aqueduct and pushes it away from the water cycle, without memorizing its role in the past.

The project proposes a new water infrastructure that includes both water-sensitive urban design elements and heritage-related elements of the Valens Aqueduct area. Using these tools brings the water to the city, where it belongs. It makes it possible to collect, treat, and store the water within the area and create a water-sensitive place that can deal with water problems: scarcity and urban flooding.

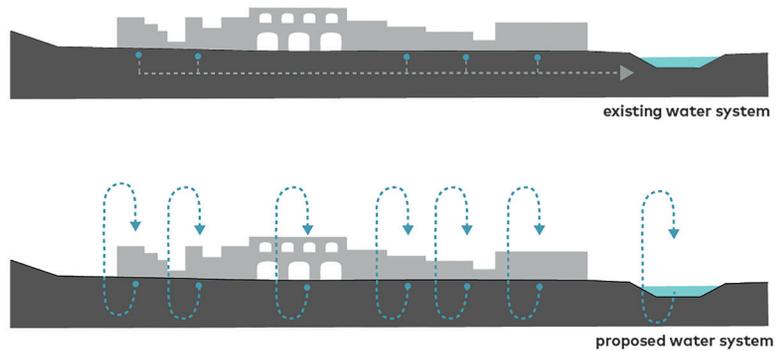


Figure 3:
Operational Framework

Aqueduct in History

The project's idea comes from combining heritage and water. Thus, it is crucial to understand the role of the Valens Aqueduct in history.

The aqueduct has been shaped by different approaches and needs. It has been formed and used by different rulers for distinctive policies. The timeline mainly represents three periods: Roman, Byzantine and Ottoman. The final and visible aqueduct bridge, now known as the Valens Aqueduct or Bozdoğan Kemerleri in Turkish, is located in the Fatih district of Istanbul, Türkiye.

Timeline

The turning points in the history of this monumental structure have been investigated to understand the aqueduct, and a visual timeline has been generated with these points.

The Valens Aqueduct is one of the examples of the early Byzantine era elements that have survived in Istanbul. In the Roman period, Hadrian is one of the most important names for the timeline because he is the one that started to build a water supply system in the city. But as the city was growing, the water supply provided by Hadrian's line was not sufficient anymore. Hence, thanks to the Valens line Constantinople could grow as it did and became the largest city in late antiquity.

The aqueduct as we know it is, however, not to be attributed to the emperor Valens only. The persistence of the system is due to many actors throughout history that repaired and extended the system. This is the reason why we decided to make our timeline as broad as possible. We decided to start in the early second century AD with Hadrian, as the first water supply system is connected to his person. The next major figure is, according to us, Constantine the Great, because he decided to 'build' a new capital at the location of the former city of Byzantium. The increased demand for fresh water precedes the development of the water supply: the construction of the Valens line.

After Valens, we have selected some actors we think have been most important within the history of the aqueduct. These are the people that kept the system alive,

by either acts of renovation or extension. Chronologically, we mention the emperor Theodosius, Justinian I, Justin II, Constantine V, and Andronikos I Komnenos. The Valens line was inaugurated in 373 by the city's prefect Clearchus. Because of the severe drought, emperor Theodosius I built a new line in 382. But it is known that the water infrastructure was damaged because of the earthquakes. During the siege of 626, the Avars cut the water supply line to prevent the city from having water. Justinian the Great restored and connected the aqueduct with the Basilica Cistern to store the water; there is a separated pipe system to the aqueduct from the era of Justin II. Constantine V reestablished the system after the great drought. Andronikos I Komnenos is the last Byzantine emperor who maintained the aqueduct to supply water to the city.

For the following period, we selected Suleiman I, Mehmet II, and Mustafa II. Why they were important is shown in the timeline by short accompanying sentences. After the conquering of Constantinople by Mehmet II, the aqueduct started to be used to supply water to Eski Saray and Topkapı Sarayı. Furthermore, the new connection from northeast has been established in this period. In the

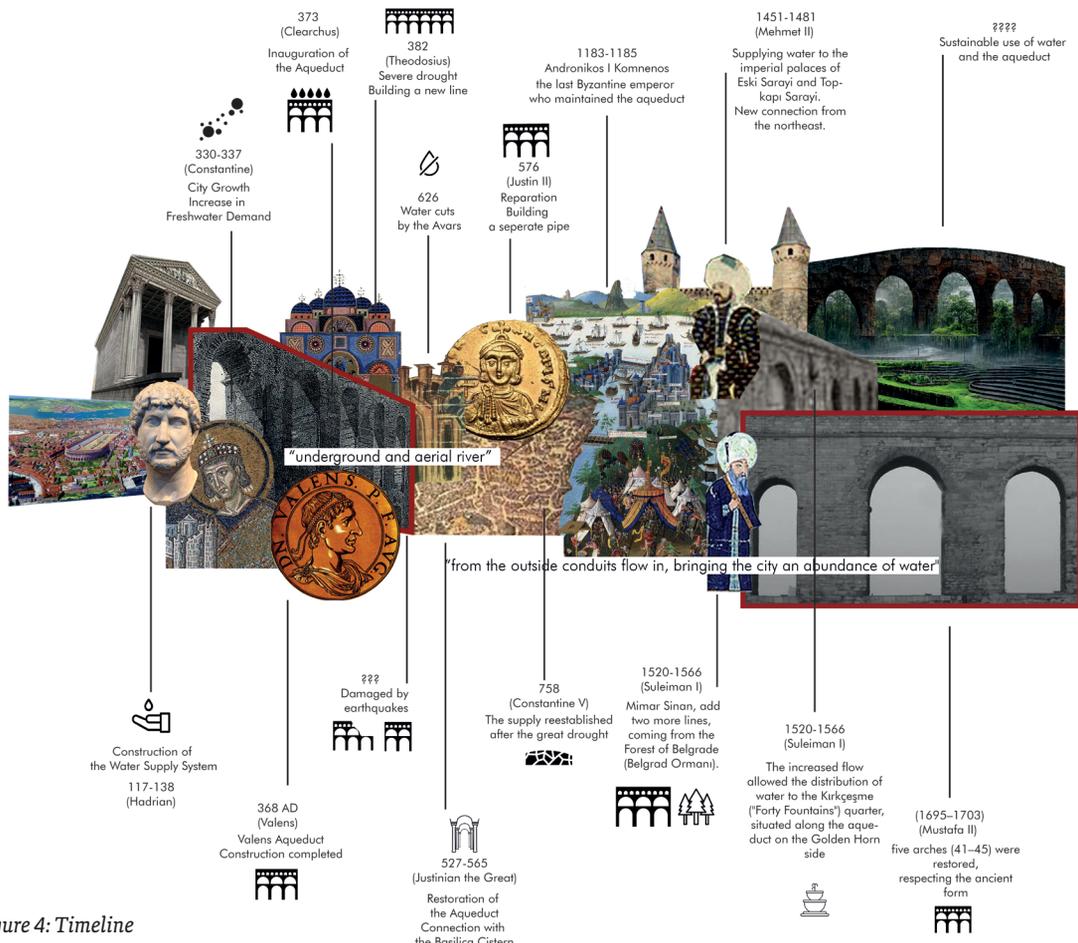


Figure 4: Timeline

reign of Suleiman II, Mimar Sinan added two more lines coming from the Forest of Belgrade to the aqueduct and the increased flow allowed the distribution of water to the Kırkçeşme ("Forty Fountains"). Finally, under Mustafa II, five arches were restored, respecting the ancient form.

The end of our timeline does not reflect the end of the story of the aqueduct. For this reason, we have named the last bullet 'sustainable use of water and the aqueduct', for this is the goal of our project. We are aware that we have only mentioned the 'great men' of history, and that many more people were involved in this story that took place against the background of continuity (of the structure itself) and discontinuity (of the political and social context). As you will see in the next section, there is some data about the quantities of people that worked on the structure at some point in history, but we do not have more information about this group.

Quotations

The quotations that are shown below are meant to be implemented in the area of our proposal. As awareness about the history and the function of the Valens aqueduct seems a major issue to the public, these sentences are meant to create more awareness and knowledge. As is visible, some key words are highlighted. These are the words we think really show important values, and in this way the quotations are probably more appealing for the public to read. They tell the story about how the aqueduct was perceived in past times. By putting these texts on informative panels, people will be able to really engage with the aqueduct, as they can read about it and look at the real structure at the same time. In this way, history—or, historical sources—and heritage can really come together.

The quotations that we selected are respectively from the fourth, sixth, and ninth centuries AD. Thus, they are primary sources that reflect people's opinions, at least the opinions from the writers themselves, about the value of the aqueduct. They all address its greatness, which is something that we want to show to the public as well. At the same time, the selection of these three citations shows an important bias: they are all Byzantine. Our goal for the future is, then, to add more similar texts from different periods. In this way, we can make the image more complete, just like the timeline above. There should be texts from the very early beginning of the system, throughout the Byzantine and Ottoman periods, and it can even be extended up until today.

Themistius' Orations (4th century)

[...] Thus they [*the Thracian nymphs*] come to us faster than thought and neither rocks hold them back nor narrows nor the tops of high mountains nor craggy cliffs nor lightless ravines, but they run underneath the ones and around the others and they fly high above the third and *they have come together into one place and have welcomed each other* and have made a pact to flow together to the temple that is *Constantine's* by name but is already *Valens'* as far as its construction is concerned. For by right the origin of each thing does not belong to the one who started it but the one who completed it. [...]¹

Justinian's Codex (6th century)

[...] It should be observed that none of those who have *the right to use the water* shall be subjected to any *expense for repairs*, as it would be abominable for *the inhabitants of this Beautiful City* to be compelled to *purchase water*. [...]²

Theophanes' Chronographia (9th century)

[...] *Cisterns and baths* were put out of commission; even those springs that in former times had gushed continuously now failed. On seeing this, the emperor set about restoring *Valentinian's (Valens') aqueduct*, which had functioned until Herakleios and had been destroyed by the Avars. He collected *artisans* from different places and brought from Asia and Pontos 1000 *masons* and 200 *plasterers*, from Hellas and the islands 500 *clay-workers*, and from Thrace itself 5000 *labourers* and 200 *brickmakers*. He set taskmasters over them including one of the patricians. When the work had thus been completed, *water flowed into the City*. [...]³

Analysis And Proposals

To understand the water situation of the area and to see how the urban fabric was shaped throughout different periods, the project consists of different scale analyses and proposes ideas which are developed by the analysis.

Macro Scale

The region this project focuses on is located in Istanbul's European side, where the city was first established. This area is abundant in water resources with many river lines connecting to the Marmara Sea and two primary water basins. These basins play a crucial role in shaping urban scale strategies due to their diverse characteristics. Istanbul has two main springs and water lines originating from the 4th and 5th centuries. The 4th century water line includes the Pınarca and Danamanđıra springs, while the 5th-century water line was developed to meet the growing water demand, incorporating Pazarlı, Ergene, Binkılıç and Paşa springs (Figure 5).

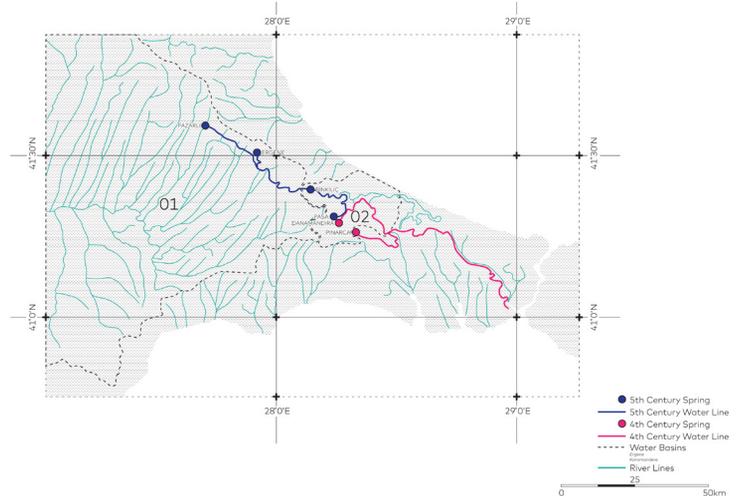


Figure 5:
4th-and 5th-Century Water Lines
and Historic Peninsula

In addition to various water elements in the peninsula, the mese axis holds historical significance with seven important forums — Arkadios, Philadelphion, Constantine, Million, Augusteion, Theodosius and Marcian. Though no longer visible, remnant of their structures still help us sense their presence. Thus, the macro scale proposal suggests creating a water-related forum near the Valens Aqueduct to connect it with other historically significant areas of the city (Figure 6).

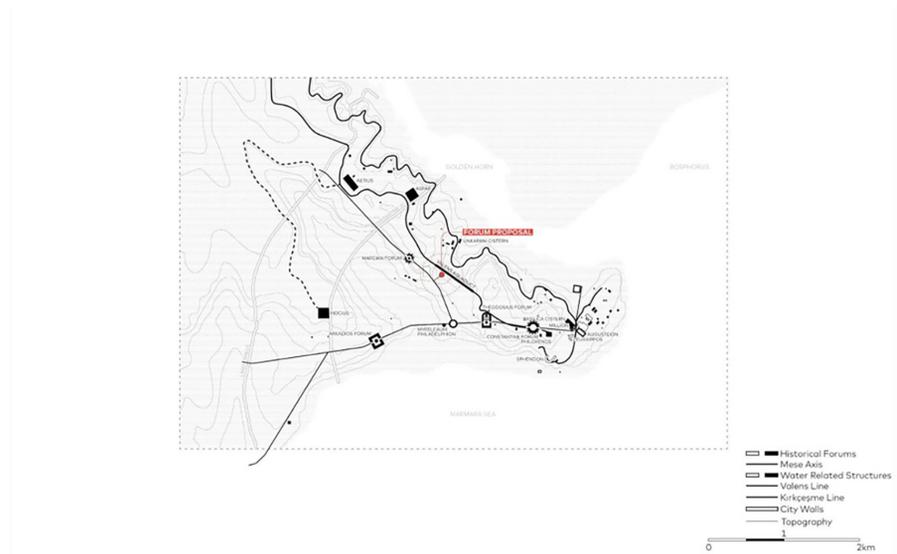


Figure 6:
Forums, Valens Aqueduct and
Forum Proposal in Historic
Peninsula

Meso & Micro Scale

The continuous grid plateau is a concept in which Atatürk Boulevard is taken underground as a design principle (Figure 7). This area focuses on the ongoing reconstruction of water and heritage elements. Symbolic points on this infinite grid plateau serve as spatial organisation patterns that attract the visitor's attention. The potential examples are discussed in the later stages of the design.

'Use - Location - Agent' Matrix represents the formula of the design concept. The 'use' axis incorporates the project's basic design elements such as temporary structures, kiosks, periodical events, lighting, bioswales, rain gardens, art installations, graphical identity and informative signage. The term 'Agents' derives from the concept of the project and characterizes its relationship with urban space. These include memory, identity, permeability, imprint, meaning, traces, sense, totality, plug-in and relation. The 'Location' axis signifies different points of experience within the cartesian matrix: the Valens Aqueduct, Fatih Memorial Park, Saraçhane Park, Hava Şehitliği Park, Şehzade Mosque, Women's Bazaar, Vefa Highschool, Atatürk Boulevard, Suyolu Street and Sertab Street. The overlapping surfaces on the superimposed 3D matrix reveal the design's overall notation (Figure 8).

The water harvesting techniques selected for this project include wastewater and stormwater (rainwater) (Figure 9). Stormwater harvesting involves collecting and storing rainwater in surface or sub-surface aquifers to prevent loss as surface runoff. Wastewater reuse encompasses a treatment process that allows plants to

create a natural ecosystem for purifying the water. These techniques are particularly important in urban settings, where rapid urbanisation has diminished the infiltration of rainwater into the subsoil, leading to reduced groundwater recharge.

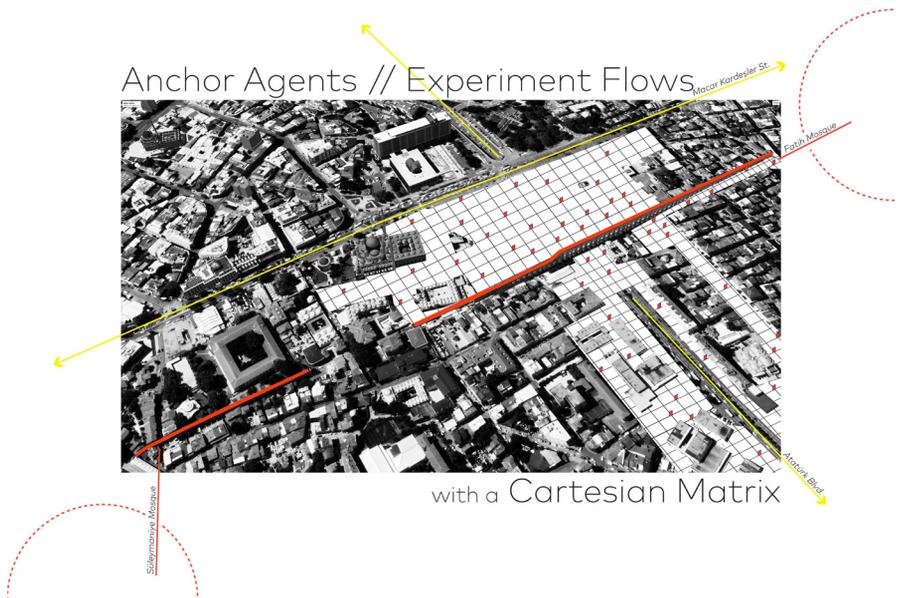


Figure 7: Generic Collage

By utilizing catchment, treatment and storage methods, stormwater can be effectively harvested allowing all the generated water in the area to be reused for irrigating the public green spaces.

The selected water-sensitive urban design elements aim to create a water-sensitive area through the catchment, treatment and storage processes. To be able to fulfil these processes, the project proposes different elements for different scales. For catchment, lower-scale decisions involve soak pits for car parks, while the upper-scale decision requires rain gardens/bioswales. Bioretention systems, also known as rain gardens, primarily benefit from stormwater runoff. Implementing this water-sensitive element is logical, strategic, and simple: it preserves groundwater. It ensures that water infiltrates into the lower layers of the ground, where it can be absorbed like a sponge.

Constructed wetlands serve as another important treatment element selected for the project, as they are a natural solution for wastewater reuse. It is essential to select site-specific plant species for optimal results. On the lower scale, septic tanks play a crucial role in treating grey and black water. However, it should only be used as primary treatment.

Detention basin/pond is another urban-scale water-sensitive urban design element, essential for the catchment and storage. Their main purpose is to reduce runoff and water flows by temporarily holding rainwater and stormwater before infiltration into the soil or release to surface water. Although these areas are not

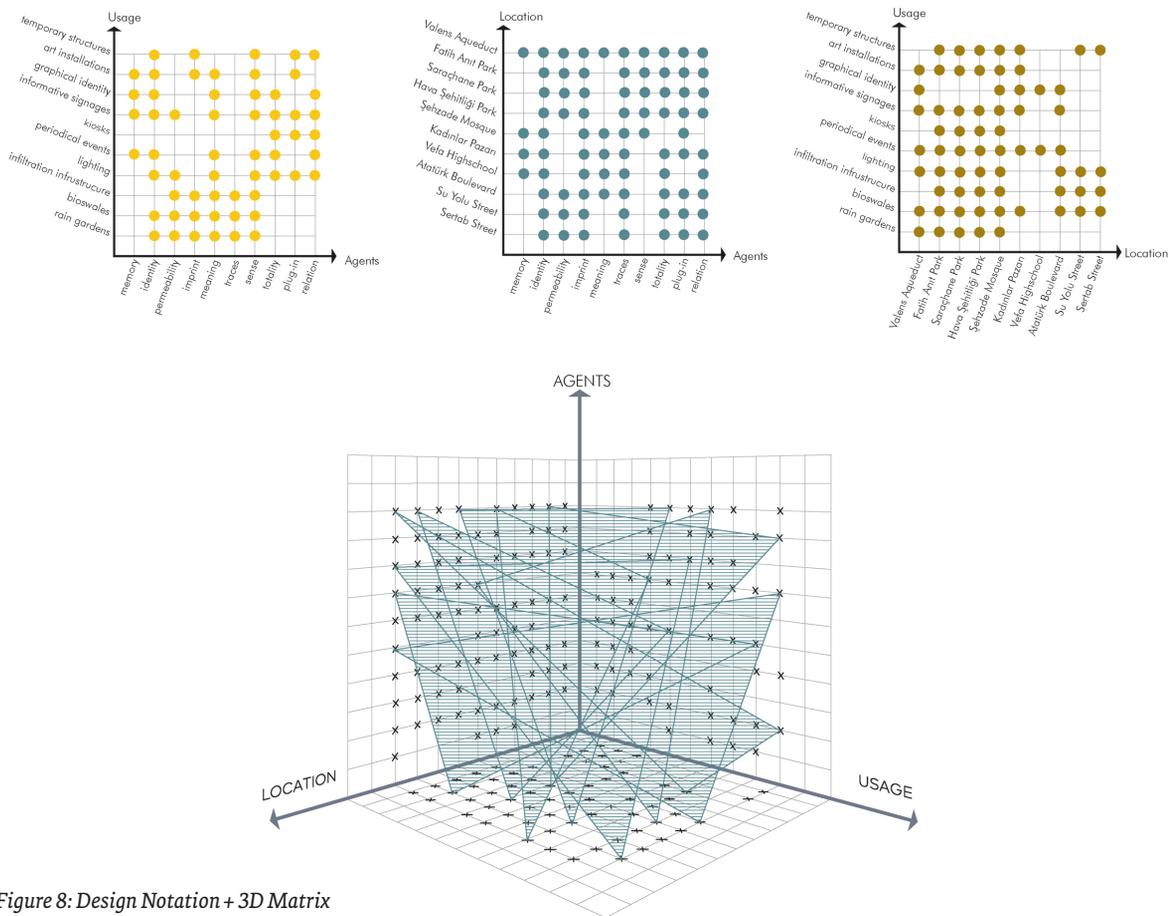


Figure 8: Design Notation + 3D Matrix

ideal for extensive treatment, they can be integrated with wetlands or rain gardens to design a holistic water management plan.

The study area focuses on an urban scale within the scope of the “Field of Memory: Bringing Water Back to the City” project. It encompasses not only the Valens Aqueduct bridge and its footprint, but also its interaction area. In this context, the area is bordered by Kıztaşı Street and Dede Efendi Street on the east-west axis while the north-south axis includes Fatih Memorial Park, Saraçhane Park, Şehzade Mosque and Garden, Women's Bazaar (İtfaiye Caddesi), Reşat Nuri Stage and İMÇ.

The project identifies two primary axes within the study area: the Meaning Axis and the Water Related Axis (Figure 10). The Meaning Axis represents the historical significance of the Valens Aqueduct, its existence, and associated uses. The Water Related Axis pertains to Atatürk Boulevard, which currently experiences heavy traffic and is planned to be underground as part of the project (Figure 11). A service road is provided in the pedestrianized area. In addition to the usage of sustainable water elements on this axis, there is also a visual reference to the Valens Aqueduct, which is actually a historical water element.

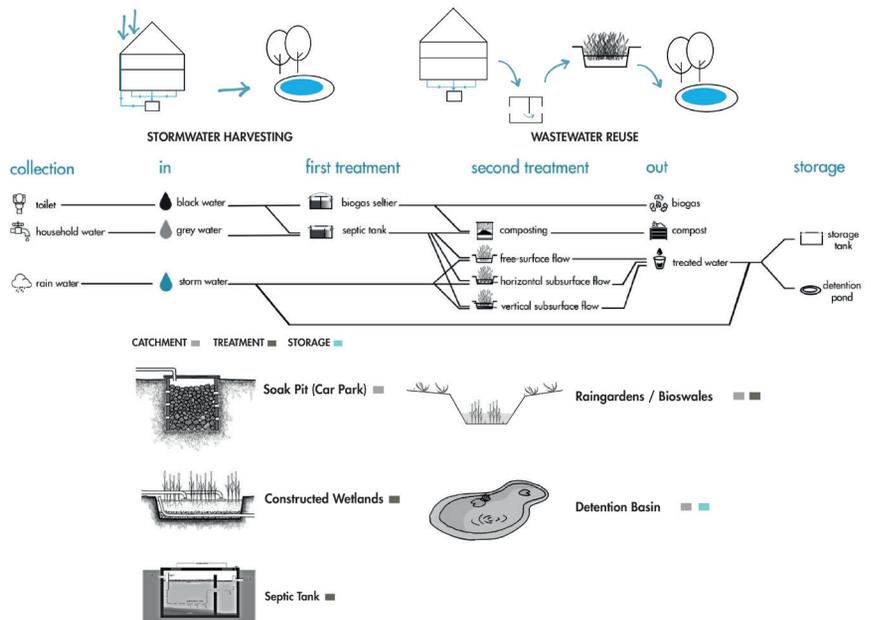


Figure 9: Sustainable Water Techniques, Sustainable Urban Water Cycle and Water Sensitive Design Elements Selected for the Project

The project envisions the creation of so-called ‘Welcoming Zones’, which serve as essential locations to communicate with the interactive zone of the Valens Aqueduct. These zones will feature kiosks that offer information pamphlets.

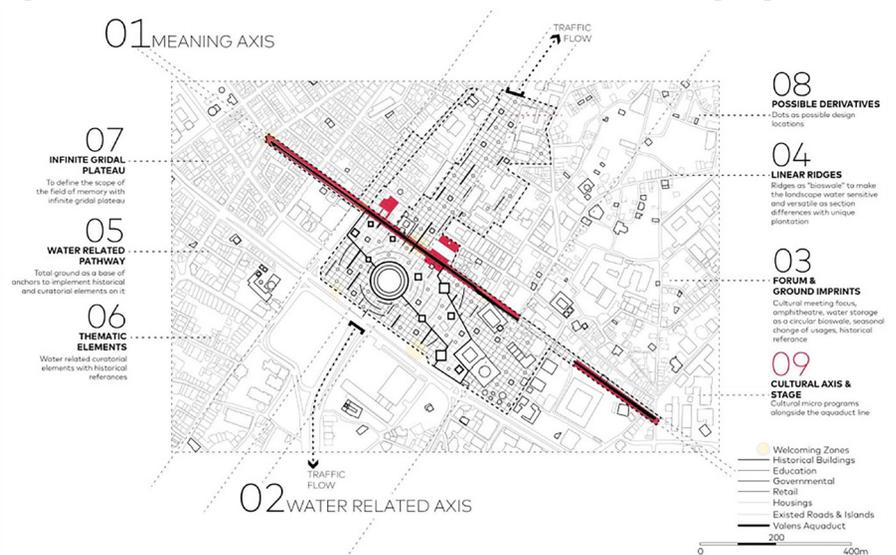


Figure 10: Urban Scale Proposal

The Forum proposal is situated at the intersection of the Meaning Axis and the Water-Related Axis. It combines historical context and contemporary sustainable water elements, utilizing circular bioswales surrounding the forum.

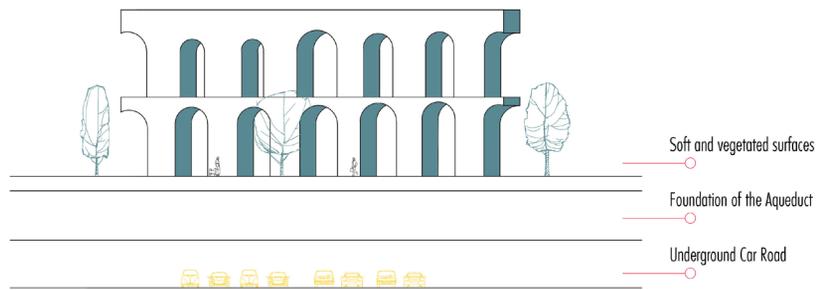


Figure 11:
Transportation Proposal

The amphitheatre, designed as an integral part of the forum decision and will serve as a cultural focal point when there is no rain. During the rainy season, the water flowing towards the amphitheatre will be collected, purified by the bioswales and constructed wetlands in the immediate vicinity and will be reused again (Figure 12).

Linear ridges are located to refer to the defined water axis. While these lines give a reference to sustainable water elements, it is foreseen that the bioswales passing under the arches of the Valens Aqueduct will have a 'memory' feature. With linear ridges, it is aimed to remind that there was once a water line passing from above, then this relationship was corrupted, but with sustainable practices, the water is brought back to the city (Figure 13).

The Water-Related Zone includes the parks in the area, where the permeability is already high, the Şehzade Mosque, and its garden (Figure 13). Besides the curatorial elements, the use of water-sensitive urban design elements according to historical references is envisioned in this zone. A prominent example of such design elements can be seen in the Şehzade Mosque, has around which historical public fountains and water scales that are currently idle are located. It is clear from its past uses that the mosque and its surroundings were used as a 'water collection and distribution area.' From this reference, the main design goal is to 'collect' the water of the shadirvans and a small number of fountains used today, to treat them with constructed wetlands, and to 'distribute' from here to provide irrigation to the surrounding plants. Thus, with that idea, the area can have a healthy water cycle with today's sustainable practices using historical references.

By using design elements that contain thematic meanings of water and history throughout the area, the region is transformed into a historical experience-memory area by taking the Valens Aqueduct as its backbone. Again, the footprint of the Valens Aqueduct will be defined as the cultural axis and will be animated with different micro-activities suitable for each season in accordance with the 'meaning axis' (Figure 14).

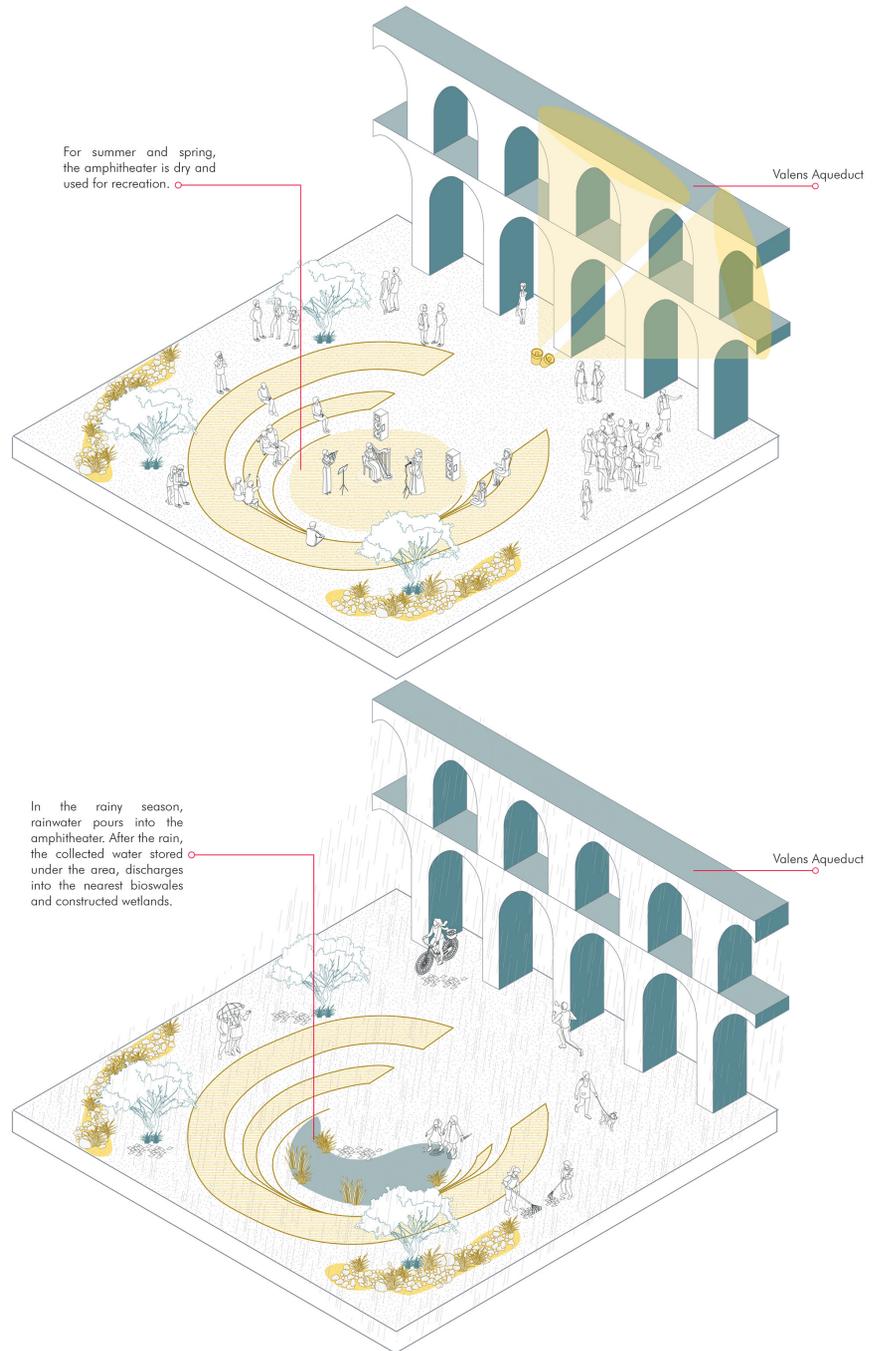


Figure 12: Forum/Amphitheater - dry season (top), rainy season (bottom)

The concept of graphic language integrity aims to support the relevant micro-activities. The project includes the implementation of infoboards, where important quotations are presented with references from historical sources, experience boards for the restoration of the damaged sections of the aqueduct (Figure 14), interactive brochures for tourists, and online applications aimed at disseminating information and enhancing awareness through welcoming kiosks. Additionally, the project encompasses some poster design examples to provide insight into the possible activities would take place on the cultural axis (Figure 15).

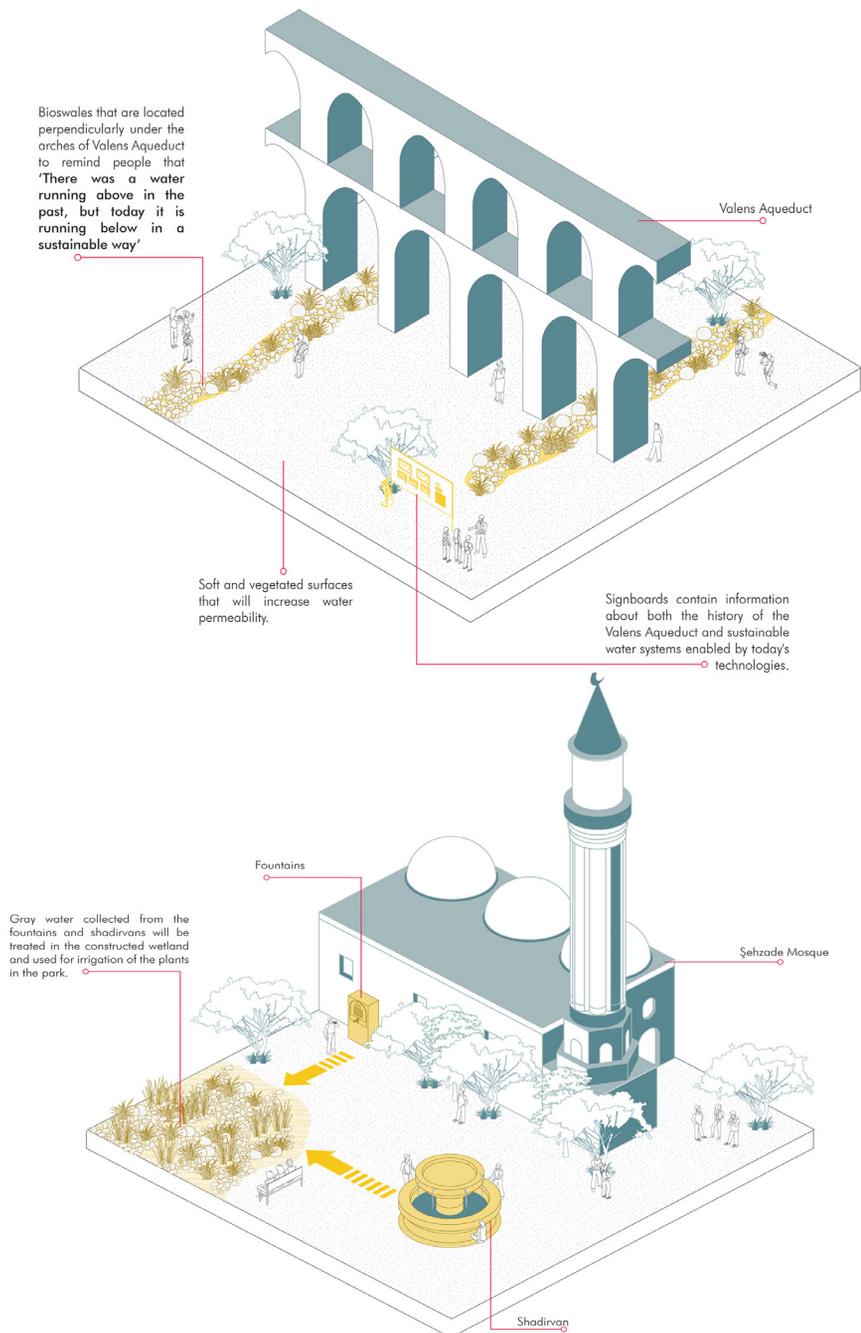


Figure 13: Water Related Decisions: Linear Ridges (top), Water Related Zone (bottom)

Furthermore, the project's scope also considers some merchandise such as coffee cups, tote bags, and various industrial design products for sale during different seasonal activities (Figure 15).

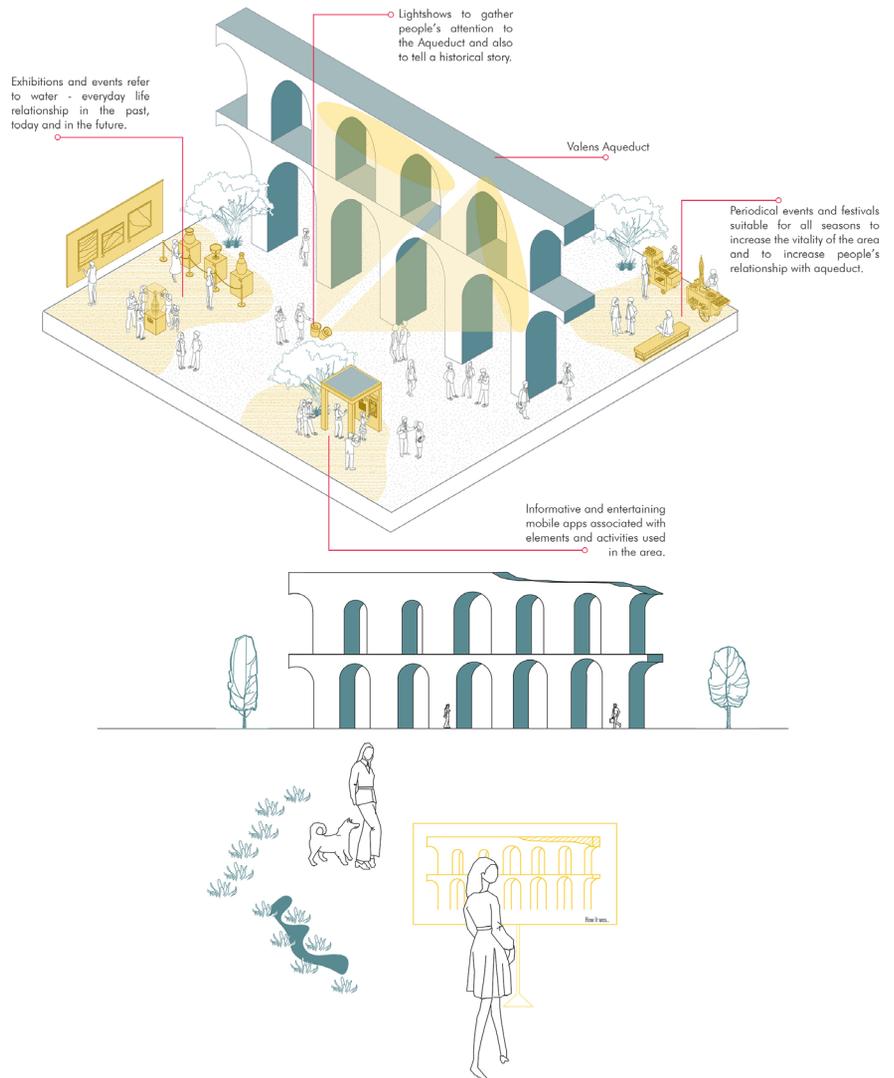


Figure 14: Cultural Axis (top) and Experience Boards (bottom)

Conclusion

The project aims to reintegrate water with the urban environment by giving meaning to water through heritage and increasing sustainable water practices. It is shaped around the question of "How can we bring the water back to the city?" The project's methodological approach and the selection of concepts and functions comes from this main question. Addressing this question within the framework of heritage requires the evaluation of not only the physical existence of water, but also notions such as 'meaning', 'experience', 'identity', 'totality' and 'permeability.'

Within this context, the traces of the 'agents' are recognized in all decisions at different scales.

The project's initial focus point is understanding the condition and the historical process of water and the aqueduct through analyses incorporating historical and contemporary perspectives. Different policies affected the existence of water as an element in the past, and today the relationship between water, the aqueduct, and people is completely broken.

The project's approach uses various levels to create a sustainable water heritage. It uses holistic methods in different stages as it is not achievable with only focal points. Hence, the project operates within three significant scales: macro, meso and micro. Inter-scale continuity and integration are key factors while conducting these three different scales in the project.

These different scales contain different sustainable water elements to integrate the water into the neighbourhood. The project offers water reuse and water harvesting methods with water elements selected by historical process and also the existing condition of the site. These water elements involve water catchment, treatment and storage elements allowing the project to sustain a healthy water cycle in the urban area and ensure the water balance visually and ecologically.

The sustainable water elements adopted for the project include bioswales, constructed wetlands, detention basins, and septic tanks. These selections are guided by historical processes, their design language and locations. In this way, the use of water as a heritage element emerges as an influential actor upholding the sustainability principle.

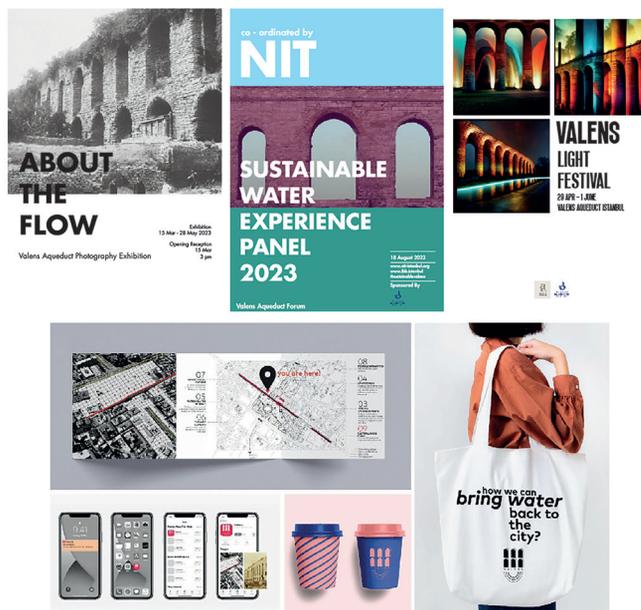


Figure 15: Graphical Language: Poster Examples, Mobile App & Product Designs

Reference List

Ancient References

Justinian. (1932). *Codex Justinianus*. (S. P. Scott, Trans.) Cincinnati.

Themistius. (2021). *Orations 6-13* (S. Swain, Trans.). Liverpool University Press.

Theophanes. (1997). *Chronographia*. (C. Mango, Trans.). Oxford University Press.

Endnotes

- ¹ Themistius, *Orationes*, 11.151a-b.
- ² *Codex Justinianus*, 11.43.7.
- ³ Theophanes, *Chronographia*, 440.

Reflections on Project Proposals

A Creative Workshop for the Sustainability of Historical Urban Water Infrastructure Heritage

Akgün İlhan
Boğaziçi University

Organized by the Netherlands Institute in Turkey (NIT), in collaboration with Middle East Technical University (METU), Radboud University, LDE Centre for Global Heritage and Development and the Netherlands Consulate-General in Istanbul, the NIT Urban Heritage Lab in 2022 addressed past experiences and current and future challenges regarding urban water supply. Furthermore, it provided valuable viewpoints and insights for local governments as well as experts and researchers in the field of heritage, who are striving to attain effective water sustainability measures and enhance public understanding of water-related issues. The program involved the active participation of 20 students, who collaborated on four distinct group initiatives focused on the historical Valens Aqueduct. Provided below is a succinct evaluation of the results of these projects.

"Pursuing Water through a Historical and Permeable Ecological Corridor. An Open-Air Museum Concept" focuses on enhancing the visibility of water cultural heritage, fortifying its socio-spatial connections with contemporary society, reintegrating historical urban fabric, and encouraging sustainable land use. The study concentrates on three key stakeholder groups: university students (especially Istanbul University), traders (Women's Market workers), tourists, and hotel staff. By utilizing "angular segment analysis" to assess movement patterns around the Valens Aqueduct, the project proposes the establishment of an ecological corridor that would create new walking narratives for people and new cycling narratives for the water. This corridor will be informed by microclimate analysis and landscape planning, incorporating green infrastructures with carefully chosen local plant species. Embracing an open-air museum concept, the project will also feature purposeful activities such as water heritage

education, guiding pathways, and adaptable spaces to create a versatile urban environment and reintroduce water through rainwater harvesting mechanism to the area. The Valens Aqueduct's revitalization might not only serve as a historical backdrop, raising awareness about Istanbul's water challenges, but also promote sustainable development through an open-air museum that weaves heritage, environment, and community, thereby empowering locals, preserving heritage, and advancing environmental sustainability.

"Field of Flowing Memory: Bringing Water Back to the City" aims to reintegrate water into the urban landscape through heritage-based symbols, fostering sustainable water practices and addressing the question of how to effectively reintroduce water to the city. Employing a "research by design" approach, this project harmonizes the water and heritage aspects as methodological foundations to achieve the sustainable valorization of the area, incorporating water-sensitive urban design principles and preserving critical heritage elements such as the Valens Aqueduct. It proposes an innovative water infrastructure amalgamating water-sensitive urban design and heritage features within the Valens Aqueduct area, facilitating localized water management to address water scarcity and urban flooding issues. The project involves micro, mezo and macro scale analyses to comprehend the area's water dynamics and historical urban evolution and proposes solutions in accordance. It integrates water harvesting methods, encompassing rainwater and greywater, as well as water-sensitive urban design elements such as catchment, treatment, and storage processes. Utilizing the Valens Aqueduct as its central axis, the project aims to transform the area into a space with rich historical memories, employing design

elements imbued with thematic significance related to water and history across the entirety of the region.

"The Valens Aqueduct as an Urban Living Lab: Integrating Networks, Enhancing Interfaces, and Revealing the Identity" seeks to pioneer innovative approaches for safeguarding water and cultural heritage, while bolstering urban sustainability and inter-agency relationships. Following the principles of the Historic Urban Landscape approach, the project envisions: (1) repurposing parks into experimental arenas by dismantling barriers, fostering pedestrian connections, and hosting indoor activities; (2) designing a mobile walking application to enrich pedestrian mobility and facilitate exploration of diverse heritage sites; and (3) transforming the Valens Aqueduct into an experiential monument – a historical promenade, collaborator, catalyst, and influencer – as the focal point of annual urban living lab events addressing water and heritage challenges. This initiative can intertwine history and nature, fuel scholarly discussions, heighten cultural heritage consciousness, cultivate collective historical awareness, engage stakeholders, underscore the aqueduct's significance, and educate on cultural preservation, water-related issues, sustainability, and climate change.

"Reconceiving the Source of Life of the City through the Acts of Intervention, Intersection, Interaction and Integration" centers on exploring the connection between water and urban environments while confronting challenges such as water scarcity, urban expansion, inclusivity gaps, restricted access, and civic involvement. The project suggests repurposing the dormant water channel situated atop the Valens Aqueduct – which is currently nonfunctional due to a broken network – into a feasible small-scale water system, utilizing additional constructions to educate the

public about the purpose, mechanics, and historical significance of aqueducts. In this context, the concept of harvesting rainwater is being contemplated as a strategy to recycle this limited network, effectively underscoring issues of water scarcity, heightening public consciousness regarding this concern, and promoting the utilization of grey-water for local needs, recreation, and facilities. Consequently, a pedestrian overpass spanning the second-storey could bridge the two green spaces located to the south of the Valens Aqueduct, thereby strengthening the societal cohesion of its surroundings. Through the incorporation of fresh artistic installations, comprehensive documentation, and urban gatherings, the project proposal endeavors to enrich communal engagement concerning water and the aqueduct, with the overarching aim of enhancing public recognition of the cultural water heritage associated with the Valens Aqueduct.

These four projects collectively innovate by reimagining the relationship between people and water, heritage, and urban spaces, highlighting strengths in interdisciplinary collaboration, technological integration, and cultural preservation. While aiming to raise awareness, foster sustainability, and empower communities, they also face challenges in long-term viability, heritage conservation, and scalability. Despite these limitations, their shared potential lies in their capacity to inspire change, from revitalizing neglected landmarks like the Valens Aqueduct to integrating water sensitive design principles and history into urban planning. Together, they underscore the power of creative solutions to address pressing environmental concerns and promote climate resilient and inclusive cities.

Learning from Istanbul's Water Heritage: The Case for Site-Sensitive Nature and Heritage-Based Interventions

Suzanne Loen
LILA Living Landscapes

A City “Without” Water

In general, the availability of freshwater is a strong driver for the development of settlements. But what is also true, is that other drivers can make up for the lack of freshwater resources. In Istanbul's case water challenges gave rise to remarkable innovations and developments. The city today boasts unique freshwater supply related artefacts that once belonged to a vast network of interacting water systems like aqueducts, reservoirs, cisterns and fountains. This water network, of which the Valens Aqueduct was a significant part, was completely woven into the social, cultural, economic fabric and not the least into the cities' magnificent urban and architectural fabric. The question for us now is: will today's water challenges also stimulate the development of magnificent water heritage of the future? Magnificent in the sense of a robust, sustainable and inclusive water resource management system that is as beneficial for humankind as it is for nature? And what lessons can we learn from Istanbul's water heritage for a water secure future?

Bridging the Gap

What the various analyses of the Valens Aqueduct combined reveal is the multi-faceted and complex nature of Istanbul's urban fresh water supply systems. It becomes clear that the development of Istanbul's 'freshwater fabric' is the result of dynamic interaction between what are often considered opposites like nature and city, craftsmanship and technology, the collective and the individual, the tangible and the intangible. The proposals have in common that there is an attempt to (either consciously or unconsciously) 'bridge' or 'connect'

the gap between these assumed opposites. While all attempts to 'bridge gaps' are worth discussing I have chosen to highlight those that I found essential in understanding urban fresh water resource management in general and water heritage in particular.

Sphere of influence of (historical) water supply systems and networks

To understand the historical relation between fresh water and urban life in Istanbul one simple question is fundamental to our understanding of it. What is the 'beginning' and what is the 'end' of the water supply system? What seems like a simple question actually raises multiple new questions that all deal with the various spheres of influence of the (historical) water systems and networks and the city it serves.

Two aspects of this question are addressed by the *Field of Flowing Memory: Bringing Water Back to the City Project*.

Connecting the hydrological and urban territory

The spatial analyses show how the water catchment system operated on a regional scale, well beyond the urban territory. The aqueducts were connected to a natural water system of mountain springs as far as 150 km away. As the analyses 'zooms' in on the urban territory it becomes clear that the various aqueduct lines were literally lifelines for the city. Together with civic and religious structures like forums, reservoirs, cisterns and fountains (sebil/sabil or water kiosks), essential for urban life, the aqueducts constitute the cities fresh water supply fabric. This multi scalar analysis is an important and valuable first step in understanding the various spheres of influence, in

this case the natural, hydrological and urban systems and territories, and how they interact. Without such understanding it is impossible to develop sustainable freshwater resource systems. The analysis itself brings to mind many new questions about the interaction between the linear networks of aqueducts and the polycentric network of the reservoirs, cisterns and fountains.

Connecting the collective and the individual

The timeline that accompanies the research of *Field of Flowing Memory* visualizes the historical developments, events and actors that contributed to and shaped this impressive work of ancient engineering and craftsmanship. The group has attempted to steer away from attributing the developments of Istanbul's water heritage to singular 'great men'. They managed to unearth information on the anonymous people who collectively built the structures, revealing a multi-cultural work force. Most striking is a quotation on laws and rules surrounding water arguing the case for water as a common good. The quotation suggests that the discussion about water as a commodity or a common good was as relevant then as it is today.

Connecting the physical and social structure

If the *Field of Flowing Memory* project started from the regional/macro scale *Reconceiving the Source of Life of the City through the Acts of: Intervention, Intersection, Interaction, Integration* Project highlights the aqueduct's micro scale. This project focuses on the spatial confrontation between the aqueduct structure and the urban tissue from the smallest scale, the arches. This results in a morphological analysis of the arches

and the social and physical interaction between the arches and their close surroundings. Where you might expect that a dominant infrastructure as the Valens aqueduct creates a barrier between the neighborhoods on the 'two sides of the track' this project argues otherwise. It is not this ancient infrastructure that creates a spatial division but Atatürk Boulevard, a multi-lane motorway. The group explores the potential of the arches as inviting 'gates' and exhibition galleries to move between the two sides of aqueduct. This bottom up approach is valuable because it teaches spatial designers and engineers that large infrastructural works have the potential, if well designed and integrated on different scales into the urban tissue, to support and sustain social urban life rather than destroy it. The aspect of the micro scale of the arches also brings the material aspects and craftsmanship behind it into focus. The sensorial aspect of our urban environment and understanding how things are made and 'work' can contribute to feelings of engagement with and shared responsibility of our surroundings and our vulnerable civic (water) infrastructures in particular.

Connecting the past, present and the future

While all works deal with the connection between the past, present and future *The Valens Aqueduct as an Urban Living Lab: Integrating Networks, Enhancing Interfaces, and Revealing the Identity* attempts to "foster a shared historical consciousness" and develop the site into a platform for water related sustainability using the Urban Living Lab (ULL) method. It is clear that the site could benefit from place making activities and interventions. However, the co-creative multi stake-holder approach, which involves locals, tourists and shop owners, also raises

important question of the cultural and socio-economic spheres of influence at play and the cultural ownership of the Valens aqueduct. Who will ultimately benefit from the transformation?

Connecting Nature and City

The attempt to connect with or introduce 'nature' into the urban environment and introduce nature and heritage inspired solutions is prominent in *Pursuing Water through a Historical and Permeable Ecological Corridor: An Open-Air Museum Concept Project*. Like the other proposals, this project's designs also constitute the transformation of the Valens aqueduct and the adjacent cistern into a show case for rainwater harvesting. The harvested rainwater can also be used to water the plants in the bostans, a local type of allotment or market garden, reintroduced to bring greenery and nature back to the city. This is envisioned as part of a local green infrastructure, an ecological corridor, introduced to improve biodiversity, livability and reduce the urban heat stress. These bottom up green and blue interventions show the potential of nature and heritage inspired solutions on a small scale. However, if we consider again the multi scaler ecological and hydrological systems and their spheres of influence the impact of heritage and nature inspired strategies could be much greater. On top of that, when dealing with green interventions spatial designers should be very mindful of the native (aquatic) ecosystems in the area of interventions as well as the ecological value of the heritage itself. A generic top-down greening strategy could disturb valuable native flora and fauna that has managed to settle on the heritage site and structure without (conscious) human intervention.

Conclusion: Site-Sensitive Nature and Heritage-Based Interventions

If the extreme and devastating weather events of this year tell us anything is that we are facing unprecedented water challenges. The current and future challenges, amplified by the impact of the climate crisis, demand other approaches - away from unsustainable one-dimensional technocratic solutions. The interest in nature-based solutions to mitigate the impact of the climate crises and to restore our eco-systems is on the rise. Unfortunately, the interest in heritage-based (or inspired) approaches and solutions is lagging behind. The importance of this course, that seeks to stimulate the development and dissemination of knowledge on multiple aspects of our historical water systems, really cannot be overstated.

There is one fundamental lesson that I learned through my engagement with this course and that is the importance of site-sensitive or site-specific nature- and heritage-based interventions. We should remain mindful that our knowledge of cultural (and natural) heritage does not automatically lead to one size fits all heritage (or nature) based solutions. Understanding the hydrological, ecological, cultural and socio-economic context and challenges in which we operate remains key and requires a multi-disciplinary approach.

It is clear that the topics explored and the issues raised in this course deserve to be followed up. Some aspects of the Valens aqueduct are so intriguing and so fundamental in helping us understand our interaction with water and our environment that they are just begging to be further explored. Therefore, I hope that a next edition of this course will continue to build on this year's rich body of knowledge.

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Course participants on the final day of the Istanbul Program
Source: NIT Archive



The structure to the left side of the image is the Valens Aqueduct and to the right side is the Kalenderhane Mosque.

Source: Mariëtte Verhoeven





Can appreciation for urban water heritage and awareness of the present-day water crisis be connected in mutually beneficial ways?

What are the contributions that heritage specialists, historians, archaeologists, conservation architects, urban planners, designers and policy makers can make towards developing integrated solutions?



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