

Sustainable planning strategies for a Port City: Rethinking the Izmir's Meles River Basin Development in Turkey

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Abstract

River deltas have been ideal locations for thriving port cities, yet the march of industrialization and urban expansion has brought significant environmental challenges. This chapter focuses on Izmir, a port city in Turkey, formerly known as Smyrna. It explores its transition from a vibrant coastal marsh to a heavily urbanized industrial area facing ecological issues. The Meles River, a key feature of İzmir's development, now experiences major problems including flooding, pollution, and habitat destruction, exacerbated by poor stormwater management and unchecked urban growth. The chapter proposes strategies adopting a multifaceted approach. Key strategies include integrating green infrastructure, restoring the river's natural state through rewilding, and updating policies to manage urban and environmental needs. By enhancing community engagement and securing diverse funding sources, İzmir can transform the Meles River into a model of social, ecological and economic sustainability.

Keywords: landscape urbanism, hydrology, resilient cities, landscape as infrastructure, sustainable planning, port city

1. Introduction

The cosmopolitan character of port cities has molded how these cities have taken economic and urban form, architectural and cultural identity. This is not just due to the new economic paradigms these cities were seeing as crucibles of social change considering capitalism expansion and industry-specific land use where the web of environmental harms established multiple social groups and conflicts that met at an urban site and a port. [1] The objective of this chapter is twofold: 1) to examine the development of Izmir through the lens of the Meles River, and 2) to identify the challenges posed by urban growth, with the aim of developing strategies for sustainable development.

When defining sustainable development many publications refer to the Brundtland Report's definition of sustainability as 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. [2] This definition is still valid since it bridges a gap between environmental management, economic development, and biophysical environment. [3] Urban design intertwines social, environmental, and economic processes and



strategies in a multidisciplinary approach from the local to the regional scale. Here, I will try to clarify what this means for sustainable urban design.

The goal of social sustainability in urban planning is to build communities that are inclusive, equitable, and resilient. This included guaranteeing access to basic services, fostering social solidarity, and fostering well-being. Public spaces that are not averse to any type of people, while also promoting interaction and social inclusiveness create better social environments. Also, affordable housing policies and design can help reduce social inequity as well. Developments will be useful if they are well planned for in participation with local communities; and therefore there will be more ownership and sustainability. Also, the integration of social sustainability in the design of urban sites can enhance quality of life and create more socially equity cities' overall conditions. [4] Integrating social sustainability into urban design has the potential to greatly improve overall quality of life and social fairness in cities.

Morelli defines environmental sustainability as the capacity to meet the resource and service needs of current and future generations while maintaining the health of the ecosystems that support them. [5] It is a condition of balance, resilience, and interdependence that enables human societies to satisfy their wants without exceeding the carrying capacity of the systems on which they depend. In cities, green infrastructure can be utilized for managing stormwater, reducing urban heat island effects, and increasing biodiversity. Urban voids may be transformed into green infrastructure of the cities which, can help decrease the urban heat island effect, manage stormwater, and increase biodiversity. Using renewable energy sources can help to lower carbon footprints. Promoting public transport, cycling, and walking, would minimize dependence on fossil fuels and air pollution. [6] These small steps would help to create urban environments that are habitable and environmentally balanced.

Economic sustainability in urban planning entails developing resilient and fair economic opportunities while also maintaining resource efficiency. This involves promoting local economies through mixed-use complexes that include residential, commercial, and recreational spaces, so reducing the need for long commutes, as well as stimulating local enterprises. Investments in green infrastructure, such as energy-efficient buildings and renewable energy infrastructure, reduce operating costs in the long run, and create jobs. Economic justice policies aimed at economic inclusion, such as affordable housing, education, training and the like, ensure that economic benefits are more fairly spread out through the different economic classes. [7] Economic sustainability assures that urban development improves cities' long-term economic well-being and resilience, helping cities to respond more effectively to economic transitions and challenges. Integrating sustainable development into urban design necessitates a holistic strategy that considers social, environmental, and economic factors.

In the next chapter, various strategies that strive for resilience and sustainability of Izmir with main focus on the Meles River as a part of the prerequisites for the key infrastructure are discussed.

2. From Rural to Urban: The Evolution of the Meles River and Delta

The Meles River is of historical and literary importance, most significantly attributed to Homer's birthplace and writing. [8] The river flows through ancient Smyrna, now İzmir, which has influenced the city's history and urbanization in multiple ways (Figure1). It has been seen as a boundary and a threshold, a target for improvement and concealment, and a source of health challenges for the city. [9]





Figure 1. Diagrammatic map showing Meles Basin and its location

One of the most formidable physical barriers to connecting Silk Road caravans and other trade routes to the city was the Meles River. The ancient Caravan Bridge, which has been preserved over the centuries, served not only as a critical gateway linking the city to the outside world but also as a remarkable engineering accomplishment designed to overcome the Meles River, often seen as an obstacle. [10] In the latter half of the 19th century, further interventions to cross the river were made to facilitate railway connections to the port. An 1860 map illustrating the route of the İzmir-Aydın railway, the first railway line in the Ottoman Empire, shows several points where the railway had to bridge the Meles River. [11] As the city expanded, its infrastructure investments intersected with this approximately 18-kilometre-long waterway, transforming it into a significant record of urban development and memory. [12]

The initial settlements in the Gulf of İzmir began in the Neolithic Age, reaching their zenith towards its end, and continuing partially into the Chalcolithic Age around 6000 years ago. After the abandonment of Late Neolithic mounds, settled life resumed in the Early Bronze Age (ca. 3300-3000 BCE) along the Bayraklı coasts at the Tepekule Mound, known as "Palaia Smyrna" (Old Smyrna). [13,14]

By the late 4th century BCE, due to political, military, and environmental disasters, the city was relocated and re-established as "Nea Smyrna" (New Smyrna) on the slopes of Pagos Hill (Kadifekale), incorporating contemporary technological advancements. Nea Smyrna was strategically chosen for its defence capabilities, commercial potential, and infrastructural suitability, and remains inhabited to this day. [15]

The İzmir Metropolitan Area Master Plan, prepared in 1965 and adopted in 1973, defined the primary development direction of the city towards a north-south axis. This growth spread mainly in the southward direction through the Karabağlar-Gaziemir-Cumaovası (present-day Menderes) line, parallel to the Meles River, to upgrade infrastructure and support the city's growth. To support this growth, the

railway system between Menemen, Gaziemir, and Cumaovası was modernized to double tracks and electrification, boosting the suburban transit speed. To facilitate this development, the railway line between Menemen, Gaziemir, and Cumaovası was upgraded with double tracks and electrification, improving the suburban transit speed. [16] An industrial zone of 220 hectares was established north of Gaziemir, while Karabağlar was designated for small-scale crafts. This strategic development enhanced connectivity to the southern transportation corridor, linking the city centre with Cumaovası Airport (now Izmir Adnan Menderes Airport), which commenced operations in 1987. Over time, extensive modifications have been made to the Meles River, including its coverage, narrowing, and interruption by road infrastructures. Since the mid-19th century, the river's morphology has been significantly altered by railway developments and, from the mid-1980s onwards, by road networks (Figure 3).

The coastline has been changed since the 1970s by stream controls, preventing both subsurface and surface water networks from reaching Izmir Bay and generating significant disturbances to the aquatic ecology. [17] For instance, large-scale coastal fillings undertaken for the organization and construction of Izmir's port in the 19th century greatly impacted the form of the Meles River. [17]

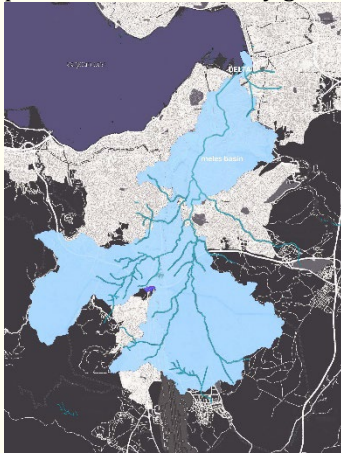


Figure 2. Meles watershed

Since the inception of the Izmir Great Canal Project in the 1970s, riverbeds prone to flooding within the urban landscape have undergone rapid transformation into concrete channels, losing their natural attributes. This significant intervention involved the concreting and rehabilitation of the Meles (Yeşildere) River, known to carry substantial pollution into the bay. Despite relocating pollutant sources, floods persisted as impermeable river- and stream beds hindered groundwater replenishment, disrupting the city's natural water ecosystem. Presently, even purportedly natural areas of the Meles have been altered for pipeline installation, exacerbating flood risks by preventing water retention. Consequently, summer desiccation of the Meles occurs, while inadequate canal cross-sections lead to flooding during heavy rainfall.

In the last century, Izmir has experienced significant urban degradation. The rejuvenation of the harbour area has presented a transformative opportunity to redefine the city's urban fabric and architectural character within the Izmir Port District. [18] The establishment of the port sought to enhance the city's contemporary image, creating a new central hub that aligns with its growing international prominence. The Meles River, historically revered as the 'holy river' and associated with Homer, played a crucial role in 19th-century travel and commerce. [19] However, 20th-century urbanization led to pollution,

channelization, and substantial transformation. Despite these changes, İzmir Bay still contains significant deposits of residual alluvial remnants from the Meles River. [20]

In the early 20th century, following the establishment of the Republic, the İzmir Port Operations gained significant importance, leading to the resolution of the longstanding issue of constructing a new port due to the inadequacy of the existing coastal facilities in Pasaport and the distance from the Alsancak railway station. [21] The decision to construct the new İzmir Alsancak Port adjacent to the Meles Delta in its current location was reached in 1944. However, the process was delayed, and it wasn't until 1954 that the construction of a new port facility in Alsancak began under the Ministry of Public Works, and finally completed in 1959. [16]

Between 1960 and 2000, İzmir Bay became notorious for its bad odour. With the development of industry and the growth of urbanization, the streams and rivers within the city centre became the focal point of chemical waste. The İzmir Great Channel Project, which began in 1987, despite being planned in 1962, only became operational in 2002. To improve the water quality in İzmir Bay, all rivers, streams, creeks, and water networks that entered the bay were repaired and regulated, and the water regime was controlled. In addition to these treatments, frequent bottom dredging was carried out to eliminate odour-causing silt accumulation, with the intention of recycling it through drying procedures. A membrane was placed over the silt deposit in the Meles delta to minimize odours and petrol emissions. The delta started to be used as a periodic waste accumulation area where mud extraction was required (Figure 3).



Figure 3. Evolution of the port of İzmir from 1945 to 2024

Urbanization and industrialization have doubtlessly imposed severe impacts on the Meles River and its surroundings in İzmir. Projects such as the İzmir Metropolitan Area Master Plan of 1965 brought about extensive alterations on the Meles River, diverting the river from its natural course and morphology. Another river degradation work started in the 1970s and is still going on. This is the İzmir Great Canal Project, which involved the canalization of large portions of the riverbed to concrete, strongly increasing the flood risks of the city, providing a permanent disturbance on the natural water system, and seriously affecting the cultural and natural heritage. On the one hand, improvements have also taken place to address water quality concerns, such as the discharge of chemical wastes from industrial and urban origins. On the other hand, water quality and flooding problems have not yet been solved. Having done an inquiry into the specifics, the following section does a thorough review of integrating principles of sustainable development into urban design practice.

3. Methodology

This chapter aims to develop strategies for fostering a sustainable urban design around the Meles River and Delta to enhance İzmir's resilience. The methodology involves a thorough examination of urban development in the Meles River Basin, particularly addressing the challenges posed by urban growth since the establishment of the industrial port in 1945. The study utilizes GIS data to design



green infrastructure along the Meles River and proposes micro-interventions along the concrete canal through various river sections. It incorporates TUIK population statistics and Milli Eğitim Bakanlığı preschool data to apply a feminist perspective to socio-economic development and urban sustainability. Historical documents, maps and literature reviews are employed to gather comprehensive information and formulate strategies for the Meles River.

A sustainability diagram, integrating social, economic, and environmental factors, is adapted to the Meles River context to create a framework for sustainable development. The strategies focus on promoting socio-economic development, implementing principles of environmental socialism, and integrating environmental economy dynamics. The methodology emphasizes small-scale interventions aimed at transforming the Meles River and Delta into a more sustainable and resilient urban environment. This includes rethinking ecology as a key driver for urban economy, supporting socio-economic growth from local to regional levels, and enhancing placemaking through compelling urban narratives.

4. Resilient Urban Ecologies: Adaptive Strategies for the Meles River and Delta

Beginning with the recognition of the sustainability diagram as a foundational tool, which incorporates social, economic, and environmental factors and is widely utilized in sustainability studies and urban planning, this chapter will seek for small scale interventions for a more sustainable Izmir. The adaptation of this diagram to the context of the Meles River and its surroundings will serve as a framework for developing strategies. These strategies encompass socio-economic development, the adaptation of environmental socialism principles, and the integration of environmental economy into the region's dynamics. The goal is to address the specific challenges and opportunities presented by the Meles River and Delta to achieve a more sustainable urban environment. In terms of the Meles context we can redefine these strategies as rethinking ecology as an agent for urban economy, socio-economic development from local to regional scale, and placemaking through urban narratives (Figure 4).

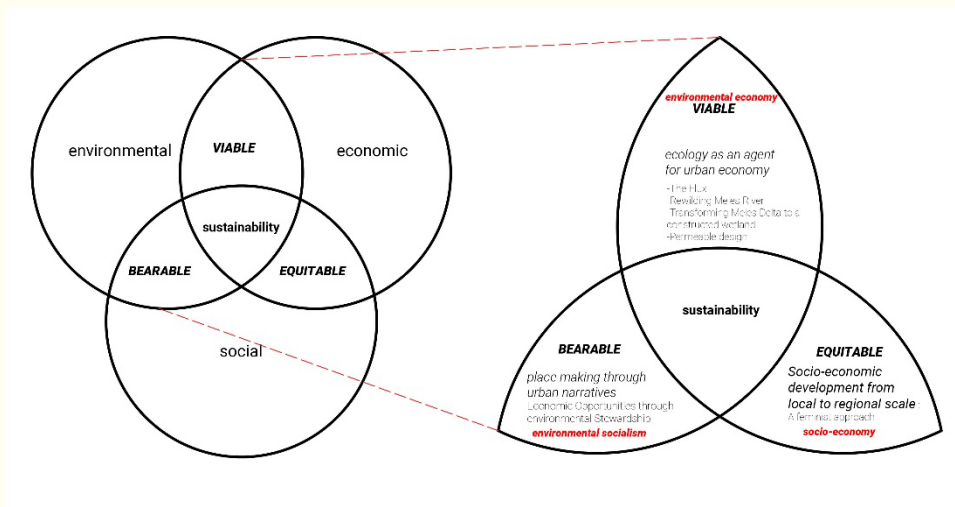


Figure 4. Adapting the sustainability diagram to the Meles River and its surroundings

The sustainability diagram's framework offers a structured method to transform its principles into actionable strategies for the Meles River Delta. Viability within this framework aligns closely with environmental sustainability, focusing on the long-term health and resilience of ecosystems. In the Meles River Delta, this is achieved through approaches like the sponge city concept, river rewilding, and the construction of wetlands, which restore natural processes, boost biodiversity, and sustainably manage water resources. These efforts ensure the environment remains strong, supporting both human and natural systems over time.

Bearability, another key concept from the sustainability diagram, translates into effective place-making within the Meles River Delta. Place-making here involves creating spaces that are culturally and socially significant. This is accomplished by refunctioning and restoring historical sites, sustaining urban memory, and creating public spaces that encourage community interaction. These strategies help transform the Meles River into a lively, inclusive space that enhances the local community's quality of life and strengthens social connections.

Finally, equity in the sustainability framework ties directly to socio-economic development on both local and regional levels. Inclusive local development strategies, such as those with a feminist approach, aim to empower marginalized groups and ensure that economic growth is beneficial to the entire community. This helps build socio-economic resilience, reduce inequalities, and create opportunities for everyone. These strategies also support regional development, ensuring that economic benefits are widely distributed across the area.

In conclusion, this comprehensive approach has the potential to safeguard and revitalize the Meles River Delta by promoting a sustainable, inclusive, and thriving future in a regional scale. However, the strategy does come with its challenges. Putting sustainability principles into practice can be intricate, especially in areas where there are various stakeholders with different priorities. Reaching the desired goals, especially in terms of environmental and socio-economic progress, typically demands ongoing dedication over time.

4.1. Rethinking ecology as an agent for urban economy: The sponge city approach

Izmir exemplifies the extensive urbanization process witnessed in many cities. During the early 20th century, the construction of densely populated urban cores on the city's slopes led to increased and more frequent flooding of the city centre on the plains below during rainstorms.

The beginning of the transformation lies in perceiving the Meles River and its surroundings not merely as a problem but as a landscape infrastructure. The goal of the proposed strategies is to enhance urban resilience by leveraging the landscape as infrastructure and applying principles of landscape urbanism.

Adopting the sponge city approach for the Meles Basin and incorporating strategies such as the creation of detention ponds, green corridors, floodable parks, bioswales, rain gardens, water capture, and soil improvement would help to improve resiliency. [22, 23] The sponge city concept offers cost-effective and environmentally friendly alternatives to traditional 'grey engineering' stormwater management solutions. Additionally, it has the potential to create social and recreational spaces, enhance biodiversity in urban areas, and mitigate the urban heat island effect. There are two main interventions, establishing a continuous green belt along the river, and which I define as the flux and rewilding of the Meles River.



4.1.1. The Flux

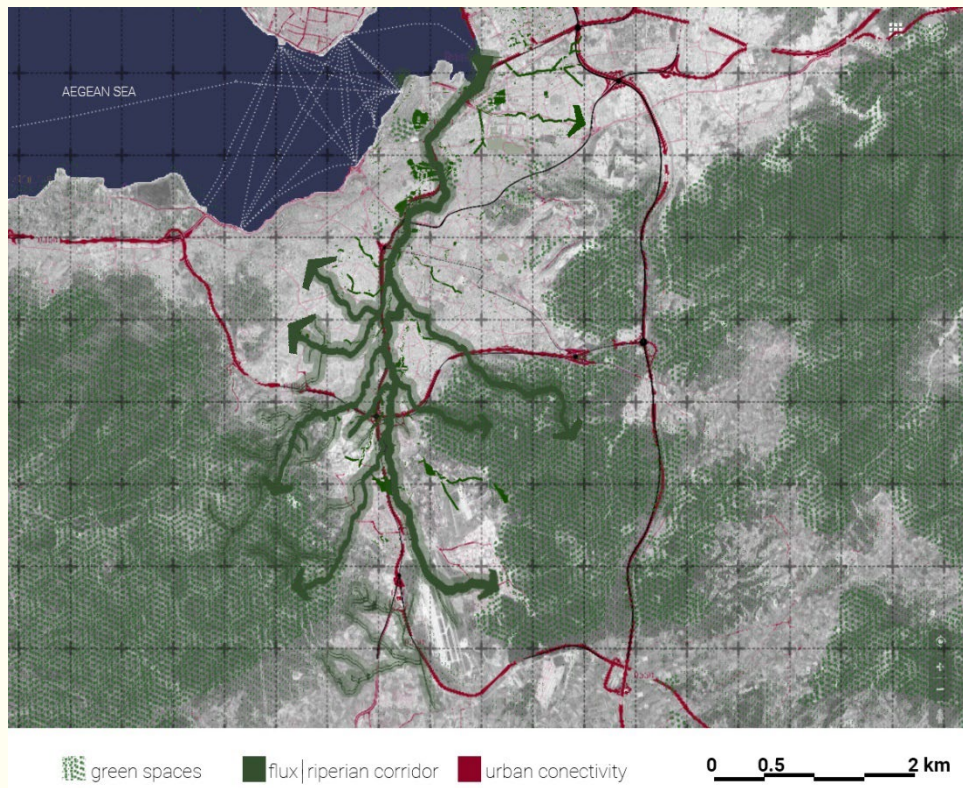


Figure 5. The concept of flux: Establishing the riparian corridor along the Meles River

Using landscape as infrastructure and employing landscape urbanism ideas provides a realistic strategy for stormwater control in Izmir. [25] However, the city lacks an appropriate supply of permeable open space. To address this issue, therefore, it is critical to protect and improve existing natural open areas to increase their porosity. Upstream flood mitigations measures such as runoff detention, water harvesting in cisterns and encouragement of permanent vegetation cover can be implemented in the plains to alleviate flooding impacts. [24]

The proposed green corridor along the Meles River will address the potential for rehabilitation of the Meles River. The approach builds upon the idea of riparian corridors which are among the most important and practical measures for conserving biodiversity and maintaining ecosystem resilience (Figure 5). Through sustainability focused strategic planning the Meles riparian corridor enhance ecological quality and connectivity and contribute resilience of the urban landscape along the Meles River.

4.1.2. Rewilding the Meles River

During the 20th century, pollution problems occurred in the gulf of Izmir with migrations due to industrialization and urbanization. Odour and foam problems occurred because of industrial waste disposal in the gulf. After 2002, Meles River was located in a concrete channel and its capacity was artificially increased. The surface of the river basin was impenetrable with concrete preventing precipitation infiltration to the underground and increasing surface flows. Short term and intense



rains caused serious floods in the river basin. Today, floodings are the most important natural hazards threatening the residential areas built in the flood plain.

Water quality analysis reports by the Environmental Protection and Control Department of Izmir Province showed that the microbiological parameters and some of the chemical parameters (pH, nitrate, heavy metals, etc.) of Meles River water were within the limits of good water quality in 2015. However, the dissolved oxygen (DO) value, COD, BOD5, ammonium nitrogen, nitrite nitrogen, total nitrogen, and total phosphorus were very high according to the same report. [25] Therefore, the overall water quality of the stream was determined as bad due to the low dissolved oxygen levels and high nutrient levels and organic matter. The Meles River, after it was enclosed in a concrete channel, tried to re-adjust to its former riverbed during the following years, forming islands of sediments or accumulation zones. The naturalization interventions at branch river points aim to restore the hydrosystem's function, making the Meles a living river through rewilding methods. This means that restoration actions are carried out to re-create natural conditions, improving the water quality and generating spaces for recreational uses. The enhancement of water quality can contribute to the development of freshwater vegetation, reviving the wildlife and increasing local biodiversity. [26] Small-scale restoration works on rivers whose beds have been changed in areas where urbanization is intense play a very important role. It is imperative that site-specific local interventions, especially where stream power is limited and naturalize modified channel profiles, such as Meles, should not be ignored. [26,27,28,29] Partial replacement of the concrete canal with a natural channel and the creation of a new meandering channel to replace concrete weirs are among the small-scale strategies proposed for adapting the Meles River (Figure 6). [28]

This naturalization of a concrete canal river section to a natural channel will increase groundwater- surface water interaction and habitat restoration, which can improve water quality and ecosystem quality of the river. Restoration of riparian zones can include concrete removal and restoration of natural vegetation on small-scale projects along the riverbanks, lifting posted riparian habitat (due to the river moving), or restoration of the hydrology in the rivers. The channel shift from a concrete channel to a more naturalized river bed would help to mitigate the impacts of urbanization, reduce flooding and boost biodiversity and ecological health throughout the city landscape. [29]



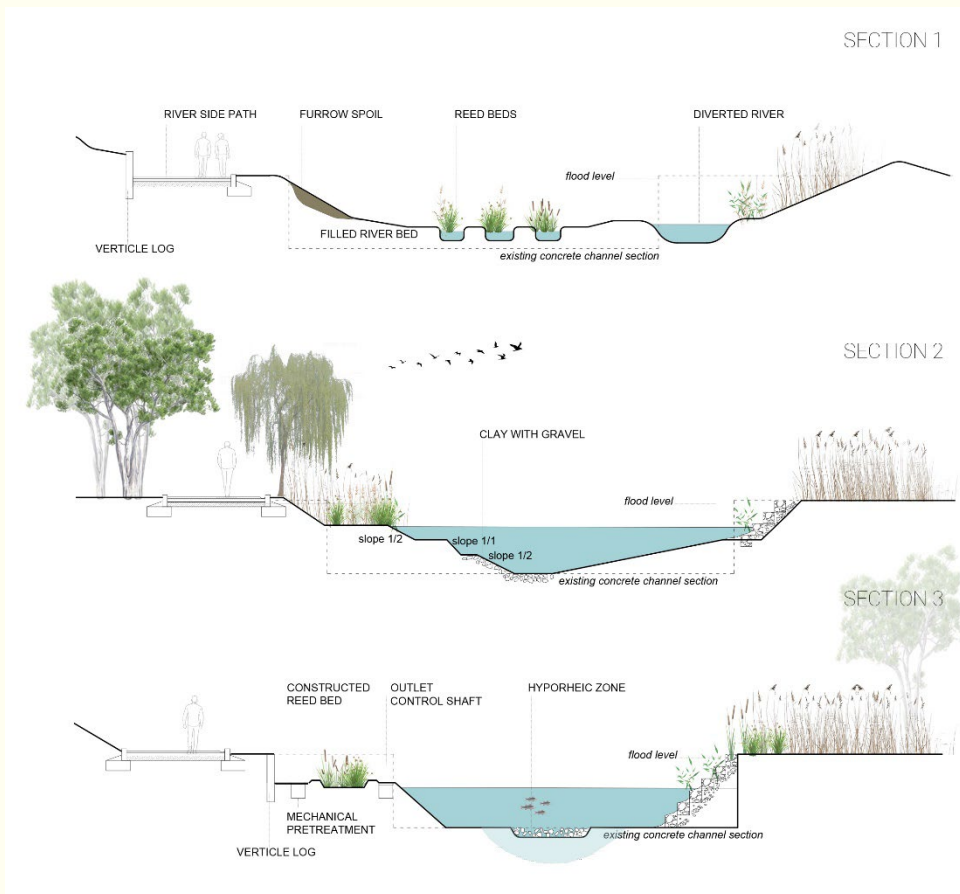


Figure 6. Section 1: The creation of a new meandering channel to replace concrete weirs, Section 2: Full replacement of the concrete canal along river sections with a natural channel. Section 3: Partial replacement of the concrete canal with a hyperoic zone

Combining engineering and ecological restoration, has the potential to improve aquatic habitat and biodiversity along the urban river path. [30] Overall, the revitalization and rewilding of the River Meles require a process-based, multi-pronged solution to deal with legacy pollution, aid in naturalization and deliver site-specific small-scale interventions in the urban setting. Utilising evidence-based interventions and learning from similar restoration efforts, the Meles River basin can become an example of how conservation and restoration initiatives can work together, helping both ecosystems and local communities. [28,29, 30] Community engagement and educational programs help involve local communities even more in the restoration to secure a long-term conservation impact – a conservation legacy – where the land is included and actively part of the management plan. Together these interventions, along with more macro-scale efforts, contribute to the improved overall environmental health and adaptive capacity of the Meles River.

4.1.3. Transforming the Meles Delta to a constructed wet land

Damming the river would reduce the frequency and severity of inundations in and around the city, partially creating a flood plain for the Meles River Delta. There are several important options for rehabilitating and improving habitat . These measures include the construction of a primary pond, filtration pools, and areas of shallow

water, to provide a range of aquatic habitats capable of supporting different species. [31]



Figure 7. Left: Strategy for transforming the Meles Delta into a constructed wetland. Annual changes in water levels

Meles Delta river systems, especially those with natural geomorphic processes and minor physical degradation, have the capacity to regenerate if allowed to go unmanaged. Still, active rehabilitation designs, such as those put in place over the last thirty years, might be necessary for metropolitan areas or rivers that have been significantly affected by hydropower, like Meles. In these situations, soft engineering techniques – such as riparian vegetation, big woody debris, and in-stream macrophytes – can help restore a more natural river ecosystem, particularly in streams with moderate levels of impact and geomorphic stress. [32]

4.1.4. Permeable Design

The principal strategy to be adapted for the Meles River Delta is transforming this artificial mud accumulation pool into an ecological constructed wetland through the implementation of regulated artificial channels and artificial topography. This comprehensive solution will help developing the delta as recreational ground to celebrate the urban memory and creating a resilient infrastructure to combat urban floods and mitigate sediment movement. Integrating the Meles River into the delta through side weirs will allow the establishment of a wetland ecosystem, which can effectively regulate floodwaters during major rainfall events and ensure the city's resilience (Figure 7).

In its current state, the Meles Delta lies adjacent to Izmir Port and represents a remnant of halophytic vegetation. It has largely lost its value in terms of river ecosystem, but it still provides habitat for water birds such as cormorants, kingfishers, herons, gulls, and terns, including the little bittern, white-headed duck, and common pochard. To further boost biodiversity and restore ecological conditions, allocating space for wetland development will boost biodiversity. This

biodiversity augmentation method may potentially lead to the return of biota to the region, representing the ecological rejuvenation of the wetland area.

The term permeability is used both in planning, architecture, landscape architecture and urban design. It refers to different meanings in different scales having the same concept referring to a flow. For instance, urban planning refers to the degree to which urban spaces allow the movement of people, vehicles, air, and water. In landscape and urban design, the permeability of the structural landscapes being built allows water to flow, thereby eliminating the risk of them becoming an ecological barrier. [33] The adoption of permeability as a strategy to create recyclable, low-carbon, and energy-efficient infrastructure for urban furniture and landscape structures around the Meles River will support the sustainability criteria. Specifically, the permeability of artificial landscapes within the River Meles riparian corridor will facilitate ecological connectivity, easing the flow of energy, water, sediment, nutrients, and organic matter, while reducing the urban heat island effect and enhancing climatic comfort. It will also contribute to reducing flood risk by increasing the soil absorption capacity. The durability of selected materials will reduce the need for frequent reproductions and repairs, thereby reducing the carbon footprint. Recyclable materials such as plastic, wood, metal alloys, steel without the need for remanufacturing can be processed and used. Material selection is an important choice to reduce structural waste. It will also ensure that the structure can be recycled at the end of its life.

4.2. Socio-economic development from local to regional scale: A feminist approach

It may be possible for the Meles Basin to achieve local to regional development that will create socio-economic transformation. Urban and regional socio-economic development at the village scale can be achieved with the participation and support of local government organizations and NGOs. The strategy stresses the conservation and wise use of natural resources combining this with mobilization of local communities to promote sustainable agriculture and industrial procedures. And in paying for educations, ecotourism and recreation, we enrich the economic landscape of the region while also protecting its significant historical and cultural legacy. Meles Basin can be part of a comprehensive development process that fosters ecological harmony as well as economic prosperity.

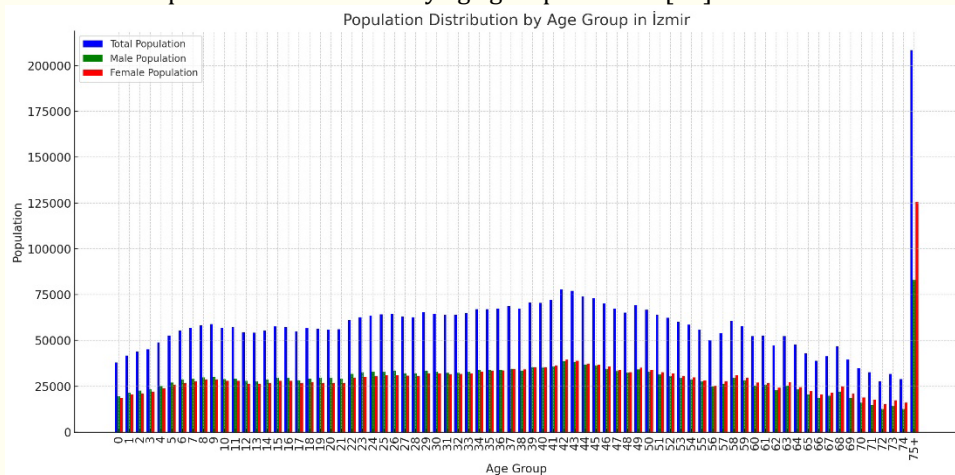
The widespread failure of top-down development policies and the dependence of regional economies on global trends have led to the search for alternative policy approaches. Today, neo-liberal policies shape port cities like many metropolises, and development processes from local to regional are not prioritized by governments. [34] These strategies aim to leverage local competitive strengths to unlock economic potential. Most importantly, these approaches include local stakeholders in all stages of development planning and implementation. Adaptation of this participative strategy for Meles would ensure that economic operations are strongly linked to the local environment by relying on a thorough awareness of the socio-institutional and economic milieu of the region. [35]

In İzmir, there are currently 123 preschools, which is insufficient given the population of 270,374 children aged 0-5 (Table 1).[36] The lack of adequate preschool facilities highlights a significant gap. Increasing the number of preschools is crucial not only for enhancing child education but also for supporting female employment and ensuring socio-economic sustainability in the region. Such improvements could enable families to participate more actively in the workforce while contributing to broader economic stability. Data on preschool availability and



workforce dynamics provide a valuable foundation for policy development and resource planning. [37]

Table 1. Population distribution by age group in Izmir. [36]



It is possible to move local development initiatives forward by ensuring women's active participation in the local economy and establishing childcare centers. [35] Establishing neighborhood centers will strengthen women's access to sustainable business models and related business support services, thereby enabling the community to develop successful and pioneering economic efforts. [35] Through deliberate integration of women into supply chains, particularly within eco-tourism, education, and agriculture sectors at the grassroots level, a more inclusive and sustainable socio-economic paradigm can take root.

The strategy for socio-economic development also involves the development of green public transportation strategies and enhancing accessibility. Connecting neighbourhoods with proposed bicycle lanes will increase accessibility, as will the merging of the existing EuroVELO bicycle route with the Meles Delta riparian corridor.

4.3. Promoting social environmentalism: Placemaking through urban narratives

Port cities on the periphery, like Izmir, serve as key points of contact with the global capitalist economy, regardless of the theoretical perspective. The colonial dynamics of port cities shaped their physical appearance, spatial layout, economic mechanisms, population dynamics, class structure, political aspirations, and cultural life. The cities functioned as human laboratories in which the social changes wrought by rampant capitalism could be seen in miniature form, the new economic operations generating new social classes and conflict, all compressed within the confines of the port-city. [1] Port cities like Izmir were key commercial nodes that connected the agrarian periphery and industrial core, and a diverse assemblage of foreigners, colonials, merchants, intermediaries, and servants contributed to their commercial networks and transformation. [1] Today, to revive this memory in Izmir, urban narratives can be revitalized by integrating memory spaces such as educational routes, memory parks, ecology parks, agricultural and industrial parks and open-air museums into the river corridor of Meles. Additionally, the adaptive reuse of derelict factories and industrial infrastructure can serve as memory spaces to reinvigorate Izmir's cosmopolitan urban memory. These include the historical textile heritage of Izmir dating back 8,000 years (including the 19th- century

Basmahane Gari and the early-20th century Sumerbank factory), Ottoman-era hydraulic infrastructure, and ancient Roman aqueducts like the Kizilcullu and Vezir Suyu aqueducts in the Paradiso region, along with St. Vukolos Church and Profiti Elia Church in Yeşildere, Kadifekale, and the historical Caravan Bridge. These are the landmarks which could collectively allow Izmir to share and therefore accessorize its true identity. Together, these sites reflect the rich urban tapestry of Izmir's heritage, including; its significance as a hub and trade for commerce.

5. Discussion

The Meles River in Izmir faces significant challenges due to urban growth and its historical transformation. Key issues include increased flooding in the city center due to inadequate stormwater management, pollution from past industrial activities, and the loss of natural habitats caused by urban expansion. The river's transformation into a concrete channel has further deteriorated its ecological function, exacerbating water quality problems and reducing biodiversity. Addressing these challenges requires navigating social and economic factors. The current regulations often do not fully incorporate urban planning aspects underscoring the necessity, for updated policies and improved coordination among authorities, environmental agencies, and community groups. Socially it is crucial to enhance community engagement and integrate heritage into planning to garner support and foster a strong connection to the river. From a perspective securing funding for both large scale infrastructure projects and small scale ecological interventions is vital while striking a balance between development and environmental conservation for long term sustainability.

To address these issues effectively a comprehensive strategy is essential. Adopting the sponge city approach by implementing detention ponds, green corridors, floodable parks and rain gardens can improve management and ecological resilience. Initiatives like rewilding efforts. Such as removing channels and enhancing water quality will help restore the river to its state and promote biodiversity. Institutional reforms along with policy updates are necessary to modernize regulations and encourage cooperation among stakeholders. Involving communities in the planning process and promoting education will ensure that social values and needs are considered. Moreover, exploring funding sources while aligning development strategies, with environmental objectives will bolster sustainable development efforts and stimulate local economies.

By implementing these tactics the Meles River has the potential to evolve into a sustainable corridor and an eco-friendly resource playing a role, in enhancing sustainability, biodiversity and the socio economic progress of the area.

6. Conclusion

Port cities have been undergoing significant urban transformation since the early 20th century. With the intensification and acceleration of commercial networks driven by neoliberal policies, this transformation has been further enhanced. Particularly since the 1980s, policies promoting deindustrialization, coupled with natural and anthropogenic disasters, have contributed to the proliferation of substandard buildings and large-scale urban transformation projects. These changes have led to the erasure of local identities and urban



elements in many areas, while also exacerbating global warming and increasing the frequency of urban disasters.

These cities are currently experiencing rapid transformation. They struggle to preserve and transmit their urban memory and heritage to future generations, rendering them vulnerable to catastrophes and subject to profit-driven coastal transformation projects. This chapter develops strategies for the port city of Izmir, leveraging socio-economic, socio-environmental, and environmental-economic principles to promote more sustainable urban development.

Fundamentally, it adapts the basic principles of sustainability to specific sites through narratives such as "Rethinking Ecology as an Agent for Urban Economy," "Socio-economic Development from Local to Regional Scale," and "Placemaking through Urban Narratives." By implementing micro-interventions that yield macro impacts, the Meles River is transformed into a landscape infrastructure. Additionally, the strategy aims to promote development from the neighbourhood scale to the basin scale through the employment of women.

Focusing on the unique context of Izmir as a cosmopolitan port city, the approach emphasizes preserving urban memories through the creation of memory parks and architectures by the adaptive reuse of historical factories.

These strategies, while tailored for Izmir, are also adaptable to other port cities. By reinterpreting and utilizing the cultural and historical superstructures, hydrological infrastructures, and inherent characteristics of port cities, we can strive to achieve more sustainable urban environments. Through proactive planning, community engagement, and visionary leadership, port cities and river deltas can evolve into models of sustainability, resilience, and prosperity in the face of ongoing global challenges.

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