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Sustainable Transformation of Historical City Istanbul; Industrial Areas, Recent Large-Scale Ecological and Regeneration Projects

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Abstract

This research illuminates the challenges faced by Istanbul, one of the world's largest metropolises, as it undergoes a paradoxical transformation from a historical city to one aspiring to sustainability. Despite its rich historical past, the city has grappled with the impacts of industrialization since the 19th century, particularly evident in the Historical Peninsula where industrial facilities coexist with slum housing in adjacent neighborhoods. According to the World Bank's latest definition, the complexities of megacities like Istanbul have intensified since the industrialization period and are now intricately linked with emerging challenges related to climate change. The urbanization and industrialization processes in cities have given rise to issues such as overpopulation, uncontrolled housing expansion, slum developments, and industrial pollution. The late 20th century witnessed a shift in urban planning paradigms, with a move towards new and innovative designs from discursive ideas and zoning methods based on the division of areas. Examining the problematic via planning principles of the French architect-planner Henri Prost, and old French l'école (school) planning tool particularly zone (zoning) of residential, industrial, and green-areas, this research critically evaluates both historical planning techniques and focus on contemporary innovative methods and projects. By exploring multiple morphological and epistemological definitions, the study offers a new perspective on the planning of Istanbul, aiming to reconcile old practices with new insights. While other cities focused on climate change, sustainability, and creating healthy and livable environments, Istanbul faced internal challenges natural disasters, earthquakes, and migrations driven by housing shortages. This research is dedicated to understanding the transformative process of Istanbul's residential and industrial areas into a sustainable city through the complex interplay of historical legacies, urbanization, and contemporary environmental imperatives.

Keywords: ***City Planning; Housing, Industrial Areas; Istanbul; Residential Areas; Sustainability.***

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1. Introduction

This research critically examines the issue of sustainability, which has recently become a crucial challenge in the development and planning of residential and industrial areas in Istanbul. In the 21st century, sustainable planning has gained paramount significance globally, particularly over the last two decades, coinciding with the evolving challenges faced by Istanbul. Despite the 1996 Istanbul Conference falling short of creating anticipated awareness about climate change for both the public and local governmental institutions in Turkey, it did contribute to a heightened global awareness, catalyzed by the preceding Conference in Rio, Brazil, in 1992. The Rio Conference, Habitat-II, the "City Summit" held in Istanbul, where UN conferences ensured the acceptance and spread of Local Agenda 21, reflecting the local projections of the principle of globally worldwide [1]. The Earth Summit took place in Istanbul, its echoes were not immediately felt in the city's planning and development at that time. Istanbul faces impending climate challenges, as highlighted by the city's mayor after the Glasgow Summit [2].

Following these pivotal conferences, the world witnessed a paradigm shift in urban planning dynamics, emphasizing human well-being, sustainability, and resilience. Although climate change had been on the global planning agenda since the 1980s, it took considerable time for its importance to be fully realized both worldwide and in Istanbul, Turkey. A thorough literature review reveals that previous studies, primarily within the discipline of architecture, have provided diverse information on planning residential and industrial areas. However, these studies often lack a multidisciplinary approach and neglect to incorporate updated perspectives on sustainability and climate-change challenges. This research aims to bridge this gap by delving into the multifaceted dimensions of sustainability and climate change issues, offering a comprehensive and updated understanding of their implications for the planning of residential and industrial areas in Istanbul. The research, examining the main problematic transformation of an old, historical city a sustainable city via specific method planning principles of the French architect-planner Henri Prost, and old French *l'école* (school) planning tool particularly *zone* (zoning) of residential, industrial, and green-areas. This study critically evaluates both historical planning techniques and focus on contemporary innovative methods and projects. By adopting a multidisciplinary approach, the study seeks to contribute valuable insights to the broader discourse on urban planning and sustainable development.

After the 1980s, a new planning agenda emerged globally, driven by the concerns of climate-change, and and planning shifted to an era were sustainability. The focus turned to new planning paradigms, breaking free from old explanatory urban models with well-known limitations [3]. With the new planning ideas centered on climate-based concerns, an recent attention is placed on innovative planning in residential areas that integrates green-areas and ecosystems, different from old planning systems and models. Climate-change problems first emerged in the 1980s, with Register's book specifically on eco-cities signified a new awareness on urban ecosystems and have brought studies on climate to the fore [4].

Presently, developing cities, exemplified by Istanbul's transformation into a mega-city with a population of 15 million, grapple with persistent challenges awaiting viable solutions like climate-change, migration, uncontrolled urban sprawl,

industrialization, decreasing green-areas, and deforestation. Across the globe, cities face new planning dynamics necessitated by the imperative to mitigate the effects of climate change. The historical approach of well-arranged "residential areas" and "industrial areas" with zoning maps during the industrialization era aimed to counteract the adverse impacts of climate change. In contemporary times, however, the climate crisis and the pursuit of sustainability have prompted the exploration of novel and innovative design and planning methods, as well as a reconsideration of older planning techniques.

The Climate-change issues in Istanbul, though overlooked for many years, have now become evident as the impact of dense urbanization unfolds in the city. Uncontrolled developments in residential and industrial areas have resulted in urban sprawl towards green areas, forested regions, and even water basins. (Fig. 1), (Fig. 2) Urbanization has historically led to the relocation of residential and industrial facilities from city centers to the peripheries, a trend initiated during the industrial period. However, this shift poses challenges in terms of preserving green areas and preventing deforestation. The industrialization of Istanbul has experienced a significant time gap compared to European cities, with substantial developments occurring post-1950s. This period marked a pivotal moment in the city's industrialization, characterized by an influx of migrants from rural areas seeking employment in newly established factories. This demographic shift created new challenges, including housing shortages and rapid urbanization. While Istanbul, like other cities, has been addressing contemporary climate-change concerns such as planning for sustainable and livable environments, the city has also grappled with internal challenges over the years. These challenges include natural hazards, earthquakes, and problems associated with its geographic location, such as massive migration, which further exacerbates housing issues. The complex interplay of external and internal factors underscores the need for a comprehensive and integrated approach to urban planning in Istanbul to ensure both environmental sustainability and the well-being of its residents.

The recent degradation of city’s ecosystem, with uncontrolled urban sprawl in the green areas and forest and like hazards of industrial pollution with concern of mucilage in the Marmara Sea, posing risks to marine life due to rising seawater temperatures and uncontrolled waste. Additionally, the drought and water scarcity were identified as life-threatening problems in the city’s future [5]. The shift to a Mediterranean climate in Istanbul has altered the city's longstanding climate characteristics. The management of planning in "residential areas" and "industrial areas" has proven ineffective due to complex governance structures. Consequently, the development of housing and industrial areas poses a persistent threat to green spaces and forested regions. (Fig. 1 and Fig. 2).

Today, urban planning paradigms must carefully assess the detrimental effects of industrialization and devise strategies to limit them, aligning with climate change considerations. This recognition has spurred the emergence of a new and multidisciplinary discursive approach, emphasizing the need to address the pressing challenges faced by Istanbul and similar cities. The research is dedicated to investigating and updating the problems specific to Istanbul as a old, historical city, with a focal point on planning within the context of sustainability and the future development of the city. While zoning principles have historically played a significant role in specifying areas, they continue to be crucial criteria

for the future development of Istanbul and other cities. The resurgence of the old urban planning discourse underscores the importance of revisiting and adapting established principles to effectively address the complexities of contemporary urbanization and sustainability challenges. This research thus contributes to the ongoing dialogue on urban planning, offering insights for the sustainable future development of cities like Istanbul.

2. Methodology

The research examines Istanbul's transformation since the early twentieth century and towards becoming a more sustainable city since the 1980s, late 20th century. It aims to make a detailed analysis of the city's problems over the years and the main challenges in planning "industrial areas" and "residential areas" in Istanbul, starting from the early 20th century and spanning the city's transformative journey over the years in the context of climate change and sustainability. Recognizing the need for a multidisciplinary approach, the research encompasses various disciplines, including city planning and architecture, as well as incorporating insights from recently updated studies on sustainability.

Also, recently, some old urban planning techniques have come back to find solutions to issues in today cities, such as climate-change and sustainability. In this context to delve into the subject comprehensively, the analysis initiates with a study of the Prost Paris zoning plans and Istanbul Master plans which dependent on old French *l'école* (school) planning tools. These plans, attributed to H. Prost, held a pivotal role in shaping the city's development for many years, with subsequent plans upon his foundational principles. The examination extends to the Prost's Paris zoning plans (PARP), where the principles of segregating "residential," "industrial," and "green" areas serve as critical planning criteria, particularly in Istanbul. Given the resurgence of some early 20th-century urban planning methods, such as zoning plans, laws, and regulations, and garden-city developments in the context of sustainability, the research explores developments since the beginning of the 20th century. Some laws and regulations established during that period for Turkey, including Istanbul, remain in force today. The planning history of Istanbul is scrutinized through specific periodic phases, focusing on the development of residential and industrial sectors. The research evaluates the current situation and contemplates how the city can undergo transformation into a more sustainable urban entity in future planning endeavors, taking stock of achievements to date.

The examination commences with a thorough analysis of the initial Istanbul Master plans by Henri Prost at the early 20th century. A comparative study is undertaken, these early plans with recent ones to illuminate the evolution of the city's planning transformation. The planning process is deconstructed into 3-4 distinct development phases, providing a nuanced understanding of Istanbul's urban development transformation.

3. Istanbul, in the Early 20th Century, The Zoning, Planning Industrial Areas and Housing Areas Transformation of Istanbul First a Metropolis and Today a Sustainable City

The Prost Istanbul Master plans were conceived as a modernization strategy, aiming for a balanced arrangement between "residential areas" and "industrial areas.". The French architect-urbanist Henri Prost was invited to Istanbul

to develop a modernization plan to those seen in modern European capitals, Paris. He previously planned Paris plan PARP (*Plan d'Aménagement de la Région Parisienne*) or the Development Plan for Paris Region [6]-[9]. The *zone* (zoning) plan, based on dividing the regions according to the functions like E. Howard locating factories and agricultural in the periphery, with the tertiary sector established in the center, surrounded by inalienable rural green belts [10]. Prost's PARP Plan addressed social and regional issues, the need to open new residential areas in Paris. Notably, the plan did not encompass the inner *périphérie* (the city wall) focused on areas outside [11]. Henri Prost Istanbul Development plan was the main application plan that remained valid for long years. They effected the city's planning decisions even to the present day [12], [13]. They were used and revised multiple times until the 1970s,-1980s, the physical Master plan reflecting a characteristic of European planning practice in Turkey [14]. The Prost Istanbul Master plans stipulated the relocation of "industrial areas" and "residential areas" outside the antique city walls (Fig. 3). This period witnessed a rapid acceleration by decisions made by the new Turkish Government, aimed to disperse industrialization throughout the country. These decisions had a profound impact many years, as the focus on industrialization problems and housing shortages did not intensify until the 1960s. A systematic hierarchy observed since the Ottoman period, residential areas in the ancient city walls, while industrial areas were strategically planned beyond them (Fig. 3). The Prost Master plans adhered to this traditional plan to extent, with an exception being the *Haliç* (Golden Horn). The Haliç area was designated to be free of industrial facilities, and new housing areas in the Historical Peninsula reserved for the emerging *bourgeois* class (Fig. 4), (Fig. 5). In the post-Prost period, 1960s, Istanbul experienced significant and dramatic urban sprawl driven by both internal and external dynamics, with internal mass migration emerging as a primary concern deeply intertwined with housing shortages.

Prost's Master plans, influenced in part by his own initiatives, included the opening of new residential areas, housing was not explicitly mentioned in his plans.

Fig.1. Istanbul, Plan Today, Urban Sprawl, Deforestation with Buildings Areas, and Industrial Areas.

Fig. 2. Istanbul, Recent Silhouette, High rise Buildings Behind the low-rise apartments Along the Bosphorus. Photo, Destinozione Istanbul.

Fig. 3. Istanbul plan, 19th century, old industrial areas along the haliç shores, (Golden Horn). Map, Anonym, by H. Coskun. Istanbul Zoning Plan, 1937. Out of the city wall of old, industrial areas from Haliç Shores. New Industrial & New Housing Areas in Bakırköy, Marmara Sea Coast. Plan, IFA Archives, Paris.

The German-originated regulatory planning, later developed by French urbanists and known as the French urban planning terminology as zone "zoning" plan for houses, could not be implemented in his Istanbul Master plans due to the scope of his modernization efforts. Governmental Institution Iller Bank Reports (formerly the Ministry of Development and Housing Institution) criticized Prost's Master plans, deeming them incomplete and insufficient [15].

The plans were said to lack vision, leading to the invitation of Italian architect Luigi Piccinato to take over. Piccinato the focus towards planning Istanbul as a Metropolitan city, drawing on his previous urban scale studies at the Abercrombie Office in London [16]. Piccinato introduced new methods, CIAM's regulations that divided cities into functions [17].

His approach aimed at redefining residential areas and industrial production zones, necessitating the development of a comprehensive transportation network to connect different regions. Three main ports of the city—Karaköy, Sirkeci, and Haydarpaşa—were strategically positioned along the main railway to supply industrial materials (Fig. 8, Fig. 9). Yedikule and Bakırköy were designated as new industrial districts, directly connected to the European Railway, with Turkish Railways facilitating the development of these new industrial zones (Fig. 6), (Fig. 7). As part of this plan, Prost agreed to relocate the existing old industrial zone along the Golden Horn, a move proposed in the 19th century due to pollution concerns [18].

Fig. 4. Istanbul, 19th century, Haliç (Golden Horn), Old, Industrial Areas along today all transformed Museum, University, etc. the Haliç Shores, workers Houses and slum (*gecekondu*). Photo, Musée Albert Kahn, Paris, H. Coskun Private Archive.

Fig. 5. Istanbul, historical peninsula, existing houses and building-blocks built in the post-prost period according to the prost master plans for new *Bourgeoise* people. Photo, C. Delgado.

3.1 Istanbul, After the 1970s, Development of Historical Peninsula and Old Industrial Area Haliç (Golden Horn)

After the 1970s, the city's development exceeded the initially established limits, propelled by the rapidly increasing internal mass migrations. The challenges of industrialization, immigration, and uncontrollable growth led to an inherently unsustainable urban density, transforming the city into an anti-metropolitan environment [19]. The consequences of rapid industrialization prompted people from small cities and the countryside to migrate to major urban centers, seeking employment in the newly established factories. Henri Prost's earlier vision had advocated for moving industrial areas outside the city borders, particularly around the Haliç region, known as the Golden Horn, next to the Historical Peninsula, in the 19th century (Fig. 4), (Fig. 5).

The city's expansion occurred alongside the emergence of slum settlements next to the newly established factories. As a pragmatic response to the housing problem, slum houses began to proliferate on the outskirts of the Historical Peninsula, along the Golden Horn, Pera, and in Kasımpaşa districts [20]. These slum settlements played a pivotal role in shaping the city's planning dynamics, triggering uncontrollable growth. The city expanded rapidly with the proliferation of slum settlements, known as *gecekondu*, initially concentrated around the *Haliç* (Golden Horn). (Fig. 3), (Fig. 4).

This area, an old industrial region, developed as an extension of the antique harbor along the Haliç. Due to the lack of a transportation network in the city and its proximity to the port, which was crucial for factories, low-income workers in *gecekondu* settlements lived in close proximity to factories around the Historical Peninsula, Pera, and the Golden Horn. Minibuses served as the primary transportation mechanism throughout the city, connecting workplaces with worker residences, as more advanced transportation vehicles were not yet prevalent in Istanbul [21].

Since the early 20th century, the governmental policy and political goal have been centered around industrialization and the establishment of a new Turkish *bourgeoisie* class [21]. In 1960s, new liberal policies of the government gave rise to challenges. The construction activities were exclusively delegated to the private sector, focusing on building houses for the upper class and the emerging bourgeoisie class in tandem with the ongoing industrialization. During the Democrat Party's governance, Prost's reconstruction plans were implemented with revisions during the construction process [22].

Prost's Master plans, considered operational projects within the context of modernization-based planning (Bilsel, 2010), were constructed block by block by private constructors who illegally opened city axes, roads, and streets. Even the builders design and constructed housing blocks and apartments [23]. This building formula, initially involving small contractors and even foremen, later evolved into multi-story (4-5-story) apartment buildings where plots were sold by speculators in the Historical Peninsula [24], (Fig. 4), (Fig. 5). The Pera Region, as well as the development axis in the north of the city and the quarters of Akatlar and Etiler, emerged as newly developed areas on the European side catering to the upper-class population.

In the 1980s, the liberal policies carried out by Prime Minister Turgut Özal Government was indicated as a problematic era in housing. With his rules, uncontrolled immigration and privatization increased the problem of illegal housing (Fig. 6). The government attempted to legalize the laws to interrupt illegal housing to protect the green areas along the Bosphorus. Contrarily, these laws were not implemented effectively, caused the legalization of illegal constructions. Thus, the slum buildings (gece-kondu), known as low-rise residences, were replaced by high rise apartments very short period. The rate of slums on cooperative parcelling was quite high and these were low-standard "*yap-satcı*" (build-seller) apartments forced the zoning decisions [25].

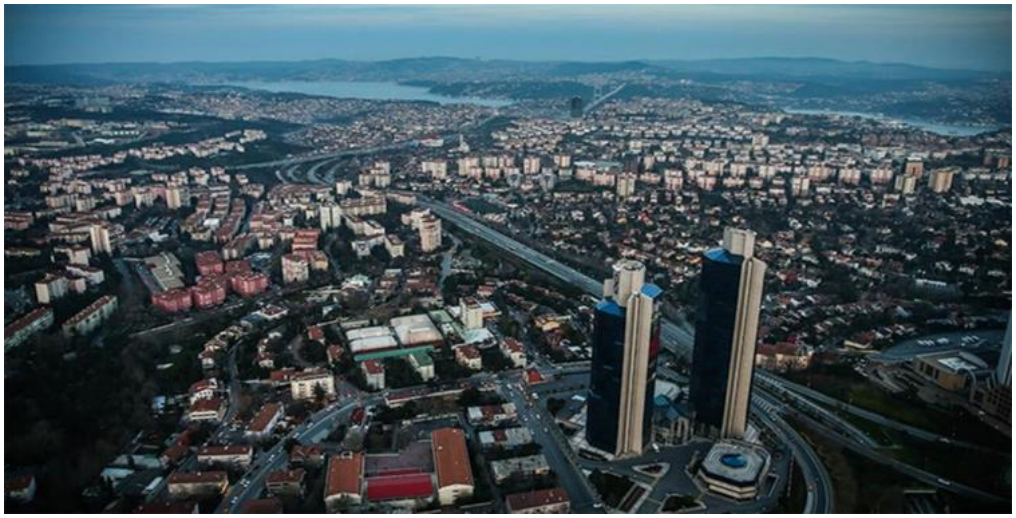

Fig. 6. Istanbul, european side, developed with modern tall buildings & satellite-cities. Photo, NTV.

Fig. 7. Istanbul, european side, industrial developments Zeytinburnu, Marmara Shore. Photo, Anonym.

Fig. 8. Istanbul, anatolian side, today developed modern buildings & garden-cities. Photo, M.Sümen.

Fig. 9. Istanbul, Anatolian Side, Today, Industrialization, Haydarpaşa Harbour. Photo.

3.2 Istanbul After 1970s, Anatolian Side; New Industrial Areas, Cité-jardins (Garden-Cities)

According to French architect-urbanist Henri Prost's *Anatolian Ciheti Nazım Planı* (Anatolian Side Development Plan) [18], new industrial residential areas were planned. H. Prost previously envisioned opening and planning new residential areas on the Anatolian side with *cité-jardins* (garden-cities) in the Acıbadem and Koşuyolu districts. In the 1970s, the opening of the new Bosphorus Bridge in 1973, changed the city's time-distance matrix adopted the city metropolization [28]. The Bosphorus bridge previously foreseen by Henri Prost plan provided the connection between the two sides of the city and led to increasing planning of "garden-cities" started from the Anatolian side [29]. This also led to the urban sprawl in the city and subsequently brought the rapid increase in illegal housing, which would have

been the city's biggest problem in the 1970s the lands were designed for the project and commercialized which led their users no control over its influence [30].

The new urban planning theories, including sustainable planning, emerged towards the end of the 20th century, reflecting versions of these models that were previously planned. During the Prost era, he specifically designed a housing model for the Anatolian Side with *parc-cités* (park-cities) in the Bosphorus Heights like today sustainable ideas to preserve green-areas and woods, along with *cité-jardins* (garden-cities) [18]. This model is also inspired from E. Howard, and R. Unwin's Model [31], [29]. From the 1970s, on the shores of the Anatolian side, in the eastern axis, new French-style banlieues developed along the newly constructed railway known as *Banlieue* train in Istanbul, connecting suburbs along the Marmara Sea shores. Kadıköy, Suadiye, Bostancı, Küçükyalı, İdealtepe, Maltepe, Pendik districts extended along the railway, resembling Parisian-style *banlieues* (Fig. 8).

New suburbs also developed around the E5 Highway, such as Ümraniye, Sultangazi, Başıbüyük, Kurtköy, etc. The unplanned development of the city continued from the 1960s until the 1980s, resulting in Istanbul an uncontrolled metropolitan city the roads closely paralleled along the E5 Highway and extended up to the Marmara Shores. The new industrial area, the Haydarpaşa Harbor of the city, was relocated from the Haliç region (old Industrial area and Main Naval Shipyard) to the Kadıköy district as a new industrial enterprise.

Table 1: Istanbul, Developed Industrial Areas, and Housing-Areas in Years.
Table, by H. Coskun.

Years	HOUSING AREAS	HOUSING MODELS	INDUSTRIAL AREAS	Industrial Facilities
19th Century	HISTORICAL PENINSULA and PERA	Building-Blocks and Apartments	HISTORICAL PENINSULA Golden Horn and Bosphorus, Zeytinburnu, Beykoz, Paşabahçe, İetc.	Ship Building, (Haliç-Istinye), Textil, (Feshane), Energy (Santral), Mills, Glass-Ceramic (Beykoz), Metal working (Bakırköy), Food (Bomonti), Tobacco (Cibali), etc.
20th Century EARLY REPUBLICAN ERA- 1970s	HISTORICAL PENINSULA-PERA, EUROPEAN SIDE; Nişantaşı, Levent,, Bakırköy, Ataköy. ANATOLIAN SIDE; Kadıköy, Acıbadem, Koşuyolu, Suadiye, etc.	Building-Blocks and Apartments, Mixed; *Cité-jardins* (garden-cities), *Villes-Stellites* (Satellite Cities) and Building-blocks, Apartments	Out of City walls; Zeytinburnu, Bakırköy, Haydarpaşa, Bosphorus Shore; Beykoz, Paşabahçe, Istinye, etc.	Haydarpaşa Harbour port services, Auto Industry, Glass-Ceramic (Beykoz), Metal (Bakırköy), Leather Manu. (Bakırköy), Food (Bomonti), etc.
1980s-2000	EUROPEAN-SIDE-Suburbs And ANATOLIAN SIDE-Suburbs	Mixed; Building Blocks and Apartments, Mostly Slum Buildings.	Bakırköy, K. Çekmece, Tuzla, Bayrampaşa, Başakşehir, Levent, etc.	Ready-Made wearing, Metal, Machine Equipments, Textil, Food production, Electrical, Leather manu., Auto Industry, etc. (Gov. Reports, 2018) .
FROM 2000s	FAR EUROPEAN SIDE. Esentepe, Başakşehrir, Halkalı, etc. And FAR ANATOLIAN SIDE; Pendik, Kurtköy, Tuzla, Sancaktepe, etc.	Large-Scale, MASS HOUSING Projects, REGENERATIONS by TOKI and Private Sector.	Recently added 2 districts: Esentepe and Arnavutköy districts.	Miscellenous.

(Fig. 9) In the 1960s, Luigi Piccinato, with new macro plan, decentralized and transferred the industrial areas to towns in the immediate vicinity of the city, such as Izmit, Bursa, Tekirdağ, etc [15].

4. The 1980s, The Climate-Change and the Sustainable Debates, 1992, Rio, and 1996, Istanbul Summits

After the 1980s, a new planning agenda emerged globally, driven by the concerns of climate-change, and the world of design and planning shifted to an era where sustainability took center stage. The focus turned to new planning paradigms, breaking free from old explanatory models with well-known limitations [3]. Cities' planning dynamics needed a radical change, and new design parameters were developed. With the emergence of new planning ideas centered on climate-based concerns, a attention is placed on innovative planning in residential areas that integrates green spaces and ecosystems, departing from existing old planning systems and models. The new, and innovative design methodologies also emerged to achieve environmental sustainability. During this period, the city of Istanbul was grappling with issues such as massive internal migration due to industrialization, and the impact of these challenges was not yet clear.

In 1992, the first Earth Summit took place in Rio de Janeiro, Brazil, and the debates, focusing on "sustainable planning," later formulated Agenda 21. The Rio Conference extended to Habitat-II, the "City Summit" held in Istanbul, where UN conferences ensured the acceptance and spread of Local Agenda 21, reflecting the local projections of the principle of global partnership worldwide [1]. The Earth Summit took place in Istanbul, its echoes were not immediately felt in the city's planning and development during that time.

Overpopulated mega-cities, sprawling with uncontrolled industrial and housing areas, became a threat to existing green spaces, forests, and urban ecosystems Rapid and uncontrollable development has transformed cities like Istanbul into mega-cities, as recognized by the United Nations [32]. Cities such as Tokyo, Sao Paulo, Mexico City, Mumbai, Calcutta, Shanghai, and Beijing have evolved into mega-cities with sprawling urban landscapes, challenging the feasibility of organized city planning [33].

Since the 1970s, the issue of internal migration has intensified in tandem with rapid industrialization, leading to the replacement of parks and gardens, as planned in Prost Master plans, with swiftly constructed tall buildings and high-rises. The city, initially designed with an emphasis on parks and green areas by H. Prost Master plan, has undergone a complete transformation into a green landscape dominated by mass concrete [34]. Throughout this gradual transformation, existing urban settlements have been subjected to isolated interventions with taller buildings [19].

In the 1970s, the construction of the new Bosphorus Bridge, altering the time-distance matrix, spurred metropolization and the construction of high-rise buildings facilitated by newly enacted laws [28]. H. Prost had initially designated the European side as the business center of the city, envisioning the Anatolian side as a residential center with the introduction of the new motorway network and the Bosphorus Bridge, reorganizing housing areas [20]. According to

H. Prost's Master Plans, the Anatolian side was planned to consist of garden houses and low-rise residential neighborhoods [18].

Amidst the changing global agenda with a focus on climate change, Istanbul found itself contending with uncontrolled slum housing spurred by liberal policies rather than engaging in sustainable planning. In the 1980s-1990s, under the liberal policies of Prime Minister Turgut Özal and the implementation of a free-trade economy, a chaotic situation unfolded, accelerating the construction of illegal housing, known as gece-kondu (slum buildings). The shift towards a free-market economy and liberalization resulted in the production of legal and illegal housing, including slum buildings *gece-kondu*, in major cities [35]. Despite Istanbul's development under the influence of liberal economies post-1980s, a significant challenge remained in the form of overpopulation and housing shortages attributed to rapid industrialization.

4.1 2020s, Transforming Istanbul to a Sustainable City; Planning Housing, Industrial Areas

Between 2010 and 2013, the Istanbul Regional Plan aimed to preserve the natural, cultural, and historical values of Istanbul and the Marmara Region. The plan sought to protect forests and water basins, with the goal of preventing the city's development axis from expanding toward the Northern Forests, although this objective was contradicted by the Channel Istanbul project [36]. In 2021, a crucial step was taken by the state in response to Climate-change. The Ministry of Environment and Urbanism was renamed the *Çevre, İklim ve Şehircilik Bakanlığı* (Ministry of Environment, Climate and Urbanism) [37]. Presently, state institutions hold significant authority in determining "industrial areas," and the determination of new "residential areas" is conducted by state institutions such as TOKI. However, at times, the involvement of the Istanbul Municipality can lead to complex management problems in determining new areas within the city.

The rapid urbanization of developing countries has led to rapid population growth, agricultural inadequacy, and a slowdown in industrialization [36]. In Turkey, the laws that play a crucial role in the selection of "industrial" zones date back to the old Sanitation Law from the 1930s, which is still in effect. According to this law, industrial areas are divided into three groups:

1st Group: Industrial facilities must be kept away from residential areas.

2nd Group: Industrial facilities arranged by special permission, even though they are deemed necessary to stay away from residences.

3rd Group: Industrial facilities that have no objection to their presence among residences [21].

While environmental health effects of selected production processes have gained attention globally in recent years, it is a fact that environmental campaigns in Turkey have not significantly influenced the location selection of private sector

industries in the city in practice. It was anticipated that this issue would be more effective in the location selection of factories in the state sector [21].

Since the industrial revolution, city centers were considered the most suitable locations for industrial areas due to proximity to consumers, the labor market, and infrastructure [21]. In Istanbul's city centers, small-scale industries, or sub-industries, such as automotive and textile workshops, were prevalent. However, especially after the 1980s, the presence of small industries in the city diminished significantly [38]. Indeed, like other global cities, Istanbul also aspires to be a leading worldwide industrial and economic center. Since the 1970s, the city of Istanbul experienced rapid industrialization and transformed into a workshop, characterized by a significant working-class population. Hence, over half of Turkey's manufacturing sector was concentrated in Istanbul as a manufacturing center [39].

The Prost Master Plan and Luigi Piccinato's Macro-City Plan aimed to transform the city into a Metropolis, directing industrial zones to the outskirts and nearby towns. The concept of "organized industrial zones" was introduced through new laws with the goal of relocating industrial areas outside the city [21]. These well-defined plans contributed to regionalization around the Sea of Marmara, particularly based on industrial activities [38].

Presently, the state institutions have the authority to determine “industrial areas” on a regional basis within cities. Analysis of industrial companies with capacity reports in Istanbul reveals that a majority of them are located in Başakşehir, Küçükçekmece, Tuzla, and Bayrampaşa districts. These enterprises are often situated in various Organized Industrial Zones (OIZs) or in the form of small clusters operating in similar sectors within specific regions [40], [41]. Recently, Arnavutköy and Esentepe districts have been designated as new “industrial areas” by state institutions, according to governmental reports [40], [42].

4.2 New Planning Ideas Developed with the Sustainability, and the New Housing Areas

Although sustainability and sustainable ideas have come to the fore recently the primary concerns in Istanbul today revolve around housing and earthquake preparedness rather than sustainability. The earthquake in 1999 significantly shifted the city's agenda, leading to a focus on regeneration projects. The continued growth of Istanbul towards the Northern forests and green areas has been a persistent trend, fueled by both internal mass migrations and transnational migrations since the 2000s. Despite the projection of allocating industrial areas to nearby towns, uncontrolled urban sprawl has intensified, making green areas, and forest areas increasingly critical.

The execution of a substantial portion of these projects remains under the authority of TOKI (Housing Development Administration of Turkey), both as a state institution and in collaboration with the private sector [43]. Decisions related to location choice of large-scale housing projects and mass-housing are primarily the responsibility of TOKI. Also collaborates with private constructors TOKI reflecting a system like the French housing construction model. It is acting more like a private sector company in recent years equipped with various powers and laws [44]. TOKI became the only authority to change the zoning status of the region, creating new plans, building new houses, and expropriating

properties [45]. While TOKI plays a significant role in large-scale housing construction projects, smaller-scale projects, individual housing blocks, and apartment constructions are carried out by small contractor groups [43].

In the 2010s, following the aftermath of the earthquake experienced in 1999, Istanbul's agenda shifted to address the issue of climate change, for new and innovative projects. The Küçükçekmece region was specifically designated for these projects through the collaboration of Küçükçekmece Municipality, Istanbul Municipality, and the state [26]. Notable among the proposed projects were macro initiatives planning an eco-city in the Küçükçekmece district on the west axis [46], [47], [27], [48]. The Eco-cities were envisioned as integrated sustainable urban forms and models addressing multiple issues simultaneously [49], [50]. Also, a large-scale regeneration project in the Kartal district on the east axis [51]. Unfortunately, these ambitious projects faced implementation challenges and were eventually halted, with issues arising between landowners and the state, as well as Kartal Municipality [19].

In the 2020s, the influence of international initiatives such as Local Agenda 21, which originated from the Habitat-II City Summit held in Istanbul, continued to shape the city's approach to sustainability. Local Agenda 21, emphasizing the global partnership principle, gained acceptance, and spread worldwide, including in Turkey and Istanbul [1]. While Agenda 21 designated five regions as model districts in Istanbul, concrete plans in this regard were yet to be established [52]. The collaboration between local municipalities, the state, and international foundations reflected a commitment to addressing sustainability challenges and fostering global ideas.

In recent years, the destruction of forest areas through large-scale projects has persisted, and a new law enacted in 2021 allowed for the possibility of opening forest areas to new housing settlements if deemed necessary [37]. This regulation raised concerns about the protection of forest areas already threatened by housing settlements. The continued expansion of uncontrolled housing areas posed threats to vital forest areas, water basins, woods, and green spaces, despite some projects being presented as environmentally friendly [1]. On the Anatolian side, private sector-driven large-scale investment projects, such as Acıbadem Wood and S. Forest, planned under the banner of wood and forest conservation.

Recent state reports have reiterated the threat posed by uncontrolled urban sprawl, emphasizing that land areas are diminishing due to this phenomenon, global warming, and increasing intensity associated with climate change promoting global sustainability [40]. The recognition of these challenges underscores the importance of implementing sustainable practices and policies to address the impact of urbanization on natural ecosystems and mitigate the effects of climate change.

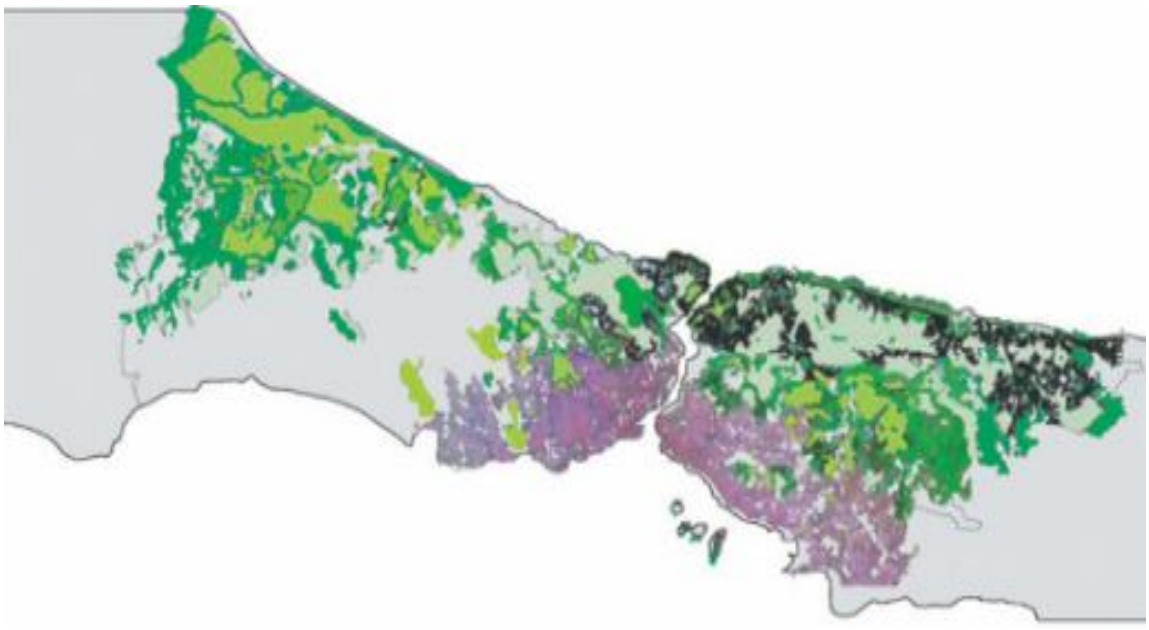

Fig. 10. Istanbul, ecology and deforestation, green, residential areas, and forest. Map, weebly.com.

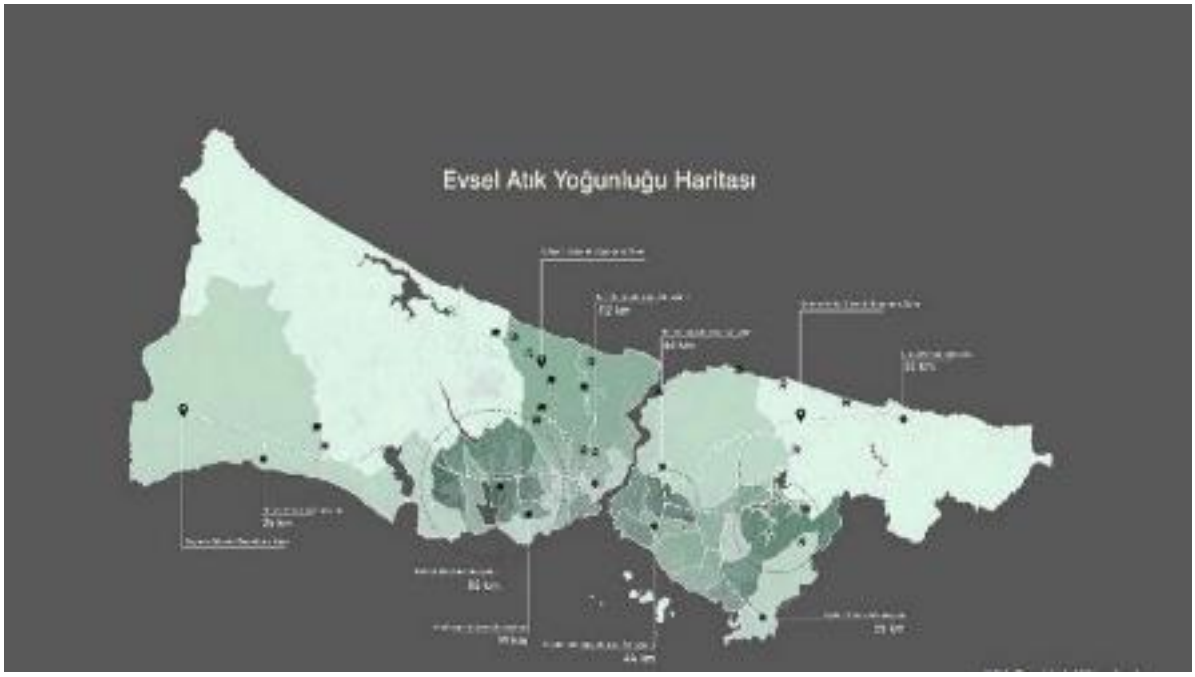

Fig. 11. Istanbul plan, industrial & housing areas, industrial, and domestic waste. Map. Aura.com.

ISTANBUL, RECENT REGENERATION, SUSTAINABLE&ECOLOGICAL LARGE-SCALE PROJECTS

Fig. 12. Istanbul, recent, regeneration project in fikirtepe, Kadıköy District.

Photo, Fikirtepe.com.

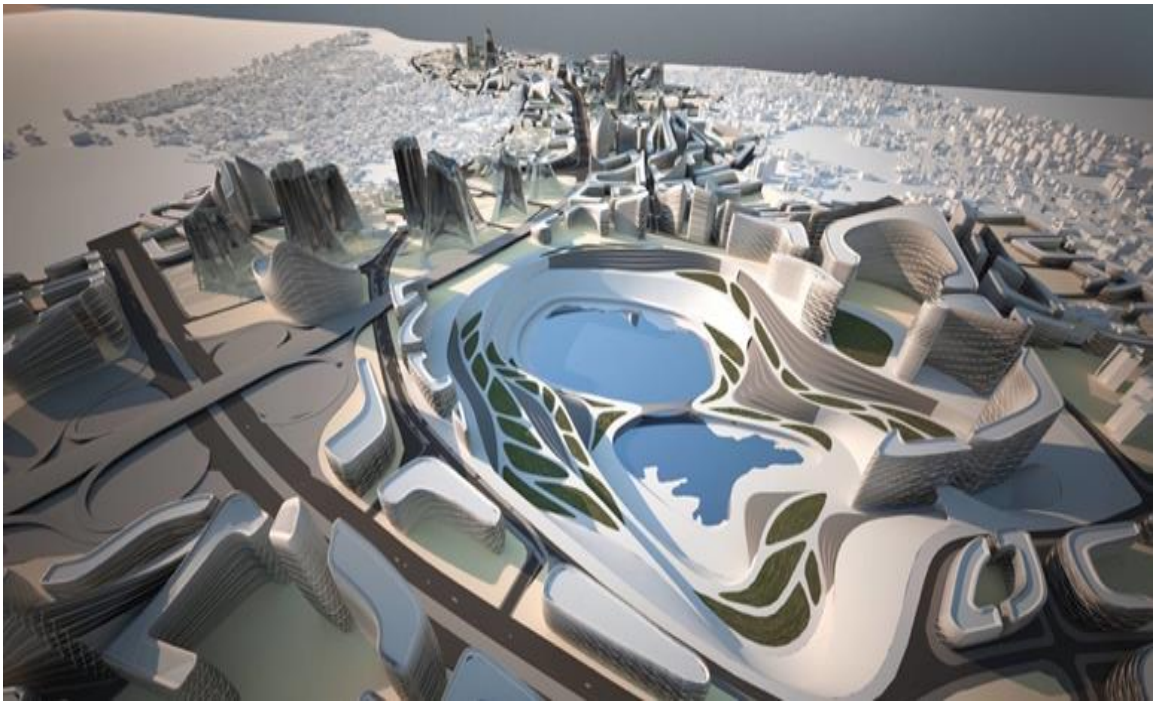

Fig. 13. Istanbul, recent, parametric regeneration project, kartal, by Zaha Hadid.

Photo, ZHA Website.

Fig. 14. Istanbul, recent ecological project, küçükçekmece Eco-city, by Ken Yeang.
Photo, Arkitera.

5. Conclusion

Despite global Climate-change summits since the 1990s and public activities focusing on climate issues, sustainability did not gain prominence in the city's urban planning long years. However, although the issue of sustainability could not raise awareness in the city for many years, it began to be included in the state's planning reports. The recent state reports theoretically acknowledge sustainability as a key government concern, practical implementations fall short, with no declared state agenda or action plan. Uncontrolled planning persists, especially towards northern forest, green-areas, woods, and water basins. (Figs. 1-2) and (Figs. 10 -11).

State reports underscore sustainability as a major challenge, alongside disaster responses like earthquake preparedness. These reports emphasize three crucial compromises: ensuring access to sufficient, equal, and social housing, addressing financing issues, and promoting global sustainability [40]. However, concerns arise as newly enacted laws, permitting the opening of forest areas for settlements perceived as conflicting with sustainability principles and posing risks to the future planning of residential areas.

Environmental disasters and the COVID-19 pandemic have caused a paradigm shift in determining new housing areas. There is a growing demand for housing outside city centers. This has led to the overlapping of residential, and industrial areas in green spaces. To address this, specific zoning plans need to be prepared, creating designated zones and zoning plans. This approach, suggested in the research, can contribute to a more sustainable determination of housing and industrial areas.

The turning point came in the 2000s, after the 1999 earthquake, prompting urgent measures and large-scale regeneration projects to renew the aging housing stock. Post-1999, a comprehensive regeneration process was initiated

throughout the city, spearheaded by TOKI, a state institution, and various private construction entities, engaging in extensive housing renewal activities simultaneously (Fig. 12), (Fig. 13) [29]. Also, during this period, in addition to these regeneration projects, in the context of the ecological planning some eco-city planning proposals were made, although they were not realized on a large scale like Küçükçekmece eco-city [27], [48]. The 2000s witnessed a shift in government policies, with TOKI emerging as the primary company for state-owned projects and housing initiatives. The city still has problems determining new residential and industrial areas. (Fig. 11) Since the early 20th century, there has been a foresight of relocating industrial areas outside the city, resulting in the establishment of large industrial zones in nearby towns through the organization of industrial zones. Although small industrial facilities are still permitted in the city, recent decisions, declaring Arnavutköy and Esenkent, located in the northern forest area, as industrial zones, contradict the earlier directives. Also, the regions; Arnavutköy, Büyükçekmece, Küçükçekmece, Esenkent on the European Side, and Sultangazi, Kurtköy on the Anatolian Side, which are moving towards green and forested areas.

In conclusion, planning residential areas with innovative and sustainable projects that incorporate controlled use and semi-use, along with the integration of green spaces, is crucial for the protection of the environment. Revisiting old urban planning models like "garden-city" concepts can offer viable alternatives to address modern challenges, including the concepts of "green-cities," "sustainable-cities," and "eco-cities (Fig. 14)." The resurgence of interest in garden-city models is evident not only locally but also globally. (Table 1), Specific zoning plans should be developed for newly opening housing areas, and a carefully crafted zoning plan should distinguish residential areas from industrial zones. Preserving existing green and forest areas by defining clear borders is essential for sustainable urban development. Istanbul urgently needs comprehensive city plans that align with principles of sustainable planning and include emergency measures for environmental disasters such as climate change, sea disasters, mucilage incidents, water supply issues, droughts, earthquakes, and more. The emphasis should be on fostering a harmonious coexistence between urban development and the natural environment.

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