

RESEARCH ARTICLE

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# An ecological dilemma, novel sustainable ideas for Istanbul examining zoning regulation for green-areas and housing

Hülya Coskun<sup>1\*</sup>

## Abstract

This research delves into the evolution of Istanbul's urban agenda, which has become increasingly intricate due to recent challenges. The city's planning paradigm has undergone a discernible shift, with heightened attention concerns like seismic resilience, sustainability, and the climate-change. The planning projections for the city have experienced significant changes, by the earthquakes 1999 and 2023, climate-change, and the pandemic in 2020. Although the pandemic is considered temporary, it has significant in bringing sustainable matters like living airier, greener areas, back to the city planning. In response to the latest challenges, particularly the earthquake, the city confronted an ecological dilemma, prompting proposal to relocate new housing areas to the Northern-forest. The city's northern development axis, planned a century ago by the French architect-urbanist Henri Prost, is being questioned today end to its limits for green-areas. Based on ongoing global discussion, on academical circles on the imperative, the historic city of Istanbul grapples with the contemporary problems sustainability and seismic considerations in its future planning endeavors. This study engages in discursive analyses while concurrently offering practical recommendations to address sustainability through the development of specific zoning arrangements focuses on dual research axis urban-based, and housing-based, laws, and regulations, also housing model, and typologies as missing part of the previous research. This study principally examines this problematic via zoning practices of Istanbul in the Henri Prost period from housing areas to the housing models and typologies. Also, globally, along with the new zoning, the old zoning laws, and regulations can be bring the agenda again in the context of sustainability to promote a balanced relationship between human, nature and sustainability goals. In conclusion, amid the recent challenges in the city, innovative suggestions for advanced zoning applications in pursuit of sustainability reveal a notable gap in the protection of green-areas, planning new settlements. Henri Prost's master plans stand out for employing distinctive zoning techniques for each district, also offering specific housing models and typologies. Extending this methodology to green-areas presents a bridge the existing void. By presented potential case scenarios at the end of the study emphasizing the merits of integrating historical zoning practices into contemporary planning, it aims to stimulate discussions on holistic and forward-looking urban development strategies.

**Keywords** Green-areas, Housing, Istanbul, Prost master plans, Sustainability, Urban planning

## Introduction

This research delves into the recent city agenda of Istanbul, a developing mega-city addressing novel approaches to urban planning and the prevalent housing challenges. Over the last few decades, Istanbul's development axis has expanded towards the Northern-forest and green-areas, posing significant threats to the city's vitality. The

\*Correspondence:

Hülya Coskun  
her\_222@yahoo.com

<sup>1</sup> Faculty of Architecture, MSGSU, Mimar Sinan Fine Arts University, Istanbul, Türkiye

unique character of Istanbul, as an ancient city, presents a myriad of complex problems distinct from those encountered by other global metropolises. This research endeavors to illuminate the evolving complex agenda of city, addressing contemporary concerns such as uncontrolled urban-sprawl and climate concerns, including deforestation, the depletion of green-areas, and housing challenges, alongside the recent seismic considerations. Indeed, all these complex and multifaceted problematics create a dilemma that is difficult to solve in the city's planning issues. The reason for this situation is that the recent proposals for earthquakes lead problems for climate considered among the main factor that formed this dilemma. While the primary focus is on sustainable urban and housing planning, the study also explores the feasibility of developing solutions that promote sustainability and considering the specific zoning regulations possibility of relocating housing settlements to green-areas, in response to earthquake issues in Istanbul.

The study designed to focus on the issue of sustainability, includes some suggestions which will be useful solving the problematic and reorganize the current agenda of the city, which has become more complex with the recent seismic concerns, by identifying the deficiencies. In this research, explore innovative studies focused on the transformation of an ancient city into a sustainable urban environment, exemplified by Istanbul 2040 plan, since the late 1990s. (See Table 1) Recently, due to city's burgeoning population needs to housing requirements to expand to the Northern- forests, the last green-areas deemed relatively safe from earthquakes. Furthermore, after 2020 pandemic, both the Istanbul Municipality and the State began to accord equal importance to sustainability like the seismic concern as outlined in the 10 Years Government Development Plan. Recently, in the post-pandemic period, it is also witnessed a shift in people's preferences towards living in airier, greener areas and houses with gardens outside the city. This change in public sentiment has propelled the adoption of urban and housing planning approaches that align with sustainable principles, marking a crucial turning point in the city's development trajectory.

The aim is to provide a comprehensive perspective both theoretical and practical applications for the city's sustainable development. Like the global cities Istanbul has experienced a significant alteration in its agenda concentrating on climate-change and sustainability since the 1990s. The issues initiated a vast momentum for the future planning and the city endeavored to evolve into a more sustainable with the seismic event of 1999, and recent in 2023, compelled a reevaluation of priorities. Even though the climate issues included in the 2040 Vision plan of Istanbul Municipality, the efforts

are limited in some urban-scale arrangements, laws and practices made. In 2023, 2024, the prerequisites of the city required to develop towards the Northern forests due to recent earthquake concerns also triggered climate issues. In this period globally American and European cities are considered mainly urban-scale zoning arrangements in the scope of sustainability (Sustainable Development Solutions Network 2019; US Cities factsheet 2021). However, in Istanbul urban planners involve opening of the new housing areas and housing settlements towards the Northern- forests after the last earthquake came to the city agenda as immediate issue. In this context, in this study it is also revealed that the research should go beyond existing urban planning and along with the zoning based urban planning, needs to the housing-based planning, and regulations should be examined specifically.

### **International perspectives on sustainable cities**

Nowadays, in the global approach, the cities are moving towards a period sustainability, have continued to discuss in academic circles since the 1990s, are gaining momentum. The climate-change concerns started by the first Earth Summit in Brazil, in 1992, (United Nations 1992) and continued later the Istanbul, in 1996, (United Nations, 1996) though it is not instantly generating awareness in city, initiated a shift in focus. When considered world literature, Richard Register's early period works such as "eco-cities" which was pioneered the climate-change issues and sustainable living style (Register 1987, 2018). By the 2000s, 2010's along with the many publications for climate-change problems, sustainable living model initiated in some cities in Germany, Brazil, UK, China, Sino Singaporean and Abu Dhabi, Masdar city considered be examples. Furthermore, climate conferences also continued Paris Agreements in 2011, and today many of them continued to held in different world cities, Paris, Kyoto, Glasgow, etc. (United Nations, 2014; United Nations, 2015; United Nations, 2020)

Indeed, with the regulations made and measures are taken globally, and climate conferences have become increasingly effective in worldwide. These are against the backdrop of worldwide discussions on topics global warming, climate-crisis, and the evolving paradigms of sustainability or "how to make cities more sustainable" in American and European cities, (Citylab, 2023). These recent theories have developed and influenced sustainable ideas in urbanism, where the concept is paired with ecology, nature, and smart technology (Farr 2008). The recent sustainable, and ecological challenges emerged as the new urban planning affecting globally, from villages to megacities (Paquot 2013). Also, in addition to environmental issues, and the

green design revolution in the world encouraged, and draw attention to this matter (Grey 2018). With these latest developments, the world focused on a more sustainable plan because megacities have more than one problem and requires comprehensive multi-disciplinary studies. Furthermore, the urban sprawl and dense urbanization, which are one of the main problems of world cities, have become a significant threat to the survival of cities' ecosystems and effective green planning is now needed (Pickett et al. 2013).

To find solutions to climate -change issues, although there are a wide range of examples in the literature of sustainability, there is a tendency towards different regulations and zoning-based urban planning and implementations, in the 2020s. In this context, specifically zoning-based urban planning, laws, and regulations come to the world agenda recently, and some implementation has already initiated by some European cities Paris and London. However, to constitute the housing-based urban planning and regulations a much newer agenda. The measures and practices taken in that world cities have developed and varied by different methods according to their specific urban problems and characteristics. In the over urbanized world cities due to specific problems in cost, land, and opening new housing areas, it is preferable that the implementation of urban scale zoning-based practices primarily , prior the planning of new sustainable housing. However, this awareness still involves difficult process differently in the world like while American cities are figure out how to move towards being more sustainable and conceptualize the numerous problems on the way sustainable city (Keeley and Benton-Short 2019; Mendelsohn and Pipa 2018).

Although American cities approach to the problematic on theoretical basis, urban based practical applications have already initiated in European cities. Recently, various cities in Europe, London, and Paris, they have already introduced specifically arranged urban zoning based regulations and band arrangements to safeguard green-areas, parks, forests, to prevent uncontrolled urban-sprawl, address environmental issues, pollution, and even pandemics. Thus, in Europe, in cities both Paris and London, put into new implementations concentrating on preparing new zoning-based urban planning practices are encountered (Citylab 2023). More specifically, recently Paris applied new regulations to plant more trees to survive sustainability and removing beltway lanes as a strategic measure to combat pollution (Citylab 2022). However, in London, existing urban zoning plans are being adapted as part of new solicitations, pushing for ultra-zones to limit carbon emissions (Citylab 2023). This all convergence of old

urban planning techniques and principles with contemporary sustainability challenges showcases the dynamic nature of urban planning, with lessons from the past theories influencing innovative solutions for the future. Furthermore, in the global response to mitigate the impacts of climate-change has led municipalities and governments worldwide to implement new applications focused on protecting green-areas.

### **The İstanbul and its historical background and on sustainable developments**

Recently, the İstanbul Municipality prepared new 2040 Vision Plan, focused on climate concerns initiated for the city's future planning to evolve into more sustainable with the seismic events, in 1999, and in 2023. However, some efforts kept limited in zoning based urban planning and arrangements particularly includes green bands, pedestrianization, bicycle ways, and no car zones for zero carbon emissions. With the recent needs in the city it has been foreseen to an urgency develop towards the northern forests due to earthquake concerns also brought climate issues to the agenda again in 2023.

With the complex status İstanbul is as an old historical and distinctive city with a present over population of approximately 16.6 million, projected to reach 18.8 million by 2040 (İstanbul Municipality 2021). Notwithstanding challenges heavily urbanization, İstanbul persists in its growth, witnessing the development of new neighborhoods and suburbs surrounding the Historic Peninsula. (See Figs. 1, 2, 3) As a mega-city, İstanbul spans into two continents, with the Asian side predominantly recognized as residential area, and the European side knowns as business districts which are connected by three bridges Bosphorus, Fatih Sultan Mehmet, and Yavuz Sultan Selim Bridges in the far north region which is also started recent discussions urban-sprawl to the Northern-forest (Perouse 2014; Coskun 2017). (See Fig. 4)

In the early twentieth century, İstanbul is more compatible sustainable city planned and arranged green zonings characterized by a harmonious blend of parks, green-areas, and residential zones by the French architect-urbanist Henri Prost Master plan. However, the mid-twentieth century over the years the city witnessed the changing in urban dynamics, and it gradually moved from this green based planning ideas. The uncontrolled developments detrimentally impacted the city's green-areas and forests. The recent challenges intensified with unregulated mass migration and unplanned urban sprawl from the 1960s–70 s onwards. By the 1970s, İstanbul grappled with significant urban population growth, compounded by a lack of controlled urban planning and inadequate infrastructure (The Economist Intelligent Unit 2009). The city started to extend from its original

hinterland to close towns east-west axis linearly from Izmit Bay in the east, and to Tekirdağ in the west. This evolution transformed Istanbul from a mono-centric urban form to a polycentric mega-city, extended nearly other cities borders characterized by an overpopulated core and surrounding metro-regions (Perouse 2008, p. 30) (See Figs. 5, 6).

In Istanbul, in the early 2000s, two pivotal projects came to the fore in the sustainability, and earthquake context specified as a two main problematic of the city. First, in 2006, Istanbul Metropolitan Municipality spear-headed an expansive urban planning competition in a far western district situated between Küçükçekmece Lake and the Marmara Sea (Arkitera 2006; Yeang 2008; Coskun 2021a). This competition included prominent architects and architectural groups such as Ken Yeang, MRVD, and Kengo Kuma, and finally Ken Yeang's Küçükçekmece eco-city project was awarded the first prize (Arkitera 2006). This eco-city project proposal emphasized the issues on sustainability and revitalization of the degrading ecosystem in the Küçükçekmece district however, could not be implemented some political and economical issues by the municipalities on that period (Coskun 2023).

The second prominent project came to the fore after in 1999, first seismic event which was highly effected the Istanbul city. This first seismic movement is started discussions of earthquake resilience problems, catalyzed a city-wide regeneration initiated by the state, to renew poor-quality housing stock fails updated seismic standards. The project is planned to contribute to the city's earthquake-related planning is Zaha Hadid Architects' extensive Kartal regeneration, in the far eastern axis of the city. This parametrical project involved the transformation of the old industrial area of Kartal district (Schumacher 2019). Also, regeneration project by Zaha Hadid Architects focusing on earthquake resilience, the Kartal district stands out as a significant proposal on a global scale due to its use of urban-scale parametricism (Coskun 2021a, b).

In 2000s, these two projects as a two principal example are presenting the city's two main problematics like sustainability and seismic concerns have not been implemented, they have played a pivotal role in the city's planning history, drawing attention once again to sustainability and earthquake specifically. They serve as noteworthy examples that resonate globally, showcasing the potential for innovative solutions to address pressing urban issues. These projects, even if stalled, contribute significantly on the future planning of the city, and serve as exemplars that have garnered attention and set precedents on a worldwide scale.

In 2019–2020, the pandemic is underscored the significance of sustainable and green planning once again nearly 20 years after the first seismic movement, in 1999. During the pandemic, a sudden and growing demand was seen to the E. Howard's early twentieth century "garden-city" model among the populace who stayed home long periods. In the post-pandemic period this housing model developed as characterized by low-rise houses with terraces and balconies in airier, and greener areas beyond the city (Hürriyet Haber 2021; Coskun 2022). With this trend the concept of horizontal buildings and "garden-cities," came to the fore emphasizing increased green-areas over multi-story tall housing. This approach fosters a sustainable relationship between urban dwellers and surroundings, reflecting globally recognized and endorsed by entities like the United Nations (United Nations 2021). Thus, especially, in the pandemic and post-pandemic period a sharp paradigm shift is seen towards more sustainable and nature-integrated urban living now it has gained momentum, the green-areas and eco-friendly planning in the wake of changing global dynamics and increased public awareness.

In 2023, in the Istanbul, the seismic safety has become a paramount consideration, with the latest earthquake in southern region of the country and prompting a renewed emphasis again on this problematic. These recent event reignited discussions of earthquake challenge have spurred the idea of planning new seismic standard housing towards the northern regions and green-areas, which constitute the last remaining green lands in the city. This shift is prompted by the planning understanding that the coastal areas along the Marmara Sea are less vulnerable than the Northern forests. This recent earthquake concerns and increasing focus on sustainability created a planning dilemma, underscores the importance of preserving these Northern-forest and green-areas. Also, creating the dilemma the planning of new satellite cities, driven by earthquake considerations, it is anticipated to further strain the already diminished green-areas and forests, raising critical concerns.

According to the recent problems, also an idea came to the fore the mass transformation process that started after the last earthquake could be an opportunity for the mega-city Istanbul becoming a sustainable city by transforming from district to district or neighborhood to neighborhood. Another challenge is the integrity of existing densely urbanized areas, following sustainable ideas, promote social equality and exploit ecological processes effectively. Also, the recent surge in sustainability concerns, particularly following the pandemic, has witnessed a resurgence of interest in old architectural and city planning theories, and methods those proposed by E. Howard in UK and H. Prost in İstanbul. In this context,

the Istanbul Master plans by Henri Prost now they hold potential as valuable data, offering insights into his old methods in city planning that can be revisited for future urban development. In response this need, the recently we witnessed the come-back of the some of the old architectural and city planning discourse like E. Howard in the world. Hence, Henri Prost İstanbul Master plans are examined again possibility of rethinking as precious data for future planning of Istanbul.

### The research gap

According to the preliminary analysis, the main problematics on climate-change and the sustainability globally, in the world and particularly in Istanbul are examined. It is revealed that the climate issues which have already included in the Istanbul Municipality's 2040 Vision plan, but this plan is limited with some only small urban-scale arrangements, regulations, laws, and practices, also not included housing issues extensively. In addition to increasing interest in sustainability and seismic concerns in the city the new laws and regulations, regarding green-areas, and housing plannings recently came to the agenda. However, preliminary analyzes indicated that the recently made studies on zoning-based laws and regulations, in the context of the sustainability and the integrity of green-areas, and housing-areas not adequate and sufficient. Particularly, regarding to planning combination of housing and green-areas are required very specific and more detailed zoning laws. The study aims to better formulation on existing zoning-based urban planning and centered the housing issues, offer specifically made housing-based urban planning, laws, and regulations. Considering the development of housing model and typologies in the newly made housing-based regulations which is the missing part of the previous research. In this context, to specify research gap, the central question is can be more advanced legislation crafted on housing-based urban planning and regulations as well as the compatible with zoning-based urban planning and, regulations. Consequently, this study is aims to scrutinize the future planning of housing-based problems such as location choices and housing models and typologies, to ensure a sustainable and resilient urban development additionally seismic issues that considers the broader environmental context.

### The methods and study area

The research focuses on the Istanbul, the recent urban planning agenda and the dilemma created by in response to contemporary planning challenges such as sustainability, seismic concerns, and epidemics. This research examines the specifically arranged zoning laws and legislation in globally, and their adaptability particularly in Istanbul, making city's more sustainable. In this context, in

the preliminary analysis it is revealed that to make zoning regulations in the city would be more effective planning idea, the study required to examine dividing into two specific parts: zoning-based city planning, laws and regulations, and housing-based city planning laws and regulations.

Therefore, the research methodology is divided into two specific parts. This separation considered to better understand and examination of the problematic the creation of more specific and detailed zoning laws and regulations. These zoning laws, and regulations are also required to made uniquely for Istanbul city, as well as the should be arranged according to specified zoning districts; city center, suburban, areas out of the city, and green-areas.

1. The primary method includes, the zoning-based urban planning, laws, and regulations, concentrate on plans, projects, reports, laws, applications which are implemented in the American and European cities and particularly in Istanbul. The data will be supply from research on these world cities, and their comparison and reflection of the Istanbul like, no car-zone or carbon free bands, for sustainability in cities Paris, London, etc. The research realized by along with the examination of existing or recently made zoning regulations as well as the laws taken and transferred from the world cities and their use in Istanbul. Additionally, the city's new laws, regulations and practices will be examined which is recently put into effect in the next 2040 Visionary Plan by Istanbul Municipality within the scope of the city's problems. Data on this subject will be provided from Istanbul Municipality's Vision 2040 reports, and other applications, Municipality, and State, etc.
2. The secondary method is based and mainly focused on housing subject, and specifically housing-based urban planning, laws, and regulations. It is also including opening new housing areas, and settlements, specifying new housing models and typologies accordance to these newly made laws. The data will be obtained via anachronistic technique by examining the existing housing planning laws, regulations, etc. Also, in general, in the world cities witnessed the recent come-back of the British E. Howard's "garden-city" models after the pandemic, and particularly Istanbul the housing models and typologies uniquely made for city by the French architect-urbanist Henri Prost. Moreover, Henri Prost İstanbul Master plans are examined since the beginning of the century, his housing-based regulations made by him particularly for city. Including opening new housing areas and settlements, and location choses, and loca-



tion based specific housing models and typologies accordance to these regulations. His housing-based urban planning, laws, and regulations may be useful for future sustainable planning of the city. The data in this part for Istanbul will be obtaining Henri Prost's, plans, drawings, reports, and his writings, etc.

### **The first period, Istanbul's planning the first master plans by Henri Prost**

Istanbul is a metropolis whose urban hinterland lies in the Marmara Region at the western end of Turkey and its already extends beyond the planned city limits (Figs. 1, 2, 4). Surrounded by the Marmara Sea in the south, the development axis of the city only allows expansion towards green-areas and the Northern-forest. The main issues of the city are the housing problematic and the uncontrolled urban-sprawl towards the north specifically Northern-forest as a threat. (Fig. 5) As a megacity, Istanbul challenges the inevitable internal and, more recently, transnational migration and residential expansion over the years. Today, the population of Istanbul has increased from 1 to 16 million, the city has grown exponentially, and green- areas are in danger of extinction.

The first visionary master plan of the city of Istanbul was made by French architect-urbanist Henri Prost, like the Paris city plan arranged with parks and green- areas, which was a strategic continuation of E. Hénard's urban planning ideas (Merlin 1991, p. 60), after the construction ban in the city of Paris according to the Cornudet law. The urban planning ideological background of E. Hénard and H. Prost originates from *Le Musée-Sociale* (Social Museum). They are both members of this institution that makes and supervises laws and regulations for the city of Paris also worked as controlling mechanism. Thus, like the Paris plan, the PARP (*Le Plan d'Aménagement Region Parisienne*), (Paris City Development Plan) Istanbul Prost Master plan was designed with green-areas and parks, which are now occupied by uncontrolled buildings or moved outside. (Figs. 5, 6) In the years when the city rapidly developed and transformed with population increase in years, by inevitable migration and urban-sprawl, which was led to gradually decreased of green-areas. In fact, these changes envisaged by H. Prost Master plans revealing the developing dynamics of the city, and the delicate balance between urban development and the environment, except population increase.

### **The second & third, post-prost period, Istanbul, transformation a metropolis**

In the post-Prost period, Istanbul went beyond its historical borders of Prost Master plan and grew rapidly, turning into a metropolis after plan of Italian architect-urbanist Luigi Piccinato's macro-scale plan (Malussardi 1993, p. 55). As a rapidly growing mega-city, Istanbul has grappled with severe congestion, urban transport, and traffic problems since the central city was divided by the strait in the 1970s, by Bosphorus Bridge leading to city's transformation into a metropolis (Tekeli 2013, p. 358). Henri Prost's master plans are differed the city into two main parts: the northern section is, encompassing the Northern-forest and green-areas, and the southern part is experiencing linear growth with residential areas like satellites cities along the Marmara Sea coastline (Fig. 5). Since the 1970s, the city had a industrializing period highly urbanized with migrations, uncontrolled buildings and housing settlements. It is pursued an anti-metropolitan density approach, particularly noteworthy for an unstable and rapidly industrializing country (Bozdogan and Akcan 2012, p. 162). The development of residential areas and towards the northern axis, Northern-forest, and green-areas has continued and accelerated recently (Fig. 6). In the last quarter of the twentieth century and into the twenty-first century, even though the early ideas on industrial decentralisation, Istanbul continued to urban sprawl towards the northern axis, as well as nearby towns in the east and west, and south like, Kocaeli, Tekirdağ, Bursa, etc. The new housing projects are designed to accommodate large migration masses, now operating at a transnational level. This expansion reflects the city's dynamic response to demographic shifts, migration trends, and the ongoing challenge of providing housing for its growing population.

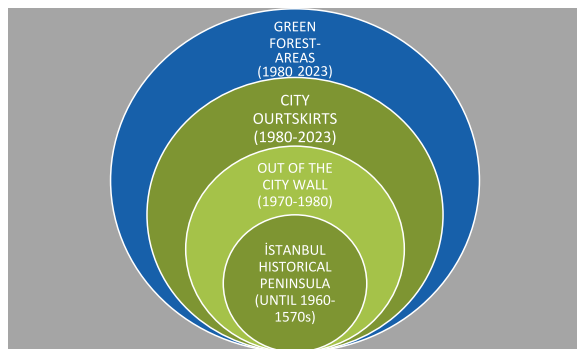
### **The fourth period, Istanbul earth-summit, in 1996, a sustainable milestone**

After the first Climate-change Conference held in Brazil, in 1992, the next in Istanbul in 1996, but these summits did not create the necessary awareness for Istanbul city (United Nations 1992; United Nations, 1996). In the context of the sustainable studies, the first book published later to draw attention to the climate issues, was on some modelled human settlements that were self-sustaining (Register 1987). Considered the sustainable efforts afterwards, the Habitat-II UN Conference in Istanbul ensured and developed Local Agenda 21, which addresses local projections in the world, was recognized in city and in international organizations along with the process (Arar 2021; UN-Habitat 1996). Following its announcement in Istanbul, the importance of implementing Local Agenda

**Table 1** The Istanbul Master Plans and Environmental Plan, by Government (Ministry of Climate-Change, Environment, and Urbanism) or Municipality



Acc. to OECD Reports 2008. Table, Author



**Fig. 1** Istanbul city Zoning Areas and Development Axis Through the years. Graphic, Author

21, emphasized by focusing on environmental, economic, and social issues, as a local level sustainable development plan. However, even though the some recent studies on climate-issues, and the housing settlements which were implemented in the city until that period would not suitable in terms of sustainability. Also, newly developed urban plannings and housing settlements which promoted as environmentally friendly in the Istanbul would be damaged natural environment forests, green areas (Aykan 2014) and even water basins. Despite the concerted recent efforts of various NGOs and civil society groups to raise awareness and advocate for more sustainable policies, the pace of change was specified as still very slow. The recent Climate- Summit held in Glasgow in November 2021 highlighted the importance the problematic and not only the main climate issues but also the potential for Istanbul to face severe water scarcity and drought in the future.

In the OECD's 2008 territorial plans for Istanbul is identified with uncontrolled urban growth in residential areas as one of the most significant problems of the city. The Istanbul Metropolitan Municipality's 1995 Master plan is estimated that approximately 55% of the city's informal settlements is potential uncontrolled urban sprawl, reaching up to 75% (Perouse 2008) (Table 1). This situation indicates uncontrolled development has raised substantial concerns for the future planning of city, especially considering the growing awareness of sustainability. Another concern is the potential expansion of illegitimate settlements towards the Northern-forest, green areas, and even existing water reserves that require more controlled planning by new zoning regulations and preservation (Coskun 2021a). These newly specified settlements over the last two decades, have been officially recognized as an area like sub-provinces (Perouse 2008).

### The fifth period, Istanbul, 1999, first seismic problems

Infact, Istanbul is in a seismically active region poses a significant risk for its physical infrastructure and the safety of its residents. The 1999 earthquake underlined the urgent need for better disaster preparedness and mitigation measures. After the 1999 earthquake, it was emphasized that new earthquake-resistant housing should be included in the city's new Master plans. It was also revealed that many people experienced inadequate infrastructure and services during the previous earthquake (Baharoğlu and Leitmann 1998). After the 1999 earthquake, Turkish planning authorities found themselves in the fifth period with the MEER (Earthquake Emergency Plan) initiated by the World Bank, processed by EU countries and moving towards sustainable

planning (Gibson and Kocabaş 2007). Although this was a very important turning point for the city, Istanbul's agenda would be updated, and the correctness of seismic concerns would be reminded without overlooking new planning strategies. Even though some progress has been made in this regard, such as the development of earthquake-resistant building codes, there are still many things that remain problematic in ensuring the city's resilience to future disasters.

Following the 1999 earthquake, as a main state institution TOKI involved the gentrification process and planning the new housing settlements accordance to renewed seismic regulations. TOKI, Toplu konut ve Kamu İdaresi Başkanlığı (Mass Housing Development and Administration Turkish Republic) initiated a large-scale gentrification process in collaboration with private contractors, particularly in city centers, and old regions (Coskun 2021a, b). They worked other contractors and despite being a state institution, TOKI has functioned similarly to a private sector company in recent years (Geray 2007). In the urban transformation

process, TOKI has played a significant role, becoming dominant in the country-side construction market with the emergence of affordable housing and neo-liberalized practices (Kuyucu 2014). TOKI has produced low cost housing project mostly social housing with accessible credits nationwide (Şenyapılı 2007; Buğra 1998). Especially after the 1999 earthquake, since 2002, it has become a major institution, constructing more than 500 thousand housing units by 2011 and surpassing 1 million by 2022 (Sönmez 2011; Euronews 2023).

### Istanbul's place in sustainability in global concept

Istanbul is aligned with the 20th-century trend of significant growth in the number of mega-cities, characterized by high population density and extensive urbanization likewise the other mega-cities. The mega-cities such as Tokyo, Shanghai, Beijing, Sao Paulo, Mexico City, Mumbai, and Calcutta have witnessed substantial expansion with orderly planning under strategic regulations (Lehmann 2011, p. 260). Despite being controlled, these cities continue to experience rapid growth, adding



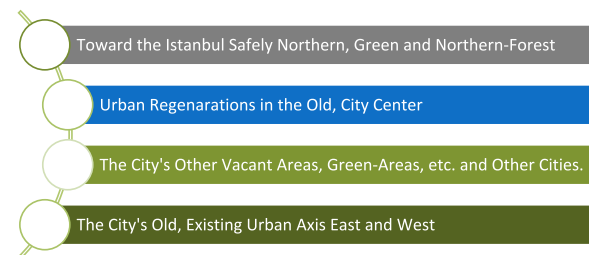
**Fig. 2** Istanbul City's Developments in years Transformed From the old, Historical Peninsula to the Mega-City. Map, Author



an area equivalent to a Manhattan-sized zone every year, accompanied by a significant increase in the number of vehicles, which has doubled to 1.5 billion (Calderon and Stern 2015, p. 79). As urban populations increase, green planning becomes increasingly crucial, with comfort values determined by the presence of green- areas, parks, and low carbon emissions to foster sustainability (Greenpeace 2022).

Today, densely urbanization is major threat to survival of sustainable cities, and the protection of ecological environment. Thus, efficient, and applicable measures are required to the future by many municipalities, governments, and associations to develop and adopt sustainability as a future goal (Beatley 2000; Curwell et al. 2005; Jenks and Jones 2010). The concept of a sustainable city has emerged as a response to addressing future urban problems between the city and its inhabitants, encompassing issues such as dense urbanization, the disappearance of green areas, forests, and water resources. Sustainability, in this context, represents the process through which cities transition to realize their future visions (Childers et al. 2013; Grove 2009; Pickett and Cadenasso 2011; Pincetl 2010; Pickett et al. 2013, p. 518). Moreover, a sustainable city incorporate normative aspects related to people's values and desires, surpassing traditional or specialized old city models.

Despite all recent efforts recent studies indicate that Istanbul has a relatively low percentage of green-areas today, raising sustainability concerns, as reflected in the Green-Score of the European Green City Index, trailing behind New York and London (Forum 2020) (Figs. 1, 2,



**Fig. 3** The Spatial Segmentation, Specifying the Newly Opening Housing Areas. Graphic, by Author

5). Additionally, there has been a drastic increase in vehicles with 380,000 crossing over Istanbul bridges, marking a 647% rise, while the population by 142% between 1980 and 2005. Notably, the car per capita ratio in Istanbul is 4.2, compared to 4 in New York, 2.5 in Paris, and 2.2 in Tokyo (Perouse 2008).

### The sixth period, climate-concerns Istanbul municipality 2040 visionary plan

IMPO, *Istanbul Metropolitan Belediyesi* (Istanbul Metropolitan Municipality), has already started a new urban design projection for the future planning of the city. This planning, which was considered on the east–west axis of the metropolis, benefited from old zoning maps from the early twentieth century. (See Table 1) In this context, the city developed in the east–west direction and virtually integrated with neighboring provinces such as Kocaeli and Tekirdağ. However, the northern region, which is



**Fig. 4** Istanbul a Metropolitan of nearly 18 million population. The view from the Asian Side to the European Side. Photo, Depositphotos



**Fig. 5** İstanbul Map, 2023, Urban-Sprawl, Recent Green-Areas (green), Residential-Areas (pink), Developed Toward Northern-Forest. Map, [www.istanbulbelediyesi.istanbul.gov.tr](http://www.istanbulbelediyesi.istanbul.gov.tr)



**Fig. 6** İstanbul, Recent Urbanization Toward to Northern-Forest. Residential-Areas (brown) and Green-Areas (white). Map, İstanbul Municipality

now the city’s only development axis, poses a threat to the Northern- forests (Figs. 2, 3, 4).

Recently, the Mayor of İstanbul implemented a visionary plan for the city with a scope of the a Climate Action considered to Green-solution that focuses on establishing an environmentally-friendly transportation system and promoting sustainable, and healthy lifestyles

(Surdurulebilirulasim.istanbul 2022; Coskun 2022). Thus, some measures put into forward on sustainability, and the reduction of transportation to eliminate to air pollution and CO2, redefining of the housing-areas, industrial-areas, as well as the green-areas. According to İstanbul Municipality new legislations applied to negotiate viable sustainable conservation and controlled use areas should



also be a step towards establishing a more balanced relationship between human, and nature accordance to recent regulations of UN.

In recent developments, some “controlled-zones” and “buffer-zones” have been created and implemented in the city by the authorities to aimed to protect the city’s green-areas in housing planning. Although these steps represent significant advances in the protection of the natural environment and ecosystems, they are still considered insufficient. If the city is anticipated to expand towards the north and green-areas, housing plans must be developed with a focus on specifically controlled usage to ensure the protection of green- areas and the Northern-forest. This targeted approach is vital for achieving sustainable urban development in Istanbul. This is also significant in the principles of the United Nation, in the context of sustainability to protect green areas. Like to create a sustainable relationship between urban dwellers and urban areas in line with United Nations’ requirements, (United Nations 2021).

### **The sixth period, Istanbul’s recent seismic concerns sustainability, housing-areas in the northern-forest**

Despite the recent seismic concerns prompted a significant shift in the planning projections for Istanbul’s future planning, the prediction of the earthquake in the recent Master plans not included (Table 1) Although the plan lately implemented by the Istanbul Municipality, the measure on seismic issues requires to revise it again. While sustainability and the earthquake are acknowledged as an essential matter in state reports, it has not been effectively reflected in practice. Thus, the seismic concerns are the initiator of taking urgent measures about this problem in new planning. However, the real problematic is that these new earthquake precautions would accelerate the urbanization towards to the green-areas, and Northern-forest (Figs. 5, 6).

The issue of housing stock also resides on the agenda as a long-standing problem for Istanbul, and the recent earthquakes have only increased the urgency of the matter. The need for priority renewal of the old and poor-quality housing stock has become vital, also it is essential to ensure that new houses are earthquake resilient. In the recent State Reports the vision of Türkiye on housing policies declared that more sustainable and environmentally friendly as well the seismic concerns of today. Also, sustainability mentioned as a significant issue of country along the earthquake problems. It this State based reports prepared different time periods emphasized the sustainability and stated on housing that provide adequate livable, healthy, durable, safe and sustainable housing for everyone also met with United Nations laws and regulations (State Development

Reports, 2018; Konut Sorunu Araş. 2022; Turkish Housing Policy Comission Reports, 2018; Onbirinci Kalkınma Raporları, 2019). Considering the sustainability is crucial of these new houses and guarantee that they are built in a way that does not harm the environment or put a strain on the city’s resources (Hürriyet 2021). Recently, the matter of determining new residential areas in the city came to the fore urgently, and within the framework of the latest earthquake map analysis, it is specified that these areas are mostly to plan towards to the northern part of the city (Figs. 5, 6). Furthermore, it is envisioned that the recent specified regulations the newly opened housing areas will be first started from the northern regions in the European Side.

Due to recent earthquake concerns, urgent measures have been taken to plan new residential areas in the Istanbul. The latest earthquake map analysis has highlighted that urban development in these new residential areas should expand towards the north, where the ground is more solid and closer to the Northern- Forest. As part of the recent urban transformation plan, approximately 1.5 million houses are projected to be built, covering both the Asian-Anatolian and European sides of the city. The initial phase of this plan involves the construction of the first 500,000 houses in newly opened housing areas, primarily in the further northern regions next to Northern-forest. It has been recently announced that the Esenyurt and Başakşehir districts on the European side will be intended to plan for this purpose (Takvim 2023). The next 500,000 houses will be planned on the Asian-Anatolian side of the city. The remaining 500,000 houses will be part of urban regeneration projects in existing districts on both the Asian and European sides (Hürriyet 2023). This strategic approach aims to address seismic concerns, ensure sustainable urban development, and balance the expansion of housing across various regions of Istanbul.

With the newly implemented plan, the new residential areas are now strategically planned in the east–west direction, in addition to the north axis (Fig. 6). This plan has already been initiated in certain regions, and others may be reconsidered or canceled due to concerns about seismic resilience. It is crucial that these new residential areas are planned with sustainability in mind, addressing earthquake-prone settlements and housing areas in the future, despite the predominant earthquake concerns. However, the implementation of this plan poses challenges and future problems for the newly planned housing areas, and houses in the city, potentially leading to demographic relocations and transitions. Achieving sustainability requires not only earthquake-resistant structures but also a comprehensive approach to planning for a sanitary city that contributes to a classic demographic

transition. Nonetheless, social scientists have found that the demographic transition and urbanization model may have some shortcomings (Boone and Modarres 2006). Balancing the diverse factors involved in urban planning, demographics, and sustainability will be crucial to the success of these initiatives and the well-being of Istanbul's residents.

Istanbul's housing problem is primarily envisioned by addressing by state or private sector contractors. The previous planning initiatives carried out by the İDÇŞB, İklim Değişikliği Çevre ve Şehircilik Bakanlığı, (Ministry of Climate- Change, Environment, and Urbanism), and TOKI, Toplu Konut İdaresi Başkanlığı (The State Mass Housing Development and Administration of Turkish Republic) for large-scale and mass-housing projects, and the Istanbul Metropolitan Municipality (İMB or İMPO) for middle-scale housing projects, (IMPO 2022). These large-scale mass-housing projects are centrally planned by TOKI under the control of the government, focusing on towards the Northern- Forest and green-areas in Istanbul, such as Esenyurt, Beylikdüzü, Tuzla, Pendik, and more. (TOKI 2023) The strategic location chois of these projects aims to address housing needs while contributing to urban development and transformation in line with government initiatives.

### **Specifically arranged zoning regulations to make cities sustainable**

Indeed, to make cities more sustainable, needs to controlled urban planning with comprehensive zoning laws, regulations on the green-areas, and including the residential areas. Uncontrolled urban-sprawl poses a significant threat to the city's green-areas, Northern-forests, woodlands, even in water future reserves. In response, the development of green zoning maps becomes imperative to regulate and control urban growth, ultimately make the city and its environment more sustainable. The concept of urban growth and green-areas is integral to sustainable development, aiming to achieve a harmonious balance between ecology and the economy in cities (Ferry 2021, p. 125). Therefore, in addition to new and innovative legislation, laws, and plans, leveraging past theories and laws can be beneficial for future planning endeavors.

Indeed, in the world cities globally, and the Istanbul particularly, a recent update and rearrangement of zoning regulations appears as an important issue for to make city more sustainable. In this context, using zoning regulations more effectively, it is needed to specifically divide in two sections like, zoning-based urban planning, laws,

and regulations and housing-based urban planning laws, and regulations.

1. The zoning-based urban planning, laws, and regulations, making city sustainable

Recently, the various urban planning methods to ensure sustainability in cities globally, and the most importantly these are emerged as zoning-based urban planning, laws, and regulations. Today, zoning-based applications are widely used in American and European cities around the world, evolving into numerous methods and regulations like specifically determined zoning-bands and zoning-areas, etc.

While some of these zoning-based urban planning are newly developed, some of them are inspired by old applications, and practices. Especially after the pandemic the old architectural, city planning theories and discourse like previously used by E. Howard in the past come-back (Herstlife 2021; Howard 2008). These old theories are started to use in rearrangement of the old cities to protect the green-areas and natural environment make them more sustainable. The French architect-urbanist Henri Prost is known as the founder of the urbanism and first created the term of *zones* (zoning) and applicated multiple zoning plans. He prepared specific zoning plans, laws and regulations for Paris, and other cities as well as the Istanbul where he arrived finally. He also specifically produced some other zoning regulations like *cordon sanitaire*, (sanitary band) or *zones non aedificandi* (no build zone). Although, zoning-based urban planning ideas, laws and regulations initially was developed in the early twentieth century, they are still relevant today. They recently, adopted by many cities to address contemporary challenges, climate-change, sustainability, green-architecture, pollution, and pandemics. These zoning-based regulations continued to use in European cities like Paris, and London today. İstanbul's zoning-based applications which is recently come-back to the planning within the scope of climate-change and sustainability as well as the pandemic. The goal is in this research also to explore the potential revalue of H. Prost's Master plans as a source of data for future urban planning efforts in Istanbul and around the world.

By revisiting these old zoning-based urban planning, laws, and regulations and incorporating them into modern planning ideas. Thus, the cities able to promote more sustainable and resilient urban environments support the health and well-being of their residents while preserving the natural environment. Urban planning centered around enhancing the quality of life for city dwellers by prioritizing factors such as; clean air, efficient



transportation, green-areas, and the preservation of natural environments. The UNEP, (United Nations Environment Programme), has recently emphasized the prominence of cities designed for a zero-carbon living standard, with ample green-areas essential for livable settlements in urban areas with equitable distribution (UNEP 2019).

Recently, likewise the world cities some zoning-based regulations, (it is explained with title, green zoning-based regulations, or specific zoning maps) has declared by Istanbul Municipality, İMPO, *İstanbul Metropolitan Planlama Ofisi*, (Istanbul Metropolitan Planning Office) to protect natural environment and green-areas with the construction of new housing projects, specifically in the northern forests. They explained the zoning-based regulations with terms like “sustainable conservation” and “controlled use green-areas” the scope of the “Regulation on the determination, registration and approval of protected areas” (İMPO 2022). The commitment to old zoning applications, which is aim to essentially divide cities into functions, aligns with contemporary sustainability-focused urban planning and zoning literature. Accordingly, the IBKK, *İstanbul Bölge Koruma Kurulu* (Istanbul Regional Conservation Commission) proposed expanding the regulations for sustainable protection by implementing controlled use areas in the city plan (İMPO 2022). This regulation is made aimed to threat of the future development of housing-areas to promote more balanced relationships between people and nature.

## 2. Housing-Based Urban Planning, Laws, and Regulations, Housing in Green, and Controlled Areas

However, opening green-areas to controlled use with zoning maps are also specifically required to develop sustainable housing models in these controlled areas. Alongside these zoning-based urban planning, laws, and regulations, (green) zoning plans, it is crucial to consider specific housing models and typologies for these specifically determined and controlled areas. These measures are integral to sustainable urban development, helping to strike a balance between meeting housing needs and preserving the natural environment.

Today, some of the old, planning theories in the past re-used to find solutions to the problems in cities. After the pandemic people desired to living in greener, and airy areas, and recently we witnessed the come-back of the some of the old architectural and urban planning theories and discourse like E. Howard (Herstlife 2021; Smith 2021; The Times 2022; The Times 1948, p. 5; Howard 2008) Also they are including some examples from old

urban planning, laws, regulations, likewise zoning-based and housing-based urban planning, and housing models can provide valuable insights for contemporary housing planning. This holistic approach to housing planning can contribute to the recent problematic of the cities like creation of sustainable and naturally protected urban environments. These old urban planning theories derivatives of the garden-cities are significant for uncontrollable urban sprawl towards to green-areas.

Istanbul’s zoning applications for housing-areas, green-areas, and housing proposals, also recently come-back with climate-change and sustainability and the pandemic (Prost 1949, 2007). The goal is to explore the revalue of Henri Prost’s Master plans as a source of data for future urban planning in Istanbul and in the world. H. Prost’s Istanbul Master plans (also considered first housing-based plans made according to the specifically segregation on regionally) includes opening housing areas, housing segregations, location choices, housing models and typologies were also examined both sustainability and earthquake issues. H. Prost developed zoning maps for Istanbul at the beginning of the twentieth century, suggested some specific and uniquely designed housing models such as *cite-parc* (park-cities) in the Bosphorus Hills to protect green-areas and woods envisioned as *cité-jardins* (garden-cities) in the Anatolian-Side which consist of green-areas and the gardens of the district

(Bilsel 2010; Coskun 2021b). İstanbul by architect-urbanists H. Prost, as similar housing-models significant today. Therefore, it will be beneficial re-use these old urban planning theories and housing models, whether it is sustainable or earthquake. In addition to zoning-based urban planning, laws, and regulations, (green) zoning plans, it is advantage make kind of implications and segregation, to consider housing models and typologies specific to controlled building areas. Also important that these distinctions are made in housing-based urban planning areas and that the determined regional segregation is compatible with each other in terms of housing models and typologies specified according to this segregation. For example, for city-centers, (High-rise or low-rise buildings) or peri-urban (2–3–4 floors low-rise blocks or buildings) or for controlled planned green areas (1–2–3 floors low-rise buildings, or It is also important to plan different housing models and typologies such as garden-city planning (Tables 2, 3, 4).

## Discussions

The research is designed to focus on the issue of sustainability, and to reorganize the current agenda of the city, which has become more complex with the recent

**Table 2** Photos, (Left), Istanbul, Satellite view, Nasa website

**Istanbul, city-center developments& housing proposals**



Mixed-Models; Green-Design, High-Rise or Low-Rise Blocks



City Center Districts; İstanbul, (European-Side); Levent, Maslak, Sarıyer, Küçükçekmece, (Anatolian-Side); Kadıköy, Pendik, Tuzla

(Right), Housing Proposal (Semi-densely) Urbanization. Photo, Eston Construct. (Below), Istanbul, Esenyurt, Shutterstock. Table, by Author. Data: State, Municipality (IMPO 2022; TOKİ 2023; Hürriyet 2023; Takvim 2023)



**Table 3** Photos; (Left), Istanbul Satellite View, Nasa Website

**Istanbul, peri-urban developments & housing proposals**



Mixed, Green-Design, Low-Rise Blocks and Houses in Green Areas in the peri-urban



Regions; Districts in the Urban Periphery; Around Existing, Large-Scale and Mass-Housing Areas, European-Side; Küçükçekmece, Esenler, Arnavutköy, and Anatolian-Side; Orhanlı, Tuzla, Pendik)

(Right), Küçükçekmece Project. (Below), Istanbul City Skyline, European Side, Maslak District Forest District, Destinazione Istanbul. Table by Author. Data: State, Municipality (IMPO 2022; TOKI 2023; Hürriyet 2023; Takvim 2023)

seismic concerns, by identifying the deficiencies. Istanbul presents unique challenges, differing in complexity from those faced by other global cities. The scope of the research focused on the recent earthquake discussions which created vast complexity and dilemma with the city's novel sustainability agenda and seismic

concerns. According to preliminary research, although the city's agenda has been focused on sustainability for a while, it has been observed that the laws already made are not appropriate, comprehensive and not including housing settlements. Additionally, the recent earthquake issues which envisioning of the relocation of



**Table 4** Photos, (left), Istanbul Satellite View, Nasa Website

**Istanbul, out of the city developments housing proposal in controlled green-areas**



Green-Design, 1–2-3 Storey Houses with Garden, or Garden-cities, in Green Areas



Regions; Out of the City District in the Countryside. Recently Specified Housing Areas for Earthquake Resistant; (European-Side); Esenyurt, Başakşehir, (Anatolian-Side), Çekmeköy

(Right), Küçükçekmece, Housing Settlements. (Below), Proposal for Balanced & Controlled Green-Areas & Housing. SözcüNewspaper, 2022. Table by Author. Data: State, Municipality (IMPO 2022; TOKI 2023; Hürriyet 2023; Takvim 2023)

residential areas to the green-areas and Northern- forest led to the emergence of comprehensive agendas. Even though, the Istanbul Municipality has increasingly prioritized climate issues, with the 2040 Vision plan, preliminary research has revealed that new and holistic approach, laws and regulations (both in terms of sustainability and earthquake) are needed. Also, the laws

and regulations of in the world cities, especially on sustainability, is included in the research, but it was found that these were some urban-scale regulations, the housing issue is missing specifically, and the city of Istanbul needed uniquely prepared city-specific, laws.

Although there have been recent measures taken in terms of sustainability of the city and some



zoning-based urban planning, laws, and regulations both by the state and the municipality. These zoning-based laws and regulations do not include the housing models and typologies built in the newly determined zoning areas compared to the first ones that emerged, and this is the most striking part of the research. Additionally, there are no comprehensive housing-based zoning determinations, and laws since it is incomplete, and the architectural features of these newly built buildings are far from being innovative, and sustainable housing models. In fact, these architectural housing models, which do not reflect today's twenty-first century and are not innovative, are more like old, concrete examples of modern architecture from the mid-twentieth century. Thus, as a result, it is thought that solely sustainability-oriented theories and practices are not sufficient and, a holistic sustainability cannot be realized. Moreover, when considered the specific earthquake problems, it is revealed that more holistic solutions including housing-based urban planning and supported sustainable housing models were needed.

In this context, the subject of the research was based on two main axis: zoning-based urban planning, laws and regulations, and housing-based urban planning, laws, and regulations. Specifically, the research axis is shifted to housing-based urban planning since the most problematic part of the research lacking comprehensive laws and regulations. The urban-scale zoning-based laws are taken as an example from around the world, there is an urgent need for uniquely made, and more specific housing-based laws for Istanbul. Thus, the scope of the research is focused more on this area, and the reality is there should be sustainable housing models that are unique to the determined zoning-based areas and specific to these specifically determined zoning areas. The shortcomings of these new laws were also tried to be highlighted in this research. From old urbanism theories on this subject. The issue of whether it is possible to benefit globally from England's E. Howard's "garden-city" model and its latest derivatives, which was seen a recent come-back after the pandemic, and specifically to Istanbul, the zoning practices and housing proposals in H. Prost's Istanbul master plans were examined in this research. Also, along the new zoning laws and regulation proposed it is also presented new suggested scenarios purposed to specify "housing" models and typologies according to the newly opening housing- areas, lands, and settlements aimed to protect Northern-Forest and green-areas.

## Conclusion

In the twenty-first century, cities face a myriad of complex challenges, surpassing the urban dynamics experienced. This research is dedicated to examining address the city's future planning challenges within the realms of sustainability and earthquake resilience which is created a dilemma in Istanbul's planning. The city's recently evolving complex agenda intertwined the current concerns such as uncontrolled urban- sprawl and climate problems, deforestation, depletion of green-areas and housing problems with more recently the seismic considerations. In this study, it is approach to main problematic which led to recent dilemma with a holistic approach on sustainability and seismic concerns with a multidisciplinary method along the both urban planning and architectural design contexts. It is also aimed to examine with a method contemporary zoning-based urban planning, laws and regulations, and housing-based urban planning, laws, and regulations housing models and typologies as solutions to the future problems of the city. Although the research focuses specifically on Istanbul, the city is implemented with multinational architects and planners, in different period also used other European past urban planning techniques and housing models will set an example for cities in a global context. Indeed, they will continue to inspire for the future architectural and urban planning being redeveloped and used in today.

Indeed, all these complex and multifaceted problems of the Istanbul create a dilemma that is made it to solve issues more difficulties in city's planning. The reason is the new residential areas proposed after the earthquake concerns triggered lately are planned towards the green-areas and Northern-forests, since this area is the most solid part of the city, and the prediction is this will cause climate problems in the long term. These new suggestion on to solving the seismic problems considered to among the main reasons for the dilemma. This problematic has emerged recently, and it led a serious problem in urban planning today. While sustainable urban and housing planning is the primary focus, the study also explores the feasibility of developing solutions that promote sustainability in response to earthquake concerns in Istanbul and considering the possibility of relocating residential settlements to green-areas.

According to the preliminary findings of the research, it is seen that some steps have been taken recently to address the city's climate problems and sustainability. In this context, lately, some zoning-based urban planning laws and regulations have been made, by the both municipality and the state authorities, to protect the city's green-areas. If they are made accordance to zoning laws, and regulations, these implications would bring great

advantage of the city's future planning. However, recently made zoning-based urban planning, laws, and regulations are not involved of housing-based urban planning, laws, and regulations and inadequate. Indeed, for sustainable reasons some green-areas out of the city declared as "specifically protected zones", or "controlled zones". Due to lack of specifically made housing-based urban planning, laws, and regulations, the newly made housing models and typologies do not meet the sustainable standards. Even though they are announced and planned specifically "semi-densely" (controlled building) or "controlled- areas", (controlled building) and "protected areas" (non-building zones) heavily urbanization with multi-story or concrete buildings continues, because there are not included and lack of the adequate housing-based laws, and regulations will be limited specifically the number of the housing, housing stories, housing models, and material in these areas. This implication is disadvantage, and it is creating an obvious threat for the city's future sustainability. It is obvious that, even though some zoning-based laws and regulation made the urbanization, and urban sprawl with the uncontrolled housing models will not be avoided if housing-based laws are not made with new housing envisaged in green-areas after the earthquake.

In this research, it is approach to the problematic specifically, and the already existing zoning-based laws and regulations were re-examined, and especially housing-based laws, and regulations were drawn and their suggestions for housing models and typologies that overlap with regional and neighborhood-based zoning regulations were also included. For example, for "semi-densely areas", partial, low-rise 2–3–4 storeys residential blocks and buildings are recommended, and in specifically "controlled use areas", it proposed minimum, low-rise, 1–2–3 storeys, garden-city models or its derivatives as sustainable housing models are recommended.

The exploration of old laws, and regulations offers a valuable perspective as potential alternative solutions in adapting to contemporary urban planning challenges, new and innovative applications in future. The proposal to allow for the development and integration of laws pioneered by acclaimed architects and urbanists such as E. Howard and H. Prost emerges as a strategic approach to address the multifaceted challenges that future cities encounter.

In Istanbul, today, both the State, the IMPO, *İstanbul Metropolitan Planlama Ofisi*, (İstanbul Metropolitan Planning Office) and local governors have realized that to protect the "green-areas", woods, forests should be arranged via new strict "zoning" laws and regulations, limited the "housing-areas".

As recent application of Governmental side in the context of the as an old method the "zoning", (like first applied by Henri Prost in Paris), continued to implement expanding their scope. Thus, these old applications developed and varied regulations according to today's circumstances which were not existed previously "specifically protected areas" or "controlled use areas" by Government.

In İstanbul, today, to protect green-areas some new regulations and "zoning" practices have already entered the city planning agenda. According to a new urban declaration; the characteristics of "sustainable conservation" and "controlled use areas", considered to among the natural sites, are explained as follows within the scope of the "Regulation on the determination, registration and approval of protected areas".

Some new regulation made by the government, not sufficient in practice and need additional regulations. Istanbul Municipality has developed specific zoning maps to plan housing areas while protecting the city's natural environment. The İMPO, *İstanbul Metropolitan Planlama Ofisi*, (Istanbul Metropolitan Planning Office) realized new regulations on sustainability to protect green-areas specifically Northern-forests.

With the decision of the State Commission of District Conservation dated July 4, 2018, some regulations determined at below;

- a. 'Sustainable protection',
- b. "Controlled use" and,
- c. "Partially qualified natural protection" areas were created for the parcels where the site rating.

According to with the decision of the State Commission of District Conservation dated July 4, 2018, up a new "Housing proposal" zoning table prepared and presented in this research (using Table 5);

In this context, the following conclusions have been reached and presented in this research carried out.

- For City-Centers; (Densely and Semi-densely Zone), Housing Proposal (Mixed-Models, Green-Houses, High-Rise and Low-Rise Models).
- For Peri-Urban Developments, (Semi-Densely Areas, Specifically Controlled Zones), Housing Proposal, (Green-Design 3–4 Storeys, Low-Rise Blocks and Houses with Garden).
- For Out of the City Developments; Specifically Controlled Zones and Buffer- Zones, (Green-Design, Low-Rise, Max. 1–2–3 Storeys Houses with Garden (Old Garden-city Model).

**Table 5** Istanbul, urban regulations and housing model proposals according to regions

Proposals	Urban regulations	Housing models	Housing model proposal per district
City-center housing developments	Transfer from the densely city center to the semi-density zones	Mixed-models; green-design, high-rise or low-rise blocks	Istanbul, (European-Side); Levent, Maslak, Sarıyer, Küçükçekmece, (Anatolian-Side); Kadıköy, Pendik, Tuzla
PERI-urban Housing developments	Semi-density areas specifically controlled zones	Green-design 3–4 storeys, low-rise blocks and houses with garden	Existing, Large-Scale and Mass-Housing Areas, (European-Side); Küçükçekmece, Esenler, Arnavutköy, and (Anatolian-Side); Orhanlı, Tuzla, Pendik
Out of the city housing developments	Specifically controlled zones and buffer-zones	Green-design 1–2–3 storeys houses with garden (old garden-city model)	Newly Specified Housing Areas out of the city ; (European-Side); Esenyurt, Başakşehir, (Anatolian-Side), Çekmeköy

Table, by Author, Data State & Municipality (IMPO 2022; TOKI 2023; Hürriyet 2023; Takvim 2023)

Thus, a "Housing" version table of the zoning applications of regional green-areas taken by the Regional Commission, which overlaps with these applications, was obtained. Thus, attention was drawn to the lack of holistic approach and specific zoning applications in green-areas, which was the most prominent point in this research, and suggestions were developed with the scenario proposals made on the "housing" version accordance to these green zoning applications of subject added (Table 5) and in the last tables (Tables 2, 3, 4).

On conclusion, in this research, past and new housing models and proposals for sustainable urban and housing design were examined, and as a result, in three main zoning areas specified in the city; city-center, peri-urban (semi-green areas), and newly developed areas in the out of city (mostly green-areas or next to woods, and forest) proposals, whether inspired by past housing theories or in the context of sustainability and even Covid-19 in recent years newly progressed innovative suggestions were developed and presented. It is aimed to use these suggestions as a model proposal in the future planning of the city or in other cities and to prepare a resource for another future research.

#### Abbreviations

IBKK,	Istanbul Bölge Koruma Kurulu (Istanbul Regional Conservation Commission)
İDÇŞB,	İklim Değişikliği Çevre ve Şehircilik Bakanlığı, (Turkish Ministry of Climate-Change, Environment, and Urbanism), The recently changed from the old Title of "The Turkish Ministry of Urbanism", adding the Climate-Change after the climate concerns
İMPO,	Istanbul Metropolitan Planlama Ofisi, (Istanbul Metropolitan Planning Office)
MEER	(The Earthquake Emergency Plan), The Turkish, Earthquake Emergency Plan Implemented After the Istanbul, 1999 Earthquake
OECD Reports,	The Reports of Organization for Economic Cooperation and Development
PARP,	Le Plan d'Aménagement Region Parisienne, (Paris Region Development Plan) by Henri Prost in the early 20th Century.

TOKI,	Toplu Konut ve Kamu Ortaklığı İdaresi Başkanlığı, (Mass Housing Development and Administration of Turkish Republic)
UNEP,	United Nations Environmental Program, the global authority for the environment with programmes focusing on climate, nature, pollution, sustainable development and more

#### Author contributions

No other author contributed.

#### Funding

No fund were supported in this manuscript.

#### Availability of data and materials

The data and material submitted this manuscript is originally prepared by Author, (also as specified Author) like; tables, some images, revised, and photoshopped images. The other materials the mostly photos supplied form internet as open sources, they open to all people, so I confirm that they do not need to any permission from any people and institution.

#### Declarations

##### Ethics approval and consent to participate

I kindly confirm that in this manuscript I do not need any ethics approval due to no experiment have been carried out in this research neither on human nor animal.

##### Consent for publication

I kindly confirm that this manuscript is original, written by me as only Author has rights the publication.

##### Competing interests

Kindly inform that no competing interest included.

Received: 17 July 2023 Accepted: 9 September 2024  
Published online: 05 October 2024

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at Faculty of Architecture and Design, Rumeli University, İstanbul, Türkiye

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**Hülya Coskun** Received her B.Arch. and M.Sci. Degrees in Architecture from Faculty of Architecture, MSGSU, (Mimar Sinan Fine Arts University), and educated at ENSA-PB, École Nationale Supérieure d’Architecture de Paris-Belleville, Paris, France during her doctoral studies. She earned her PhD. degree in Architecture from MSGSU, Faculty of Architecture, İstanbul, Turkey with the Doctoral Thesis of “Housing Problem in the First Half of the 20th Century in Europe and Henri Prost Example”. She is currently working as an Ass. Prof. Dr.