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Conservation and change in planning practice: the method of morphological regionalization

Conservação e transformação na prática de planejamento: o método de regionalização morfológica

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Abstract

Balancing conservation and change of the physical form of cities is a key challenge for planning. Supported on a thorough understanding of the main socioeconomic and environmental needs and aspirations of a city and on the fundamental characteristics of its physical form, spatial planning should offer a framework to promote the conservation of structural physical elements while allowing change of less persistent elements. In many cases, planning fails to provide such framework. The paper addresses this major problem. It is argued that one of the main reasons for failure is the lack of scientific support to planning practice. To address this weakness, the paper proposes a revised version of the method of morphological regionalization. The method was designed by M.R.G. Conzen in the early 1960s and subsequently applied over the next

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decades by several academics in different geographical and cultural settings. This revised version of the method offers a systematic definition of procedural options and steps, a clear usage of terminology, and a strong linkage to the historico-geographical approach, supporting the creation of a new framework to understand conservation and change. The method is applied into a city with a unique urban history, Istanbul, focusing particularly on Fatih (historical peninsula).

Keywords: Planning practice. Conservation and change. Urban morphology. Morphological regions. Istanbul.

Resumo

Encontrar um equilíbrio entre conservação e transformação da forma física das cidades é um desafio fundamental para o planejamento. Apoiado numa compreensão aprofundada das principais necessidades e aspirações socioeconómicas e ambientais de uma cidade e das características fundamentais da sua forma física, o planejamento físico deve fornecer um enquadramento que promova a conservação dos elementos físicos estruturantes e permita a alteração dos elementos menos persistentes. Em muitos casos, o planejamento não tem sido capaz de fornecer tal estrutura. Este artigo aborda esse problema fundamental. Argumenta-se que uma das principais razões para o fracasso é a ausência de respaldo científico para a prática de planejamento. Para lidar com esta fragilidade, o artigo propõe uma versão revista do método de regionalização morfológica. O método foi concebido por M.R.G. Conzen no início dos anos 1960 e aplicado, ao longo das últimas décadas, por vários acadêmicos em diferentes contextos geográficos e culturais. Esta versão revista do método fornece uma definição explícita e sistemática de opções e etapas processuais, um uso claro de terminologia, e uma relação robusta com a abordagem histórico-geográfica, suportando a criação de uma nova estrutura para compreender a conservação e a mudança. O método é aplicado em uma cidade com uma história urbana única, Istambul, focando-se em Fatih (península histórica).

***Palavras-chave**: Prática de planejamento. Conservação e transformação. Morfologia urbana. Regiões morfológicas. Istambul.*

Introduction

Cities are in constant transformation. While receiving a physical setting from past generations, each society adapts it to address its main needs and aspirations. This process of transformation takes place at very different scales, from the plot (for instance, a house extension) to the metropolitan area (for example, the implementation of a new transport system) (Whitehand, 2001). The process is promoted by different agents, individual or collective, acting directly or indirectly on the urban landscape (Larkham & Conzen, 2014; Vigiola, 2021). While transformation can be rather piecemeal, it can also be disruptive involving the loss of significant built heritage and important references for both collective and individual memories.

Planning should offer a framework for managing and regulating this process, conserving the most structural elements of each urban landscape, and allowing the transformation of less important elements (Larkham, 1996; Cataldi, 2016; Sjöholm & Hidman, 2020). The regulation of conservation and change (both part of the same development process) is not easy, neither has the same nature in the different parts of the city (Oliveira, 2021). In general, historical areas will need more conservation than peripheral areas. But it is crucial to acknowledge that all parts of the city should accommodate both permanence and transformation, and that policies of conservation cannot be separated from policies of change. One important aspect in this regulation is the accurate identification of the different parts of the city. If the purpose is to regulate urban form's conservation and change, the criteria for the identification of these parts should have a morphological nature, which is not always the case. In addition, the specific contents of regulation of each of these areas, defining what should be preserved and what should be transformed, should be strongly rooted in the physical characteristics of each area.

Urban conservation is an idea of modern times, developed after the French revolution (Bandarin & Van Oers, 2012). Over the nineteenth and twentieth centuries, with variations in different geographical and cultural contexts, historic monuments were the focus of conservation. While promoting the preservation of these special buildings, this conservation approach allowed, and in some cases supported, the destruction of significant parts of urban landscapes based, for instance, on health, security, and aesthetic considerations. In parallel to this dominant approach, new perspectives on conservation emphasizing the role of the urban landscape started to emerge in the early twentieth century, inspired by works of Sitte (1889), Geddes (1915) and Giovannoni (1931). In the 1960s and 1970s there were important advances, including the preparation of the Venice Charter, the creation of the International Council on Monuments and Sites / ICOMOS (and the subsequent realization of the 'Convention concerning the protection of world cultural and natural heritage' and establishment of the 'World Heritage List') and the making of the first planning documents centred on conservation – notably the Bologna plan coordinated by Cervelatti. Present debate on urban conservation includes the tension between narrow architectural perspectives (including facadism and pastiche) and a comprehensive understanding of heritage (like the historic urban landscape approach – Bandarin & Van Oers, 2012), the synergies and tensions with planning (Minner, 2016), the importance of cultural tourism in economy and the pressure of tourists (Orbasli, 2002; Nasser, 2003), and the contradiction between places that were areas of production in the past and are centres of consumption in the present, to name some of the most important.

Faced with the lack of effective frameworks to address conservation and change as part of the same development process, this paper argues for decision-making processes supported by scientific evidence, offering an understanding of why, what, and how preservation and transformation should occur. To address this problem, the paper proposes a revised version of the method of morphological regionalization (Conzen, 1960; Whitehand, 2009; Oliveira & Yaygin, 2020). This revised version offers an explicit and systematic definition of procedural options and steps, a clear usage of language and terminology, and a strong linkage to the historico-geographical body of knowledge, supporting the creation of a new framework to understand

conservation and change in the different parts of a human settlement. These improvements to the original method are expanded in the next section. The revised version of the method is applied into a unique city in Humankind's history, Istanbul – focusing particularly on Fatih (historical peninsula).

The paper is in five parts. After this brief introduction to conservation and change, the paper presents the origins and main developments of morphological regionalization, discussing the challenge of applying a method formulated in the UK into different contexts, identifying its main weaknesses, and proposing a revised version. It then provides a synthesis of the urban history and main physical characteristics of Istanbul and Fatih district, addressing its natural landscape and early settlement as Byzantion, fundamental aspects of its life as capital of the Roman, Byzantine and Ottoman Empires, and its role in the Turkish Republic. The method of morphological regionalization is then applied into the northwest of Fatih. The last part of the paper offers a comprehensive discussion of results. In addition to producing specific knowledge on Istanbul, results should be relevant for the debate on the morphological regionalization method, and to the way planning addresses conservation and change. While the relevance of the paper's main findings to planning practice is suggested, no planning application is presented in this article.

The method of morphological regionalization

The origins of the concept of morphological region and the method of morphological regionalization can be found in the seminal study of Alnwick (Conzen, 1960). Proposing a priority for the town plan as a framework for the other human-made features, linked to the site and to the past existence of the town, Conzen defines the plan unit as an individualized combination of streets, plots and block-plans of buildings in a particular area of the town, having a morphological homogeneity that is distinct from its neighbours. The concept would then evolve to the morphological region in the study of Ludlow in the mid-1970s. In Alnwick, Conzen maps a four-tier 'hierarchy' of units based just on the town plan.

It is important to address Conzen's notion of hierarchy. Firstly, he argues for a hierarchy of form complexes. The town plan contains both the building fabric and land utilization; and, in turn, the building fabric itself contains that part of land utilization that lies within it. Secondly, the historical stratification of the urban landscape, reflecting the distinctive residues of History, gives rise to a hierarchy of morphological regions. The nature and diversity of functions and the degree of historical stratification have a key influence on the number of tiers in the hierarchy of units (Whitehand, 2009). Thirdly, Conzen argues for a hierarchy of form persistence. In this context, the town plan is the most persistent; building fabric is less persistent and the land and building utilization is even less persistent. These different degrees of persistence correspond to different weights of the three form complexes in the urban landscape.

Fifteen years after publication of Alnwick, the first of two texts on Ludlow was published (Conzen, 1975, 1988). These two texts have introduced an innovative emphasis on the three form complexes, mapping morphological regions, based on the combination of town plan, building fabric and land uses. Conzen (1975) maps each of the complexes individually. Each map contains a hierarchy of units ranging from major to particular divisions of the town. The three maps together form the basis for the preparation of a fourth composite map of a five-tier hierarchy of morphological regions. The construction of this composite map was also an innovation in relation to Alnwick. In the second application to Ludlow, Conzen (1988) makes more explicit the rationale and criteria for morphological regionalization. He relates the three form complexes with the degree of form persistence and the morphological periods of the town, with the morphological constituents of historical stratification, and with their contribution to the hierarchy of morphological regions.

A comprehensive review of the main developments of the concept over the last decades is offered by Oliveira & Yaygin (2020). Bearing in mind the main goals of the paper, this section gathers two types of research works – studies that have strengthened the method through progressive systematisation and investigations that have reinforced it through application into different cultural and geographical contexts. The first type includes three studies developed in the 1990s and 2000s. The study of Worcester, by Baker & Slater (1992), offered unusual and detailed explanation of the method's application. Mainly because of the object under analysis, the medieval core of a town, building fabric and land uses were not considered. The plan units (with a focus on plots) have a two-tier hierarchy. While the main characteristics of streets and plots support the definition of the first-order regions, secondary characteristics of plots are used for the definition of second-order regions. Discussion of methodological aspects includes issues such as the scale of morphological unity and temporal change of regions. Focusing on conservation areas of Birmingham and Bristol, Barrett (1993, 1996) developed a few methodological procedures very close to Conzen (1988), paying particular attention to how the different maps of units of each of the form complexes are elaborated and then combined into a composite map. A four-tier hierarchy of regions for each area was identified: first-order boundaries correspond to the major plan units, reflecting the main stages of streets and plots evolution; second- and third-order boundaries reflecting plan changes within first-order plan units and in the boundaries of land-use and building form units; and fourth-order boundaries considering variations of building form and minor differentiations of plan. Finally, Bienstman (2007) offered a comprehensive discussion of the concept. It was the first comparative regionalization study between cities in different countries: Alkmaar, Netherlands, and Bromsgrove, UK. Bienstman described, in considerable detail, a method of regionalization like that of Conzen and Barrett, proposing a sequence of five main steps for the delimitation of a hierarchy of regions. For Alkmaar and Bromsgrove, individual maps of town plan, building fabric and land uses were prepared, informing the production of a composite map with a four-tier hierarchy of regions.

The second group of studies addresses the application of a method designed in Europe into different geographical and cultural settings. The most consistent applications of the method outside Europe were developed in Asia and Oceania, including three studies in China and one in New Zealand. The Chinese applications are framed by two major difficulties, the absence of detailed historical maps and the short life of many ordinary residential buildings. Because of this, the first comprehensive application in China, developed by Whitehand & Gu (2007a) on the walled city of Pingyao, recognized a few components for the delimitation of regions but was not able to produce a map of regions. Whitehand and his colleagues developed two other studies for Beijing and Guangzhou, focusing on conservation areas of smaller size than the historical kernel of Pinyao (Whitehand & Gu, 2007b; Whitehand et al., 2011). In both cases they were able to produce a map of regions. In Beijing, Whitehand & Gu (2007b) prepared a set of maps of plan units, building types, and land uses, acknowledging a two-tier hierarchy of regions. In Guangzhou, Whitehand et al. (2011) employed three form complexes, and identified a three-order hierarchy of morphological regions. The first and second-order of boundaries of regions consist of the plan unit boundaries, and the number of storeys is a major basis for distinguishing the third-order boundaries. The first morphological regionalization in Oceania did not find the difficulties that were faced in China. In the Auckland study, Gu (2010) offered a three-tier hierarchy of regions based on the town plan, building form and land uses. The first-order boundaries were derived from the plan type areas, representing street system, plot pattern and topographical features; the second-order boundaries were largely derived from the building types, including building heights; and the third-order boundaries reflect the pattern of land uses. Bearing in mind the readership of this journal, it is important to mention applications in other geographical contexts of the Global South, particularly Africa and South America. Morphological regionalizations have been carried out in Africa by Whitehand (2009) and AlSadaty (2021), and in South America by Spolaor (2023). Whitehand (2009) applied the method in Lusaka,

Zambia, exploring the differences between Africa and Europe in one particular type of region, the fringe belt (a higher proportion of open spaces was found in Lusaka). AlSadaty (2021) applied the method in Cairo, Egypt, exploring its potential in urban conservation and in the delimitation of boundaries for protection areas. A two-tier order of morphological regions was identified in the analysis of one part of Cairo – Bulaq Abulela. Spolaor (2023) applied the method in Salvador, Brazil, as part of a composite morphological analysis of informal settlements. The study offers a systematic reflection on the urban forms of the Global South (both informal and formal) and the Global North.

In their review paper, Oliveira & Yaygin (2020) identified three main weaknesses of the concept. The first is the absence of a strong linkage between each regionalization and the historico-geographical body of knowledge. The concept cannot be isolated from the historico-geographical framework, otherwise there is a risk that it becomes a mechanical set of rules to produce a final map. The acknowledgment of such framework will facilitate the successful use of the concept and increase the relevance of its results. The second weakness is the lack of clear usage of language and terminology in each application to facilitate the shared construction of a more robust concept. The introduction of new terms, with no significant difference in terms of contents, should be avoided, as it prejudices the robust definition of a coherent body of knowledge. The terminology of regionalizations should be clear and shared by different researchers. The third weakness is the absence of an explicit and systematic definition of procedural options and steps. If that is the case, a 'black-box' nature will prevail, making a collective learning process considerably more difficult. The explanation of the procedural aspects should include the form complexes (identification, persistence, and contribution to the hierarchy), the morphological constituents, the criteria, and the production of intermediate and final maps.

This paper proposes a revised version of the method of morphological regionalization. What distinguishes this revised version of the method? This revised version is based on a few criteria deriving from Conzen (1960)'s historico-geographical approach and his tripartite division of the urban landscape. Conzen (1960) argued that, in terms of function, the geographical character of a town or city is determined by its economic and social significance in a regional context. Morphologically, it finds expression in the urban landscape, which is a combination of town plan, building fabric and land uses (Table 1). Conzen claims priority for the town plan as it offers the framework for other man-made features and provides the physical link between these, on the one hand, and the physical site and the city's past existence, on the other hand. Acknowledging Conzen's morphological view and tripartite division of the urban landscape, the paper proposes a set of fundamental criteria (Table 2). These are as follows. The street age / expansion phases, street geometry, plot shape (area, width, depth), building block-plan, building coverage, position of building are related to the Conzenian form complex of the town plan, and contribute to all orders of regions. The building types, building height, and building materials emerge from the Conzenian form complex of building fabric, and contribute to intermediate and low orders of regions. Finally, land uses (general and detailed) contribute to the identification of intermediate order of regions. In this revised version each criterion is mapped individually and the sequence of steps of the mapping process are explicit, offering a higher precision to the identification of regions. The identification of a hierarchy and the contribution of each morphological constituent to the hierarchy are made clear. The superimposition or successive analysis (the difference will be addressed in the fourth section) of different criteria and respective maps supports the preparation of a composite map of regions.

The revised version of the method is applied into Istanbul's oldest district, Fatih (the so-called historical peninsula). Two main reasons supported the selection of Istanbul and Fatih. Firstly, the purpose was to select a city with a clearly different geographical and cultural setting in relation to the UK cities where the concept and method were conceived, contributing not only to make these more systematic (that would

be achieved independently of the case study), but also more robust, testing its limits in a different context. Secondly, Istanbul is a city with a unique urban history. For more than 1500 years, it was the capital of Roman, Byzantine and Ottoman Empires. The wars and natural events (plagues, earthquakes, fires) that have occurred throughout the city life, and the intense socioeconomic pressure felt after the mid-twentieth century, led to profound physical transformations. Today, the urban form is a complex palimpsest that is urgent to conserve for future generations – accommodating change, but resisting to narrow architectural perspectives, the pressure of tourism, and the successive transformation of areas of production into areas of consumption. Of all districts, Fatih is the one which better expresses this richness.

Table 1 – The revised version of the method and the method in other studies

The revised version of the method	The method in other studies
The identification of main criteria provides a more robust and systematic way of implementing the method, and reduces subjectivity	In most cases, a systematic set of criteria is not identified, and subjectivity is still an important issue
The preparation of the morphological regions map is based on the application of each criterion (based on form complexes), offering higher precision	The preparation of the morphological regions map is based on form complexes (and not on criteria), many times leading to less precision
The sequence of steps of the mapping process are explicit	In almost all cases, the sequence of steps of the mapping process is elusive
The individual maps of each morphological constituent (intermediate maps) are defined by simple criteria	In most cases, the production of individual maps of morphological constituents (intermediate maps) does not exist
The identification of a hierarchy and the contribution of each morphological constituent to that hierarchy are more explicit	In some cases, the identification of a hierarchy and the contribution of each morphological constituent to that hierarchy is less explicit
The use of GIS tools enables a decrease in time consumption (and an increase of objectivity)	In most cases, the regionalization is a long time-consuming process
The clarification of the method can make it more attractive to practitioners	The method has not attracted of practitioners, partially due to its inexplicit procedures

Source: Authors (2023).

Table 2 – Procedural aspects

Form complexes	Persistence	Contribution to the hierarchy (orders)	Morphological constituents	Criteria
Town-plan	Maximal	High Intermediate Low	Streets Plots Buildings	Street age / expansion phases Street geometry Plot shape (area, width, depth) Building block-plan Building coverage Position of buildings
Building fabric	Considerable	Intermediate Low	Buildings	Building types Building height Building materials
Land uses	Minimal	Intermediate	Uses	Uses – general and detailed

Source: Authors (2023).

Istanbul, Fatih and its neighbourhoods

The natural site where Byzantion (Istanbul's first name) was established is unique (Figure 1). It lies between Asia and Europe, the Marmora and Black Sea, and the Golden Horn and Bosphorus rivers. The settlement was established in the promontory on the tip of the peninsula, in the end of the Eastern Balkans, 50m above the water level. Byzantion was founded in 659 BC by the Megarans, a Greek group. With the Roman expansion in the second century BC, the city progressively lost its autonomy, and in the first century it was finally incorporated by Rome. In the late second century, Byzantion was destroyed by Septimus Severus, after the alliance of the city with one of his rivals. There are no relevant archaeological remains from the city before its destruction. Due to its geopolitical importance, Byzantion was later rebuilt.

In the early fourth century, Constantine made the city the capital of the empire, now centred in the Eastern Mediterranean. Constantinople (the second name of Istanbul) would be the capital of Roman and Byzantine empires for one millennium. Its most prosperous period as East Roman capital was between its foundation and the end of Justinian reign in the mid-sixth century. After Justinian, the city faced constant threats: external pressures from Islam, the neighbouring Balkan states, and the Catholics of the Western Mediterranean; internal religious struggles; and a set of natural events. As in the former period, Constantinople physical form would be lost in the early Middle Ages, and most of what is known about it, is based on later literary descriptions.

In the mid-fifteenth century Constantinople was captured by the Ottoman Empire – an event with a strong symbolism for both civilizations. One century after the conquest, the reign of Süleyman the Magnificent is the apogee of the Ottoman Empire. The process of modernization and westernization of Istanbul (the new name of Constantinople) started in the eighteenth century, with the 'tulip period', leading to a more extrovert lifestyle, and being strengthened in mid-nineteenth century by the 'tanzimat', a period of structural reforms of Ottoman society (Çelik, 1993; Yılmaz, 2015). In the nineteenth century, Istanbul urban form started to change: in the street patterns, leading towards higher regularity; in the scale of the building fabric, with larger building footprints; and in development control processes of residential areas and buildings.

The First World War, the occupation of the city by western allies, the war of independence, the end of the Ottoman state in 1923, and the capital transfer to Ankara was a sequence of events with a profound impact on Istanbul. In the 1930s, the first systematic attempts for spatial planning started to be developed. While the implementation of planning proposals was delayed due to the lack of resources, the rhythm and depth of city change would progressively increase over the twentieth century. This includes the profound transformation of Istanbul urban forms: the destruction of parts of the Theodosian walls; the construction of a new street pattern planned for cars; the loss of Ottoman residential architecture in the historical centre and along the Bosphorus; and the establishment of the *gecekondu* (squatter settlements) due to the high rates of population growth, particularly after the mid-twentieth century (Kuban, 2010).

Istanbul is now the home of 15 million inhabitants, distributed by 39 districts – 25 in Europe and 14 in Asia – and 963 neighbourhoods. Fatih is one of these districts. It is the home of almost 450,000 people, distributed by about 60 neighbourhoods. Fatih is the area of the imperial capital, limited by the Theodosian walls, described in the former paragraphs. While these paragraphs portray a loss of built heritage throughout Fatih life, the district is still made of unique urban forms and patterns. In the mid-1980s, UNESCO classified four areas of the city as part of the World Heritage List: an Archaeological Park, at the east limit of the Historic peninsula; the Suleymaniye quarter with Suleymaniye Mosque complex, bazaars and the buildings around it; the Zeyrek building fabric around the Zeyrek Mosque (the former church of the Pantocrator); and the area along both sides of the Theodosian land walls, including remains of the former Blachernae Palace. All these areas are in the district; the last two are in the northwest part of Fatih – the object of this regionalization. According to UNESCO, the universal value of these four areas consists in its unique integration of architectural masterpieces that reflect the meeting of Europe and Asia over many centuries, and in its skyline formed by the genius of Byzantine and Ottomans – made of Hagia Sophia, Topkapi Palace, and Suleymaniye Mosque, to name just a few. In addition, the vernacular timber housing around major religious monuments in the Süleymaniye and Zeyrek quarters provides exceptional evidence of the late Ottoman period. Yet, at the time of inscription, UNESCO recognized it as a vulnerable urban landscape. The challenge is resisting the pressure for change, conserving and strengthening the timber structures. Strategic thought is also needed for dealing with tourism, urban regeneration more widely and traffic.

This paper focuses on the northwest part of Fatih, firstly on an area including eight neighbourhoods, and secondly on a smaller area, within the first one, encompassing three neighbourhoods (Figure 1).

Despite the position of the Theodosian walls, 5km west of the original nucleus at east, for many centuries, the population gathered in the east part of the peninsula. A first reading of this western area reveals a dense street system including different patterns erected in different time periods, small street blocks and many plots per block, the coincidence between building façades and plot frontages, some variation in building height, and the presence of some special buildings (including the Zeyrek Mosque, the Fatih Mosque, and the Yavuz Sultan Selim Mosque) and the Theodosian walls. This first reading also reveals some major changes in the urban landscape, like the Atatürk Boulevard and related traffic infrastructures, dividing the historical peninsula in two parts, or the Abdülezelpasa Street, separating the city from the Golden Horn. Despite the profound transformations, this part of city has a strong urban character and identity. In this western part of Fatih, the paper will then focus on one of the four areas listed by UNESCO (around the Zeyrek Mosque) and three neighbourhoods (Cibali, Zeyrek and Yavuz Sultan Selim).

Application of the method into Fatih district

The morphological regionalization focuses on the northwest part of Fatih district. The first step of the regionalization is the identification of first-order regions in case study area 1, making explicit the main physical differences of this urban landscape. While all orders are relevant for description and explanation of urban form, the first-order regions are the most important to planning and to the definition of a morphologically based zoning. Case study area 1 is delimited by the Theodosian Walls in the west, the Golden Horn in the north, Fevzi Pasha Cd. in the south, and Ataturk Boulevard in the east (these are two fundamental streets in this area – Figure 1). After the identification of first-order regions, a smaller area is selected for more detailed morphological analysis – case study area 2 – Pantokrator-Porta Puteae (Figure 1, bottom right). Table 2 identifies the specific criteria for the morphological regionalization of Fatih, as well as the contribution of each criterion to the final definition of a morphological region – in other words, the weight of each criterion. For instance, due to their persistence, streets contribute higher that the three-dimensional aspects of buildings. Each of these criteria is mapped individually. The subsequent preparation of a composite map (the maps of first-order, second-order...) can involve: i. the superimposition of different maps (named intermediate maps in the following paragraphs), or ii. the successive analysis of different maps. While the first is mostly based on the identification of coincident boundaries in different maps, the second is mainly achieved by the delimitation of new boundaries based on the analysis of complex and diverse urban landscapes that led to distinct borders in different intermediate maps. In the preparation of intermediate maps, the analysis of some criteria (for example, plot area in Figure 5 top left) involves the classification of distinct groups according to the performance of that element of urban form (for instance, different groups according to the size of plots). The natural breaks method is adopted for that classification. Faced with different alternatives of classification, the natural breaks method was selected because classification (the distinction between 'group a' and 'group b') is not predefined, but it is established by the specificity of the sample under analysis.

First-order regions (case study area 1)

Two main criteria support the identification of first-order morphological regions in case study area 1: the phases of urban expansion (which are intimately related to the age of streets), and the geometrical arrangement of streets. The identification of streets age draws on a set of eight maps prepared by: Kauffer (1776), Muhendishane (1845), Ekrem Hakkı Ayverdi (1875-1882), Goad (1904), the 'Germans' (1913-1914), Necip Bey (1914-1918), Wofrang Müller-Wienner (1922), and Pervititch (1922-1945). A 1946 aerial photo is used in addition

to this cartographical set. Among these cartographical sources, the Kauffer map has, perhaps, the most important role (Figure 2). This is the first scientific map of the city, prepared by a French civil engineer, François Kauffer. The map is at 1:25.000 scale. It includes streets and special buildings (as well as their names).

Few streets of the late eighteenth century's urban landscape (Kauffer's map) have been conserved until the twenty-first century. The three maps of the nineteenth and early twentieth century represent one morphological period. The three following maps represent another morphological period. Pervititch (1929) is representative of the republican era. The aerial photo of 1946 includes two new main axes, delimiting the study area at south and west. Based on this set of historical maps, a map of streets age is produced (Figure 3, top left). Based on this identification of streets age, an intermediate map is prepared (Figure 3, top right).

Case study area 1 is then analysed according to the geometrical arrangement of streets. This criterion corresponds to how a street system is organized to support the main urban flows. Three main types of street pattern are identified in the case study: gridiron, loose grid, and dead ends (Figure 3, bottom right).

The composite map of first-order morphological regions is obtained through the superimposition of these two intermediate maps – age of streets and streets geometry (Figure 4, based on the overlap of Figure 3 top right and Figure 3 bottom right). This composite map reflects the fundamental differences in the town plan of the northwest part of Fatih. Ten morphological regions are identified: Constantine-Valens Aqueduct, Ayia Theodosia, Pantokrator-Porta Puteae, Yavuz Sultan Selim Road, Balat-Ahrida Temple, Ebu Zerr el-Gifari, Palatium Constantini (Constantine Palace), Draman Road, The Ecumenical Patriarchate, Pammakaristos-Panagia Vlaherna (Table 3). The regions' names are related to extant special buildings (like monasteries, churches, palaces, and temples) and streets, somehow capturing the spirit of the place.

Table 3 – Characteristics of first-order morphological regions

Regions	Street age / expansion phases	Street geometry
Constantine-Valens Aqueduct	1913-1922	Loose grid (dense)
Ayia Theodosia		
Pantokrator-Porta Puteae	1845-1904	Dead ends
Yavuz Sultan Selim Road	1929	Loose grid
Balat-Ahrida Temple	1845-1904	Gridiron
Ebu Zerr el-Gifari		
Palatium Constantini	1845-1904	Loose grid
Draman Road	1845-1904	Loose grid / Dead ends
The Ecumenical Patriarchate	1776, 1845-1904	Dead ends
Pammakaristos-Panagia Vlaherna		

Source: Authors (2023).

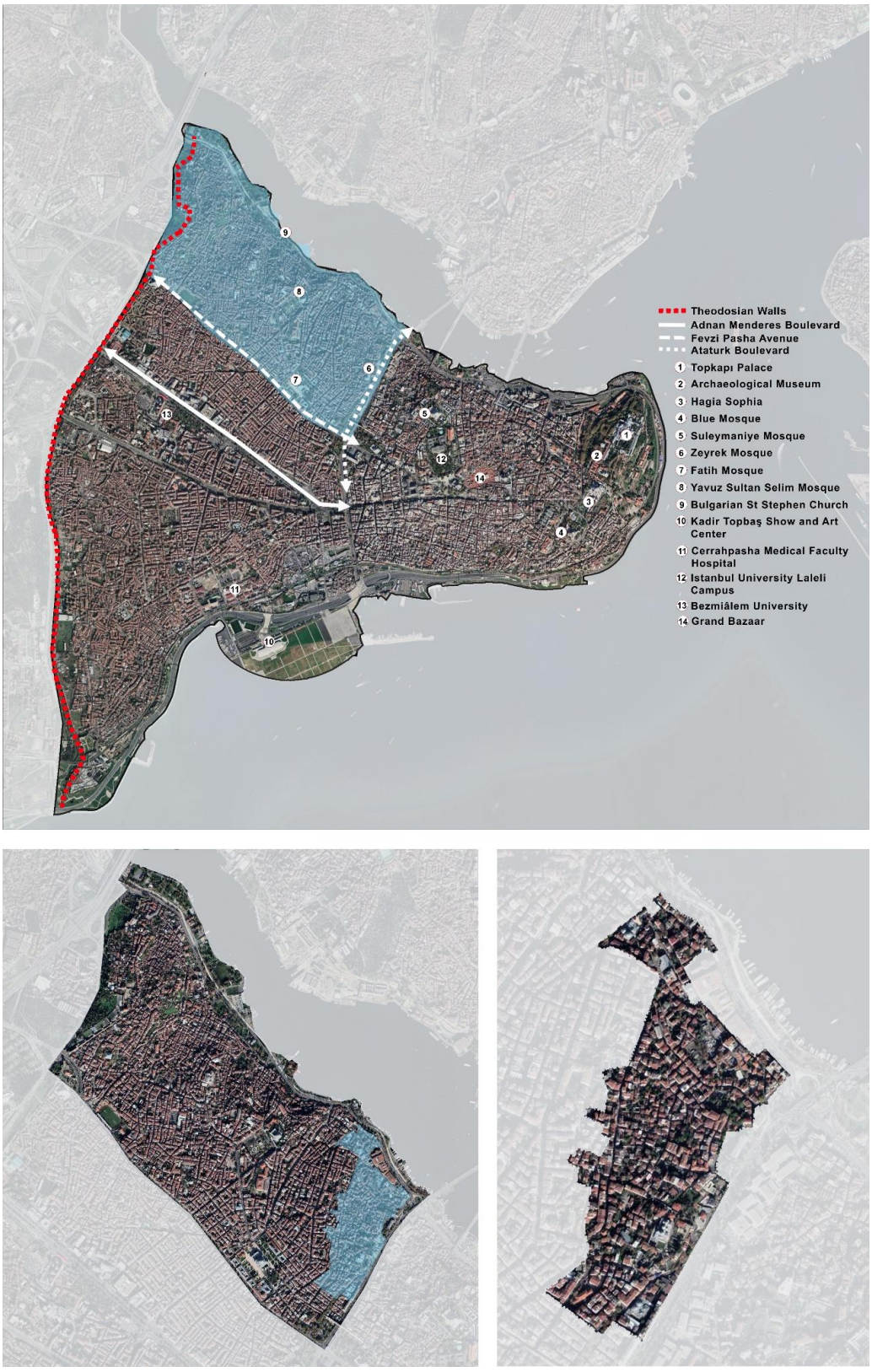

Figure 1 – Fatih district (top), case study area 1 (bottom-left) and case study area 2 (bottom-right). Source: Google Earth (2021).

Figure 2 – Kauffer map, 1776. Source: IBB, Istanbul Metropolitan Municipality, Archive.

Figure 3 – Age of streets (up left), regionalization based on the age of streets (up right), regionalization based on geometrical arrangement of streets (bottom right), and streets name (bottom left). Source: Authors (2023).

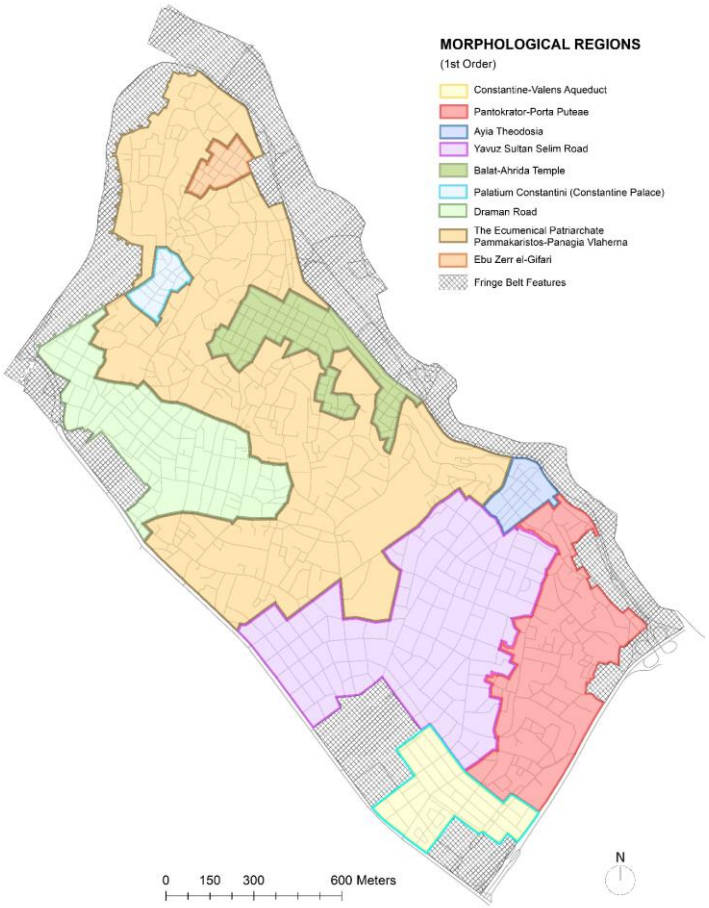

Figure 4 – First-order morphological regions. Source: authors.

Second-order regions (case study area 2)

The Pantokrator-Porta Puteae region (including one area that is part of the World Heritage List) is selected as case study 2 within case study 1 (Figure 1, bottom right) to continue exploring the existing morphological differences at a lower level of analysis. Plot shape and land uses are the two criteria supporting the identification of second-order regions. Plot shape includes the consideration of plot area, width, and depth. Three intervals, based on the natural breaks' method, are used to produce the three maps of plot area, width, and depth (Figure 5). Plot area is classified as small, medium, and large. Small and medium plots correspond mainly to residential and commercial functions. Large plots are mainly fringe belt features (the fringe belt is a belt-like zone originating from the temporarily stationary or slowly advancing fringe of a town and it is composed of a characteristic mixture of land use units initially seeking peripheral location – Conzen, 1960). Plot width is classified as narrow, medium, and large. Narrow and medium frontages mainly consist of residential uses. Large frontages include mainly fringe belt features, and rarely commercial utilization. Finally, plot depth is classified as short, medium, and long. The longest plots have residential and commercial uses. Fringe belt features commonly correspond to medium depth.

The identification of land uses is based upon information received from Istanbul local authority and field work carried out in March 2019. Case study 2 includes a wide range of functions, from advertising agencies, automotive services to residential, commercial, and social uses. This wide range is then grouped into broader classification types, as follows: commercial, housing, fringe belts (educational, institutional, and religious), and warehouses – Figure 5 bottom right and Figure 6. Commercial uses are mainly around Atatürk Boulevard (mostly new constructions) and the Golden Horn.

The preparation of the second-order regions' map results from the superimposition (as in the first-order regions' map) of plot shape and land uses maps (Figure 7 is based on the four maps of Figure 5). In the production of the second-order regions' map (Figure 7), plot area and width, and land uses had a high contribution for the identification of second-order regions. The contribution of plot depth is more reduced due to its high diversity in the area under analysis (and the subsequent difficulty of delimiting regions). Figure 7 represents nineteen second-order regions. Three of these are commercial regions, nine are residential regions, and seven are fringe belt features. The name of these regions is related to plot size and land uses. The main characteristics of the second-order regions (justifying the existence of each of these as a specific region) are presented in Table 4.

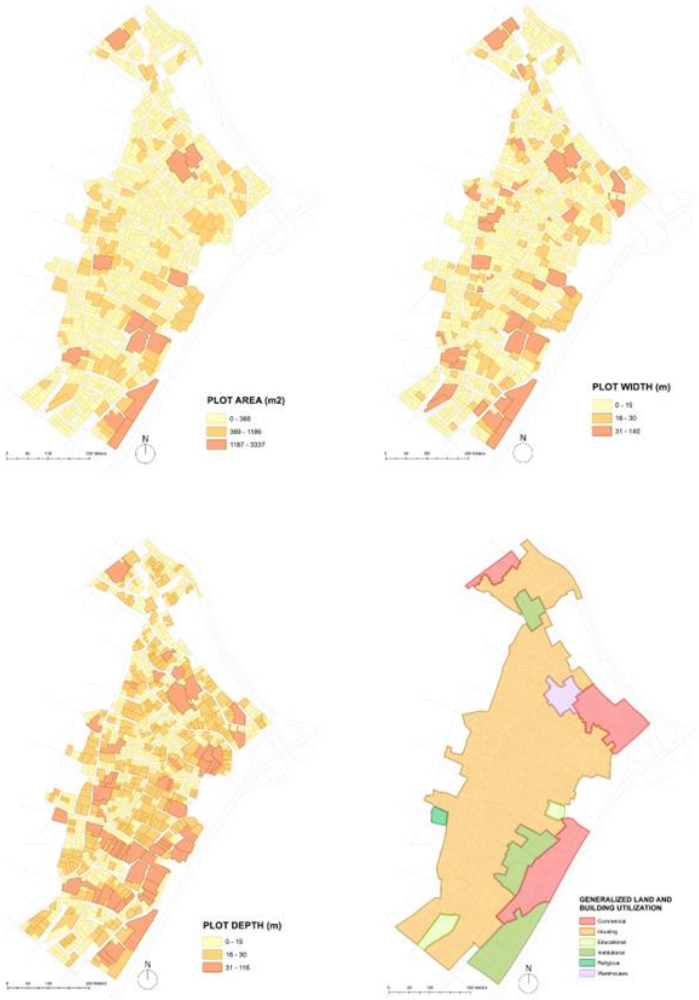

Figure 5 – Plot shape – area (top left), width (top right), and depth (bottom left) – and land uses (bottom right). Source: Authors (2023).

Figure 6 – Different building uses: commercial, educational, religious, and residential. Source: Authors (2023).

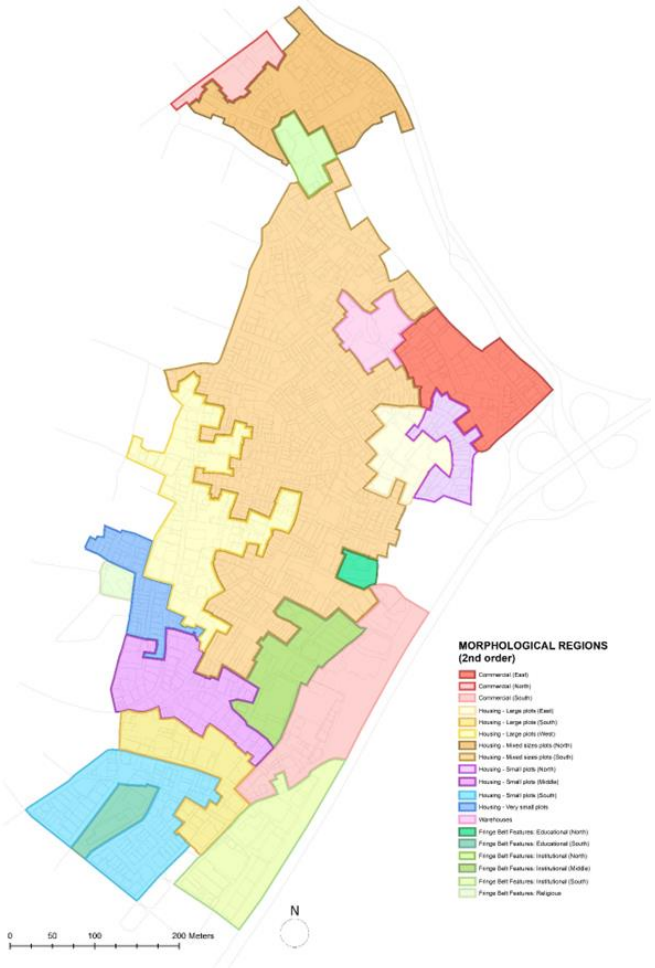

Figure 7 – Second-order morphological regions. Source: Authors (2023).

Table 4 – Characteristics of second-order morphological regions

Regions	Plot layout			Land and building utilization
	Area	Width	Depth	
Commercial (North)	Large	Large	Long	Commercial
Commercial (South)	Large, small	Medium, Narrow	Long	
Commercial (East)	Large, small	Large, Narrow	Medium, Short	
Housing - Large plots (East)	Medium	Medium	Long	Housing
Housing - Large plots (South)	Medium	Medium	Long, medium	
Housing - Large plots (West)	Large	Medium	Long, medium	
Housing - Mixed sizes plots (North)	Mainly small	Narrow	Medium, short	
Housing - Mixed sizes plots (South)	Mainly small	Medium, Narrow	Long, Medium, short	
Housing - Small plots (North)	Small	Narrow	Medium	
Housing - Small plots (Middle)	Small	Narrow	Medium, short	
Housing - Small plots (South)				
Housing - Very small plots	Very small	Narrow	Short	
Warehouses	Large	Large	Long	Warehouses
Fringe Belt Features: Educational (North)	Large	Large	Long	Educational
Fringe Belt Features: Educational (South)	Medium	Large	Medium	
Fringe Belt Features: Institutional (North)	Medium	Medium	Long	Educational, Institutional
Fringe Belt Features: Institutional (Middle)	Large, medium	Large	Long, medium	Religious, Educational, Institutional
Fringe Belt Features: Institutional (South)	Large	Large	Long, medium	Religious, Institutional
Fringe Belt Features: Religious	Medium	Medium	Long	Religious

Source: Authors (2023).

Third-order regions (case study area 2)

The fundamental criteria for the identification of third-order regions are plot shape, building coverage, building types, and land uses. The map of building coverage offers a threefold classification of building intensity on plots, based on three intervals. Most plots of the area have high building coverage, Figure 8.

The map of building types was prepared by the authors based on the main characteristics of buildings in case study 2 (as there is no classification of this topic for Istanbul). The map includes seven building types (Figure 8, top right): single-family buildings, single-family buildings with bay window, single-family buildings with bay window (Ottoman), multi-family buildings, bath (Ottoman), mosque and, finally, other buildings (see Figure 9 for photographs of the building fabric).

Pantokrator-Porta Puteae is a very diverse area, particularly, in terms of building fabric, resulting from a set of profound transformations developed over time. As such, the identification of third-order regions is not straightforward. Instead of the superimposition of intermediate maps, developed for the first-order and second-order's composite maps, the preparation of a composite map of third-order regions involves the successive analysis of intermediate maps as follows. Firstly, the building coverage map is analysed (very homogeneous, giving a medium contribution for the identification of regions); then the land uses map (high contribution) and plot shape map (low contribution); and, finally, the building types map (high contribution). If compared to the potential weight of each criterion established in Table 2, there is a substantial difference for land uses and building types. Both have a higher contribution in the Istanbul application, due to the complexity and diversity of urban form of the Turkish city.

The application of these criteria led to the division of second-order regions into third-order regions. In Figure 10, second-order regions are tagged in Roman numbers, and third order regions are tagged in Arabic numerals. In the case of non-divided second-order regions (Warehouses, Educational North, Educational South, and Religious) only Roman numbers are included. The region 'housing – mixed size plots south' has a profound differentiation in terms of building type characteristics. Its division lays mainly on that basis. The divisions of regions 'housing – small plots north' and 'housing – very small plots' are based on building type features.

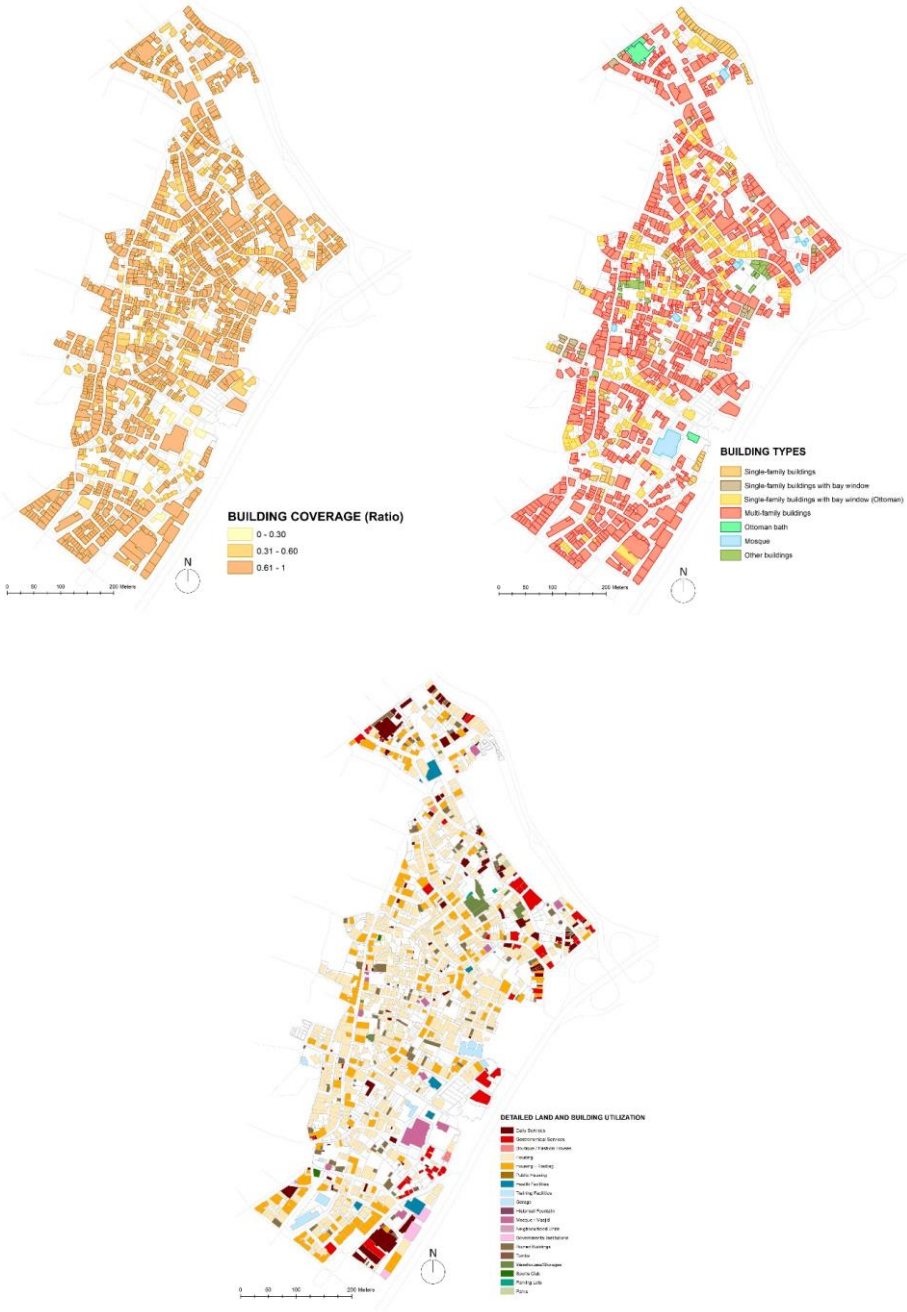

Figure 8 – Building coverage (top left), building types (top right), and detailed land uses (bottom). Source: Authors (2023).

Figure 9 –. Single-family buildings with bay window – Ottoman (top left), single-family buildings (top right), single-family buildings with bay window (bottom left), multi-family buildings (bottom right). Source: Authors (2023).

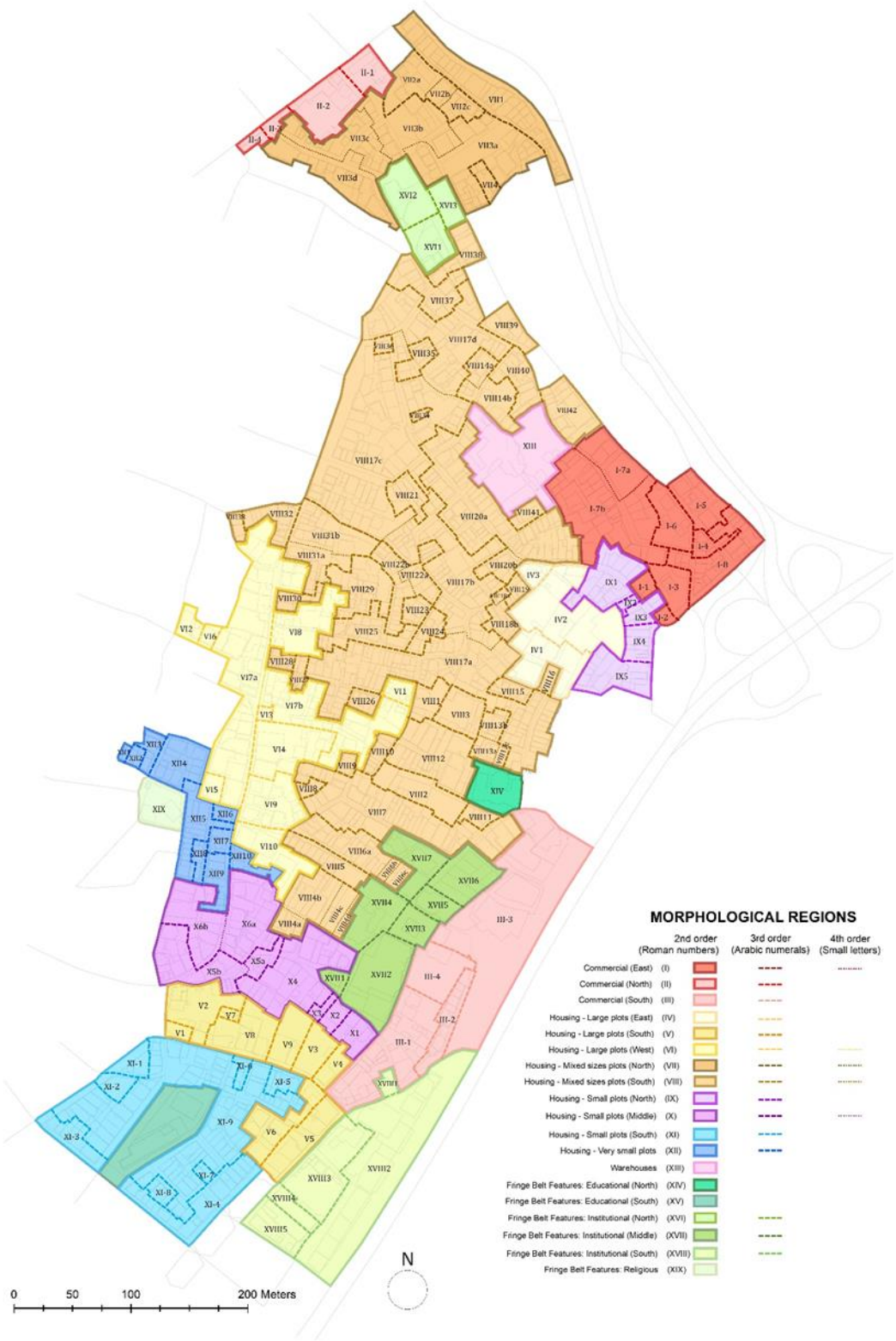

Figure 10 – Morphological regions: second-, third- and fourth-orders. Source: Authors (2023).

Fourth-order regions (case study area 2)

The identification of fourth-order regions is based on building materials and height. The first intermediate map includes four building materials: timber, concrete, masonry, and stone (Figures 11 and 12). Most structures in Pantokrator-Porta Puteae are masonry buildings. Timber and concrete buildings have a similar distribution in the area. There are only a few buildings made of stone – the most important is the Ottoman bath.

The second map, devoted to building height, includes eight classes, from 1 to 8 storeys. Most buildings in the case study area are 1 to 3 storeys. The area also includes 4 and 5 storeys buildings; buildings of 5 or more storeys have a reduced presence in the area (Figures 11 and 13).

As in third-order regions, instead of the superimposition of intermediate maps of building materials and height to prepare the composite map of fourth-order regions, the two intermediate maps are successively analysed. This is mainly due to the very complex characteristics of the area. The maps of building materials or building heights do not lead to exact boundaries, for each material or each storey interval. Building materials have a stronger contribution to the identification of regions than building height (more diverse). In Figure 10, fourth-order regions are tagged in small letters. Based on building materials and height, five third-order regions are subdivided into fourth-order regions. These are commercial (east), housing - large plots (west), housing - mixed sizes plots (north), housing-mixed sizes plots (south), and housing-small plots (middle). The regions of housing - mixed sizes plots (north) and housing - mixed sizes plots (south) have a strong diversity in terms of material and height.

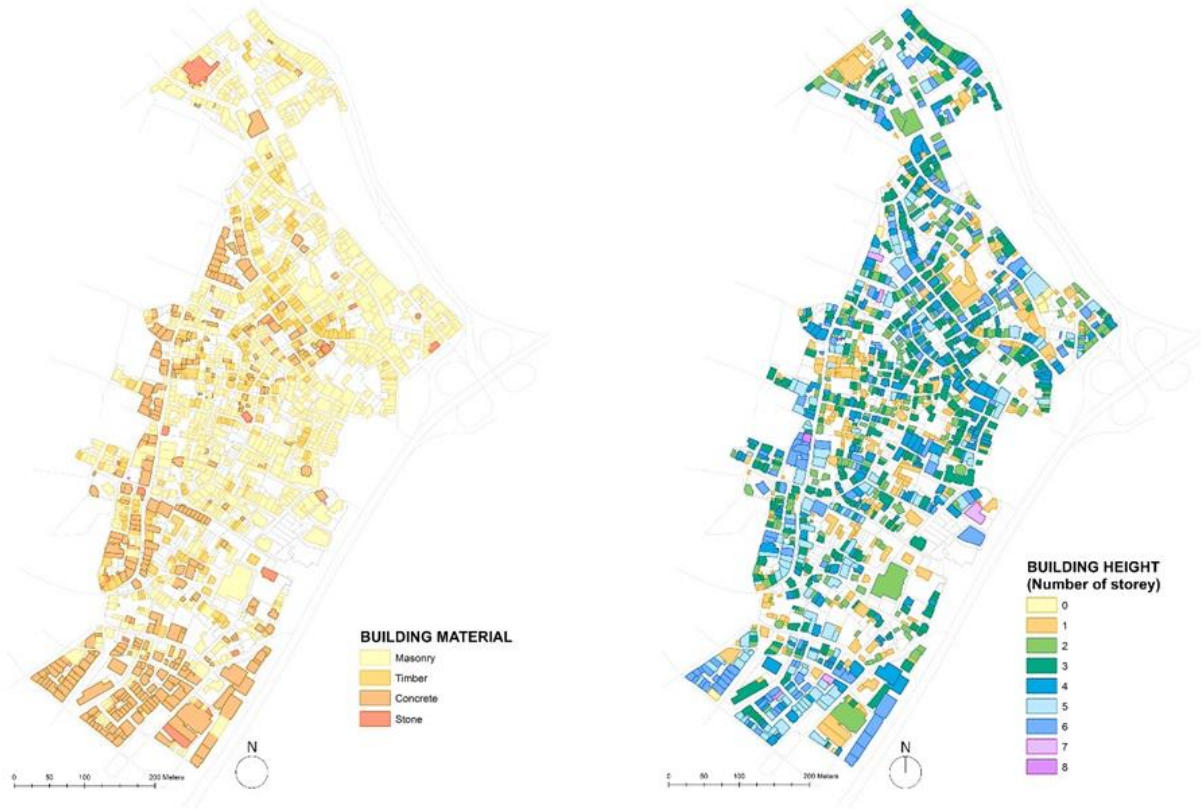

Figure 11 – Building materials (left) and height (right). Source: Authors (2023).

Figure 12 – Buildings materials: concrete (top left), masonry (top right), timber (bottom left), and stone (top right). Source: Authors (2023).

Figure 13 – Buildings height. Source: Authors (2023).

Discussion

Some fundamental weaknesses of previous morphological regionalizations have been listed early in this paper. These include the lack of explicit and systematic definition of procedural options and steps, and an unclear usage of language and terminology in each application – something that would facilitate the shared construction of a more robust method. The paper has also identified a few studies that have tried to address these weaknesses, including Conzen (1988), Baker & Slater (1992), Barrett (1993) and Biestman (2007). A second group of studies of great relevance for this paper, as applications of the method into diverse cultural and geographical contexts, is constituted by Whitehand & Gu (2007b), Whitehand et al. (2011), Gu (2010), Whitehand (200), AlSadaty (2021) and Spolaor (2023).

This paper aims at moving the morphological regionalization method one step further. The morphological assessment of the northwest part of Fatih led to the delimitation of a hierarchical order of regions, based on the analysis of town plan, building fabric and land uses. The town plan has proven to be of major significance, confirming its role as a major contributor to the structure of the urban landscape (as stated in literature and in Table 2). Land uses were the secondary contributor, which is not always the case – this is justified by the complexity and diversity of Fatih's urban landscape.

The application into Fatih shown that the production of a composite map of regions is not always provided by the superimposition of intermediate maps. This is mainly due to the complex and diversified urban form of the area. The dominance of traditional patterns of combination of urban form elements (as opposed to urban landscapes framed by the garden-city or modernist models) led to non-utilization of two of the ten criteria, building position in the plot and building block-plan, as these would not reveal significant differences. Compared to some European applications of the method, the Fatih application seems more difficult and less straightforward, due to the presence of distinct layers of urban form produced in different historical periods. Contrarily to the application in China described in section 2, the Fatih application did not find significant obstacles, in terms of data.

A map of first-order morphological regions, mainly based on the town plan (as the map in Figure 4), can be the basis to produce a map of planning zones as a key tool to urban landscape management, enabling the definition of regulations for the design of new forms with a strong relationship with extant urban forms. Each zone in the zoning map should then be addressed in terms of what must be conserved and what can be transformed (mainly driven by population growth and tourism pressure), and of how this transformation can occur. This process for the definition of specific rules for transformation can be supported by lower-order regions. For instance, the second-order regions (Figure 7) make explicit what are the fundamental characteristics of plots in northeast Fatih – a crucial element for the historico-geographical approach (Conzen, 1960) that is usually undervalued by planning and, sometimes, by evidence-based design approaches (Gehl, 2011). All these issues are of great relevance for spatial planning, particularly for Turkish planning (and many countries in the Global South) where regulations are very generic and do not acknowledge the specific character of each urban landscape. Furthermore, urban regeneration projects many times contribute for the destruction of unique built heritage; reconstruction and rehabilitation projects tend to lack scientific support; and mainstream practice does not consider the perspectives and strategies of a wide number of agents.

Conclusions

The contribution of this paper to literature is threefold. Firstly, it addresses the challenge launched by Oliveira & Yaygin (2020) to improve the method of morphological regionalization by making its procedural options and steps more explicit and systematic (including the key task of map preparation supported

by specific criteria, and the fundamental notion of hierarchy), using clear language and terminology, and establishing stronger linkages to the historico-geographical body of knowledge.

Secondly, the paper explores the method contribution to understand conservation and change, as part of the same development process. The method application into different levels, identifying four orders of morphological regions offers a detailed description and explanation of the urban landscape that can also be used for prescription. As discussed in the end of the last section, the method can be used to support planning practice, to inform the design of zoning maps, based on urban form and not on land uses (usually for segregation purposes).

Thirdly, in addition to these 'general' contributions to the method of morphological regionalization (conclusion 1) and to planning and the debate on conservation and change (conclusion 2), the paper offers 'particular' insights into the historico-geographical structure of the urban landscape of the northwest part of Fatih. While the universal value of some of these areas are acknowledged by UNESCO, this morphological regionalization makes evident what is the contribution of each element of urban form – streets, street blocks, plots, common buildings, and special buildings – for the overall character and identity of northwest Fatih.

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Data availability statement

The dataset that supports the results of this paper is available at SciELO Data and can be accessed via https://doi.org/10.48331/scielodata.3H60AH.

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