


Article

Shaping Sustainable Cities: A Long-Term GIS-Emanated Spatial Analysis of Settlement Growth and Planning in a Coastal Mediterranean European City

Ioannis Vardopoulos ^{1,2,3,*} , Sophia Ioannides ⁴, Marios Georgiou ⁵, Irene Voukkali ³ , Luca Salvati ^{6,*} and Yannis E. Doukas ⁷

- ¹ Department of Regional and Economic Development, School of Applied Economics and Social Sciences, Agricultural University of Athens (AUA), 33100 Amfissa, Central Greece, Greece
 - ² School of Environment, Geography and Applied Economics, Harokopio University (HUA), 17676 Kallithea, Attica, Greece
 - ³ Laboratory of Chemical Engineering and Engineering Sustainability, Faculty of Pure and Applied Sciences, Open University of Cyprus (OUC), Latsia, 2231 Nicosia, Cyprus
 - ⁴ Independent Researcher, 10673 Athens, Attica, Greece
 - ⁵ Independent Researcher, 2677 Nicosia, Cyprus
 - ⁶ Department of Methods and Models for Economics, Territory and Finance, Faculty of Economics, Sapienza University of Rome, 00161 Rome, Italy
 - ⁷ Department of Agricultural Development, Agri-Food and Natural Resources Management, School of Agricultural Development, Nutrition and Sustainability, National and Kapodistrian University of Athens (UoA), 34400 Psachna, Evia, Greece
- * Correspondence: ivardopoulos@post.com (I.V.); luca.salvati@uniroma1.it (L.S.)

Abstract: European cities have experienced rapid (and often conflicting) transformations that include, inter alia, the environment, the economy, society, climate change, and access to affordable housing, with implications for their future development. In order to address such issues, assessing the current situation of European metropolises is crucial to understanding new urban development models. In light of these dynamics, our study focused on urban expansion in Pafos, Cyprus, between 1993 and 2021. Such dynamics were examined through photointerpretation (using kernel density estimation) via the ArcGISPro spatial analyst tool. The empirical results of this analysis are considered particularly insightful, especially those regarding urban sprawl and its implications for future land management for the study area, and could help toward shaping specific policies to guide cities towards sustainable and environmentally friendly development. The analysis reveals a gradual increase in settlements over time (55%), although the rate of growth has decreased in recent years, as a consequence of the economic crisis. Density maps revealed varying levels of urban concentration density, highlighting the presence of high-density settlement cores downtown and low-density, dispersed settlements in the surrounding districts. According to the empirical findings of this study, urban growth in Pafos features fragmented development patterns with scattered building landscapes and large empty spaces. To address the challenges of urban sprawl in the study area, specific actions are proposed to promote sustainable urban development and mitigate its negative impacts. By examining Pafos building/settlement development and urban planning, stakeholders can gain valuable insights and implement viable solutions for the future. This study contributes to the evolving discourse on urbanization, its characteristics, causes, and consequences, and highlights the importance of the “compact city” model as a counterforce to urban sprawl and a pathway to sustainability.

Keywords: urban sustainability; urban sprawl; spatial analysis; urban planning; regional planning; land use; housing development; urban density



Citation: Vardopoulos, I.; Ioannides, S.; Georgiou, M.; Voukkali, I.; Salvati, L.; Doukas, Y.E. Shaping Sustainable Cities: A Long-Term GIS-Emanated Spatial Analysis of Settlement Growth and Planning in a Coastal Mediterranean European City.

Sustainability **2023**, *15*, 11202.
<https://doi.org/10.3390/su151411202>

Received: 24 June 2023
 Revised: 13 July 2023
 Accepted: 14 July 2023
 Published: 18 July 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

According to the OECD Secretary-General [1], the future development of cities will determine progress in crucial areas such as the environment, economy, society, climate

change, and access to affordable housing. Throughout the 21st century, European citizens have witnessed rapid and conflicting land-use change shaping urban landscapes both within and outside cities like never before [2,3]. Housing development in European cities has been a significant issue since the beginning of the century [4,5]. Based on these premises, it is appropriate to assess the current growth path of European metropolises hosting the majority of their countries' population and recognize the impact of urban development models on socioeconomic development [6]. This analysis will contribute the establishment of policies guiding cities towards sustainable and environmentally friendly development [1,7].

From this perspective, urban expansion in Pafos (Cyprus) from 1993 to 2021 was explored focusing on the physical causes of settlement growth [8], such as population increase [9], economic expansion [10,11], trends in the spatial concentration of activities and specific land use [12], and the provision of urban planning [13,14]. The study employed ArcGISPro, a spatial analysis tool (www.pro.arcgis.com), to visualize and investigate Pafos' long-term urban development. This approach enables the assessment of key urban sprawl indicators identified in the 2018 OECD report [1], providing valuable insights into metropolitan evolution and its implications for the future management of cities and regions.

2. Unraveling the “Sprawl Conundrum”: The Compact City Promise and the New Paths to Sustainable Urbanization

The notion of “sprawl” indicates phenomena related to city development, urbanization, and processes of urban transformations. Cervero (1997) remarked that “urban sprawl is difficult to define, but you know it when you see it”, often referring to sprawl as mostly unaesthetic and uneconomic settlement forms [15]. The concept of urban sprawl was first mentioned by Draper in 1937 during an American Planning Association conference [16,17]. In the United States, sprawl was recognized in the late 1950s as the conversion of rural areas into industrial, residential, and commercial development [18]. Whyte's book, published in 1958, provides one of the earliest official scientific reports on the subject [19]. Over the past six decades, scholars have carried out extensive studies on urban sprawl, resulting in a vast body of literature that explores its definitions, causes, and consequences [20–24]. While there is a plethora of definitions available, there is no universally accepted one within the scientific community. Nevertheless, there is a general consensus among scholars regarding the fundamental dimensions of this intricate phenomenon [8,25,26], although this term still generates some controversy and confusion [27,28]. Chin [29] acknowledged that sprawl serves as a hegemonic concept encompassing a broad spectrum of urban forms. This understanding has led to the development of an interesting morphological typology that differentiates sprawl based on its land use, economic outcomes, and density [30]. Consequently, sprawl cannot be regarded as a distinctive settlement form, representing instead a sort of metropolitan continuum, spanning from semi-compact development to fully dispersed patterns of urban growth [31]. Harvey and Clark (1965) [32] identified three types of “ideally natural” models of sprawl: low density, linear development (ribbon development), and discontinuous development (leapfrog development).

The Transportation Research Council [33] delineated the characteristics of sprawl in relation with land use, arguing that it is challenging to distinguish urban sprawl from a more compatible form of urban development from all the pillars of sustainability, namely the environment, society, and economics [34]. Consequently, no universally accepted definition of sprawl based on land use exists, limiting a truly comprehensive understanding of the phenomenon [35–37]. Regarding the definition of urban sprawl based on its impacts, it is grounded in the notion that the physical extent of urban expansion serves as a direct measure of the phenomenon [36,38,39]. Ewing [38] specifically asserted that the restricted accessibility to relevant land use and the absence of functional open spaces offer an effective means to define urban sprawl. Sprawl is precisely defined as a development pattern characterized by restricted accessibility between interconnected land patches, resulting from dispersed development and uniform land-use patterns [40]. Density, as a fourth

defining characteristic, is particularly variable as it is not uniformly defined, e.g., in the United States and England, due to different spatial perspectives and approaches. Chin's attempt [29] to utilize density as a defining criterion for categorizing various types of urban sprawl underscores this variability. Furthermore, Bruegmann [41] (p. 17) contributed to another valuable aspect by linking the phenomenon of sprawl to the influence of economic development. He highlights that "dispersal is considered the preferred residential pattern globally, particularly in regions with relative economic prosperity, where residents possess the autonomy to choose their desired level of consumption within an urban setting". However, the author also concurs with the aforementioned characteristics of sprawl, stating that it is characterized by low density, dispersed development, and a lack of land-use prediction or planning [40] (p. 18).

As previously mentioned, the concept of sprawl is considered elusive [4]. In their study, Maier, Franz, and Schröck (2006) [42] focused on quantitative measures of urban sprawl. However, they concluded that sprawl is a multidimensional phenomenon, making its measurement a challenging task. Even if we were able to measure its various dimensions, the interpretation of these measures presents an even greater challenge. To address this issue, the 2018 OECD report [1] identified seven indicators (Table 1) of urban sprawl, which were calculated for over 1100 urban areas in 29 OECD countries at three different time points: 1990, 2000, and 2014. These indicators allow for a complete monitoring of sprawl over time and space, providing stakeholders with valuable insights to make informed decisions regarding the need for policy actions that promote economic growth, environmental sustainability, and social inclusion.

Table 1. Indicators of urban sprawl and their description in full [1].

Indicator	Description
Average population density	The average number of inhabitants in a km ² of land, urban area
Population-to-density allocation	The share of population living in areas where population density is below a certain threshold (e.g., 1500 inhabitants/km ²)
Land-to-density allocation	The share of urban footprint of areas where population density lies below a certain threshold (e.g., 1500 inhabitants/km ²)
Variation of population density	The degree to which population density varies across the city
Fragmentation	The number fragments of urban fabric per km ² of built-up area
Polycentricity	The number of high-density peaks in an urban area
Decentralization	The percentage of population residing outside the high-density peaks of an urban area

2.1. Policies toward the "Compact City" as a Response to Urban Sprawl

In recent decades, the concept of the "compact city" has (re)emerged as a response to the challenges posed by urban sprawl [43,44]. This term has become popular in the urban planning literature, particularly in studies specifically pertaining to the future (development) of European cities. It is widely regarded as a well-crafted approach to fostering sustainable development in metropolitan areas, taking into consideration the economic, social, and environmental ramifications associated with urban sprawl [45]. On the one hand, according to Burton (2000) [46], land-use diversification, an efficient public transportation system, and infrastructures that encourage pedestrian and bicycle mobility, as well as population growth, are all characteristics of compact cities. This approach offers the potential to tackle various issues associated with urban sprawl by emphasizing intensified urban development within existing city boundaries and minimizing the need for expanding into rural areas. Hence, a compact city represents a comprehensive process that prioritizes the optimal use of available land (e.g., brownfields) before considering new developments on (e.g., greenfield) rural land, thereby addressing the unsustainable aspects of metropolitan growth [47]. On the other hand, according to Burgess [48], contemporary approaches to the compact city entail the expansion of built-up space and residential densities to achieve intensified development of economic, social, and cultural activities within urban areas. This

strategy involves concentrating urban functions and strategically manipulating the size, form, and structure of settlements to achieve global environmental and social sustainability advantages. Furthermore, as noted by Næss [49], the fundamental objective of the compact city model is to meet future development requirements by increasing population densities within the existing and defined urban area.

Contrary to common perceptions, higher-density settlements are characterized by enhanced social viability [46]. This is primarily attributed to the equitable distribution of products and services within these areas, as well as the ability to effectively maintain local amenities and facilities [50]. The compact city model establishes social sustainability by emphasizing the importance of high density for the city's internal functions to thrive. In essence, high density is a fundamental prerequisite for ensuring the vitality of the compact city [51]. The contemporary vision of a compact and sustainable city necessitates a fundamental departure from monocentric development and the overreliance on automobile transportation [52]. It calls for a design approach that fosters thriving communities and promotes enhanced mobility, all while reducing dependence on private car usage [53]. Instead, the focus is on fostering clean mass transportation systems and pedestrian-oriented networks to facilitate efficient movement and accessibility within urban environments [54]. The design of a compact city revolves around the establishment of vibrant social and commercial hubs that serve as focal points for community engagement and transportation connectivity [55]. These hubs act as catalysts for the development of thriving neighborhoods and communities. Within the compact city framework, neighborhoods are delineated with clear boundaries, and each possesses its own designated public spaces that cater to specific public and private activities [56]. The expansion and thoughtful shaping of public spaces are prioritized, aiming to create a welcoming and secure environment that promotes citizen safety and nurtures social interactions [57]. The concept of the compact city encompasses several key objectives, including well-defined boundaries, high population density, mixed land use, limited agricultural land consumption, sustainable management of natural resources, pollution reduction, energy efficiency, decreased reliance on private vehicles, and promotion of additional means of transportation—among them mass transit, cycling, and walking [57–59]. Furthermore, it is crucial to highlight the significant aspects of public health, economic prosperity, and the eradication of social segregation as integral components of this concept [58,60–62].

2.2. Towards Sustainable Cities: Balancing Growth, Ecology, and Livability

Cities in developed regions are now acknowledged as contributors to environmental predicament [63]. However, they are also recognized as pivotal agents in advancing the global objective of sustainable development [64]. The Brundtland Commission, convened by the United Nations in 1987, defined “sustainable development” as a form of progress that meets present generation needs while safeguarding the ability of future generations to meet their own requirements [65,66]. Similarly, Christensen [67] posited sustainable development as a paradigm that ensures the preservation of natural systems, which serve as the fundamental underpinning of human well-being, by securing favorable conditions for life and requisite productive foundations [68]. Sustainable development entails the implementation of developmental and environmental policies based on cost–benefit analyses and rigorous economic evaluations, thereby reinforcing environmental conservation and fostering enduring and escalating levels of prosperity [69–72].

Costa, Silva, and Ramos (2005) [73] further defined the concept of sustainable development as a set of processes that guarantee the integrity of socioenvironmental equality, and optimal performance within the economic sphere. Moreover, it is argued [74] that a sustainable city encompasses efficient land management, enhanced organization of productive activities, robust transportation systems, infrastructural development, and the judicious use of existing elements, thereby taking the form of a compact city rather than uncontrolled sprawl [75]. A sustainable city is structured in a manner that enables its inhabitants to meet their needs and enhance their well-being without jeopardizing the natural environment or compromising

the livelihoods of fellow human beings, both in the present and the future [76,77]. The key goals of a sustainable city encompass poverty reduction through job creation [78], ensuring adequate housing [79], crime prevention [80], and the promotion of social justice [81]. Additionally, these goals encompass social diversity [82], fostering of agricultural pursuits [83], infrastructural enhancements [84], and the provision of water and energy supplies [85,86]. Further objectives involve waste recycling and reuse [87], environmental protection and restoration [88], and the enhancement of transportation and communication systems [89]. The design and use of innovative technology [90], participatory governance [91], and sustainable design [92] also featured prominently in the pursuit of sustainable development. Advocates of the sustainable city theory [63] contend that by optimizing land use [93], promoting mixed soil exploitation [94], and establishing an efficient transportation infrastructure [95] while simultaneously ensuring sufficient and decent housing [96], challenges such as urban sprawl and rapid urbanization can be effectively tackled [37,97]. Consequently, urban planners and developers have increasingly embraced this theory, exerting influence on local authorities and governments to prioritize and redirect public investments, particularly toward rural areas and environmental conservation efforts [14,74,98].

3. Methodology

3.1. Study Area

Pafos, situated in the western part of Cyprus, is one of the six administrative divisions of the island (Figure 1). It shares its northern border with Nicosia and its southern border with Limassol. Spanning an estimated area of 1393 km², it ranks as the third largest administrative division in Cyprus. Pafos encompasses approximately 15% of the total land area of Cyprus and is under the full administration of the Republic of Cyprus. The Pafos administrative division is further divided into 121 communities and 4 municipalities: Pafos, Geroskipou, Pegeia, and Chrysochous.



Figure 1. (Left) The Republic of Cyprus located on a map of the EU/World. Orange color denotes the Turkish-occupied territory of the Republic of Cyprus following the 1974 Turkish-occupied territory of the Republic of Cyprus. Source: JLogan, CC BY-SA 4.0, via Wikimedia Commons. (Center) Location (in red color) of Pafos District in Cyprus. Source: TUBS, CC BY-SA 3.0, via Wikimedia Commons. (Right) Pafos Municipality (in green color) in Pafos District (yellow color). Source: Xaris333, CC BY-SA 4.0, via Wikimedia Commons.

Notably, the municipality of Pafos stands out as an attractive city, renowned for its cultural heritage, historical significance, and idyllic natural surroundings. Characterized by charming villages, rolling hills, and mountainous landscapes, the district's southern region boasts stunning coastlines adorned with endless beaches and secluded coves. Indeed, following the Turkish invasion of Cyprus in July 1974, Pafos experienced substantial growth, primarily fueled by construction and tourism. Notably, the population has witnessed an increase over the years, with 19,452 residents in 1992, 26,530 in 2001, and 32,892 in 2011, as reported by the Department of Town Planning and Housing in 2019. Within the municipality of Pafos, the territory was further divided into five districts: Agios Pavlos, Mouttallos, Anavargos, Agios Theodoros, and the charming Lower Pafos district.

3.2. Rationale and Logical Framework of the Study

The availability of digital and analogic data covering the time period from 1993 to 2021 served as a motivating factor in selecting Pafos as the focal point of this case study. However, several other criteria played a crucial role in this decision-making process. Pafos was chosen due to its encompassment of the historical urban core of the city, setting it apart from other neighboring municipalities. Furthermore, Pafos has remained relatively unaffected by the casino investment program and associated policies granting tax exemptions to luxury properties with high building coefficients, which have had a substantial impact on other regions, particularly Limassol. Additionally, the absence of major government service establishments, including a ministry, parliament, presidential palace, cabinet, and archbishopric, within Pafos rendered it a more representative example for such a study. Moreover, the Pafos Local Plan remained substantially unaltered by any special policies specific to such development initiatives, confirming its suitability as a case study subject. To investigate the long-term sprawl within Pafos, a series of maps were developed. These maps served as the fundamental basis for visually analyzing growth patterns within the study area over an extended time period (1993 to 2021). The primary objective was to assess the presence or absence of “urban sprawl” in the region.

3.3. Data Source

To develop the maps for the analysis set as the scope of the current research, it was necessary to collect appropriate data sources. The search for suitable data sources was a challenging and time-consuming process successfully carried out through governmental agencies. The data collected are listed in Table 2 as well as the respective figures (Figures 2–7).

Table 2. Data sources employed in the analysis.

1993 Pafos analog map
1993 Pafos orthophoto maps (Figure 2)
1993 Pafos Local Plan (Figure 3)
2003 Pafos Local Plan (Figure 4)
2009 Pafos satellite images (Google Earth) (Figure 5)
2014 Pafos high-resolution orthophoto maps (Figure 6)
2021 Pafos Satellite Images (via Google Earth)
Shapefile map (administrative boundaries, buildings, land plots, and zoning derived from 2014 (Figure 7) and 2019 Pafos Local Plans)



Figure 2. Orthophoto map of the Municipality of Pafos, 1993 (source: The Republic of Cyprus Land Registry).

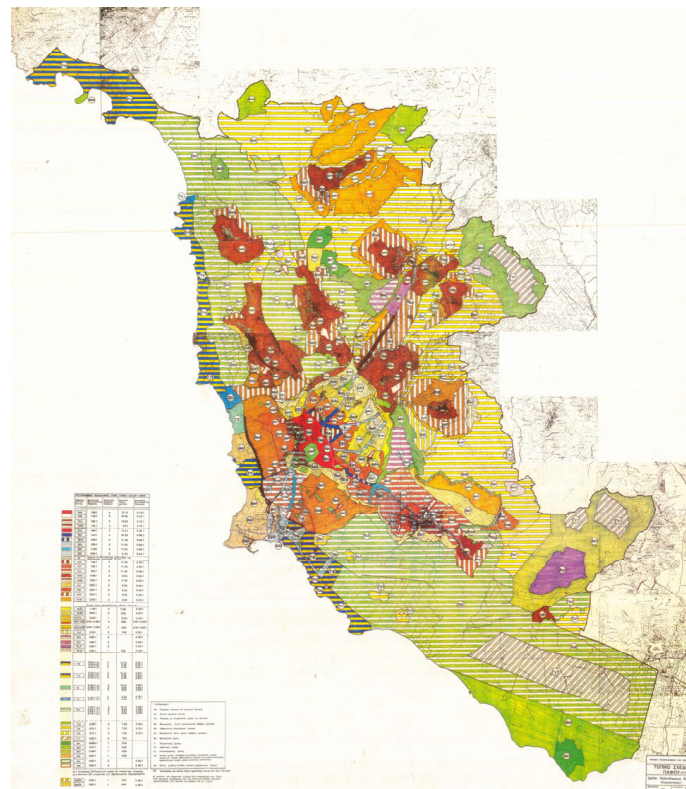


Figure 3. Local Plan of the Municipality of Pafos, 1993 (source: Department of Town Planning and Housing, Ministry of the Interior, Republic of Cyprus).

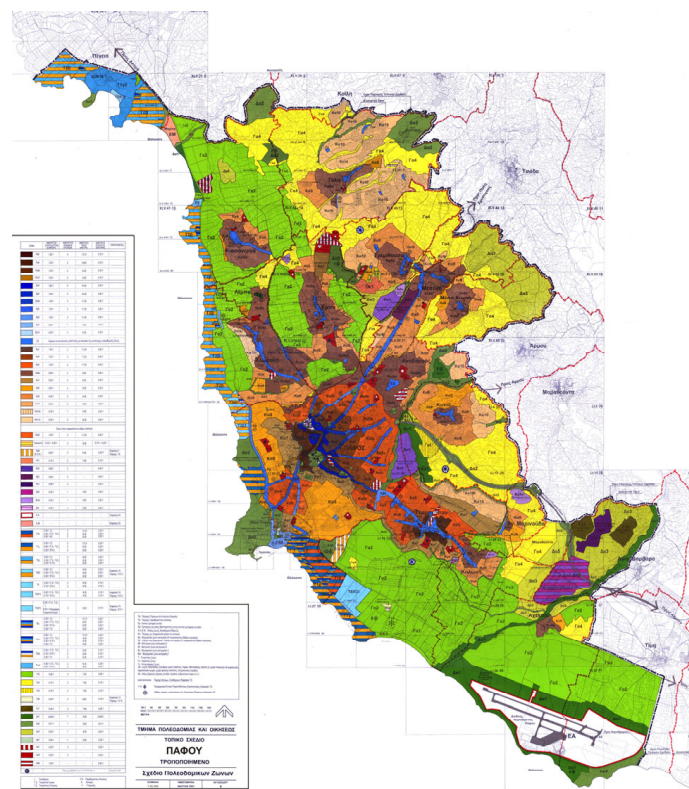


Figure 4. Local Plan of the Municipality of Pafos, 2003 (source: Department of Town Planning and Housing, Ministry of the Interior, Republic of Cyprus).



Figure 5. Satellite image of the Municipality of Pafos, 1993 (source: The Republic of Cyprus Land Registry).

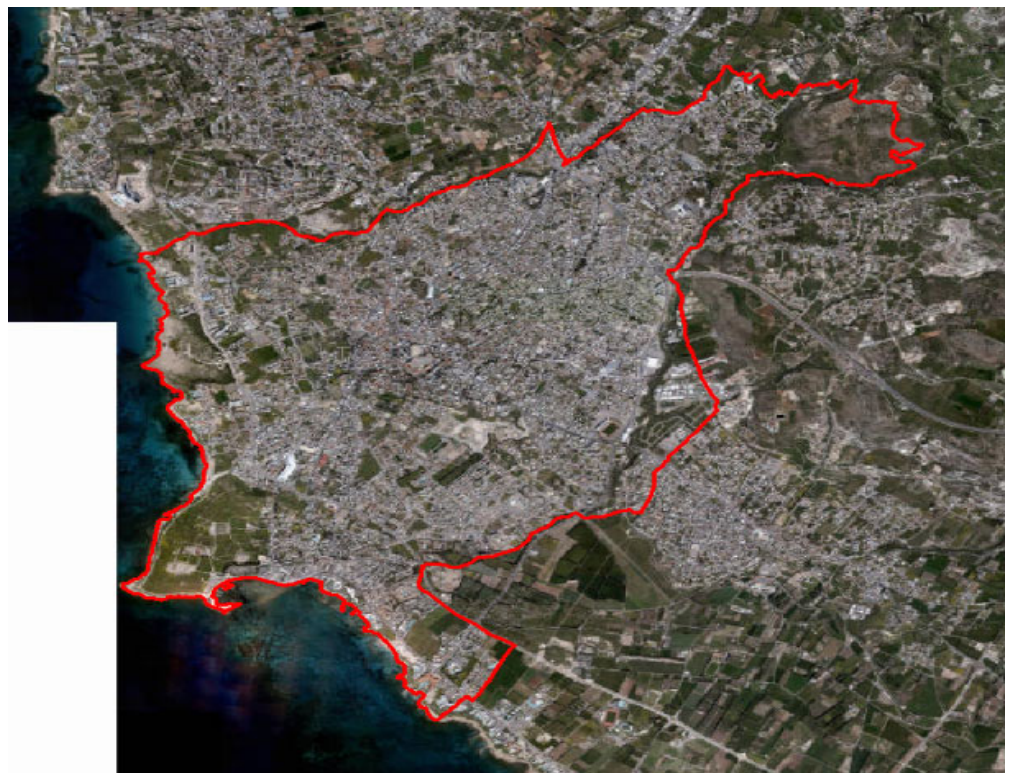


Figure 6. 2014 Pafos orthophoto map (source: The Republic of Cyprus Land Registry).

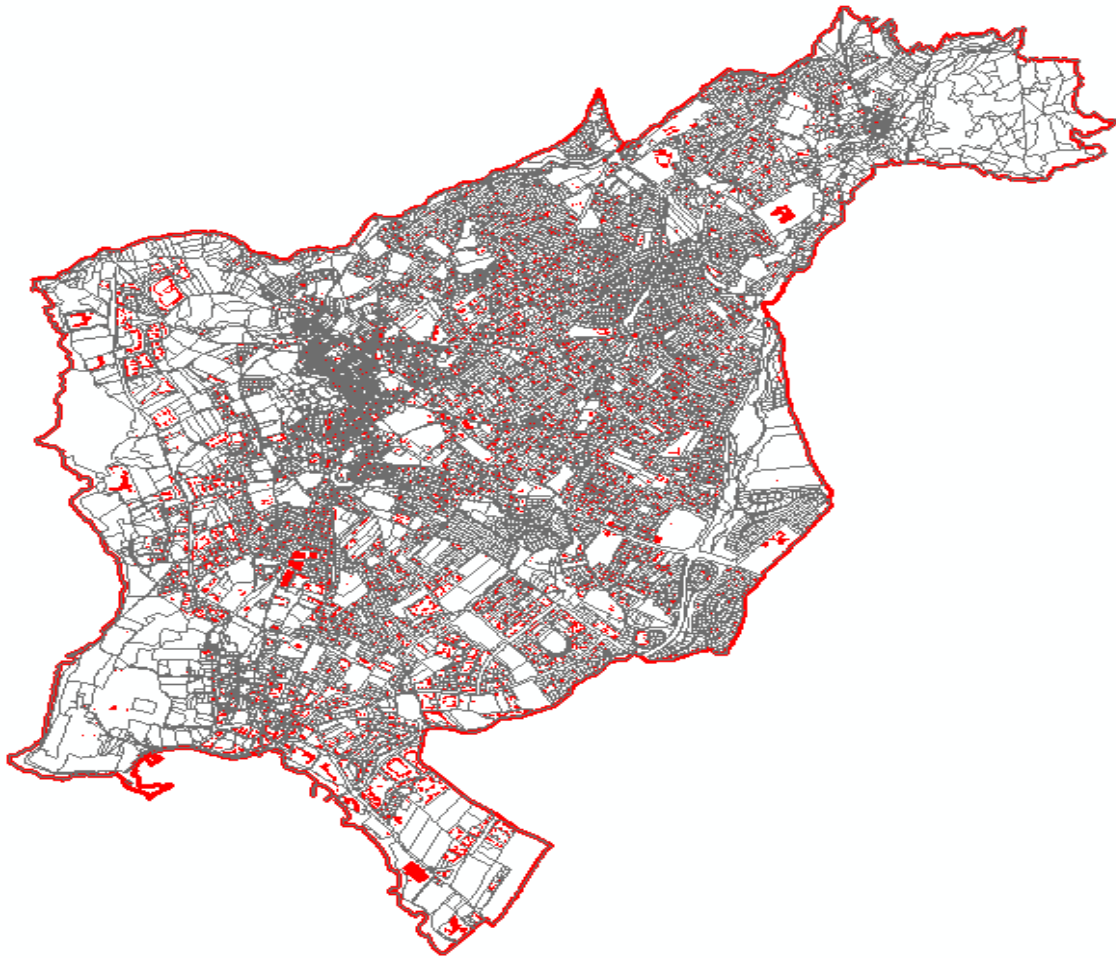


Figure 7. 2014 Pafos digital base map (source: The Republic of Cyprus Land Registry).

3.4. Implementation

To investigate the urban sprawl in Pafos from 1993 to 2021, a comprehensive set of maps was developed. These data representations can be categorized into two main thematic clusters, namely (i) building stock and (ii) building stock density. In addition, land-use and construction coefficient maps were developed and analyzed quantitatively. For the development of building stock maps, the digital shapefile (Figure 7) was redacted through photointerpretation (see Figure 8). Starting from the 2014 Pafos orthophoto map (Figure 6), the only available high-resolution map, a redaction process was implemented, involving the elimination and rectification of inaccurate buildings where deemed necessary, along with the incorporation of previously absent or missing buildings. The shapefile format of the digital base map (Figure 7) comprised a comprehensive dataset of 10,108 registered entries. Among these entries, 2349 were subsequently removed, while 3856 entries underwent updates. The same methodology was employed to develop the digital base maps for all the time periods studied herein. The vector layers for each year were created independently. For the year 1993, the Pafos building stock was initially recorded at 7724 structures. The building stock increased to 10,007 entries in 2003. Finally, the present (2021) status was established using Pafos 2021 satellite images obtained through Google Earth. A total of 441 new buildings were included, while 98 were removed, bringing the Pafos residential stock to a total of 11,958 buildings.

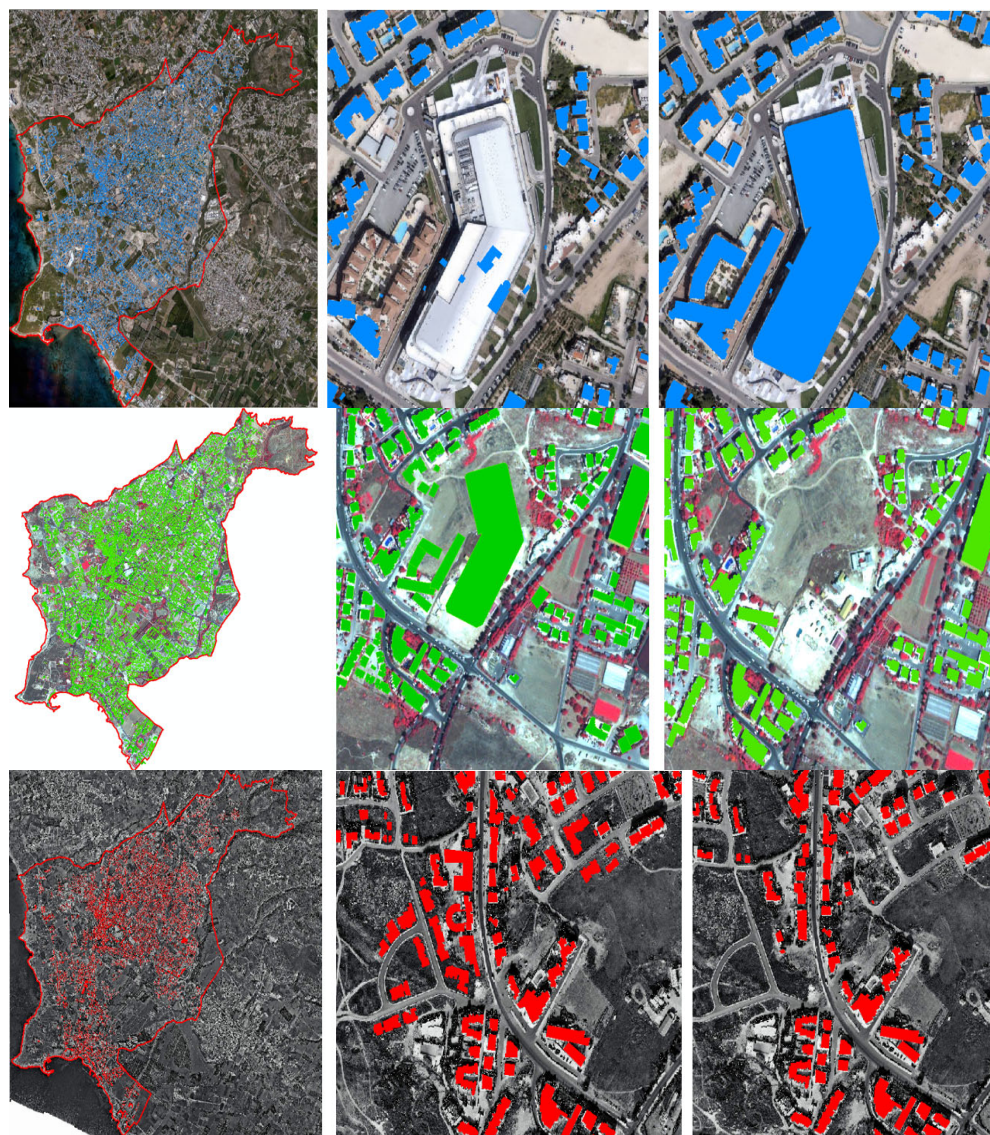


Figure 8. First row: digital basemap update for 2014; second row: building footprint delineation process for 2003; last row: building footprint delineation process for 1993.

The development of the building stock density maps involved the use of the Kernel Density Estimator (KDE) method for analyzing urban density. KDE analysis calculates the density of a specific characteristic at individual points within a surrounding area. It employs spatial interpolation techniques to compute a value per unit area for each point. The resulting surface exhibits a higher density value at the point location and gradually diminishes as the distance from the point increases, ultimately converging to zero. Typically, the outcome of KDE analysis is represented as a raster dataset, where each cell contains a density value that is weighted based on its distance from the original features. KDE analysis is commonly applied to assess urban densities, including building stock density, commercial activity density, utility network density, and even road density within a city. Furthermore, since the KDE method operates on point data, whereas the digital basemaps developed for the building stock maps consisted of polygon entities, a conversion of the basemaps into point data was required to facilitate compatibility with the KDE analysis (Figure 9). The analysis was carried out mid-2021 using ArcGIS, a software, v. Pro 1.0 developed by ESRI that offers advanced tools for cartographic production, spatial analysis, data processing, conversion, visualization, and data management. More specifically, the ArcGIS Pro Kernel Spatial Analyst tool was used, employing the quartic kernel function

described by Silverman (1986, p.76, Equation 4.5) (see also [99–102]) on a bandwidth basis for the PLANAR method. The spatial analysis in this study utilized imagery with a spatial resolution of 5 m, which is widely recognized as suitable and sufficient for the analysis conducted in this research, as supported by the existing scholarly literature [103,104].



Figure 9. Conversion of polygon entities into point data for use in the Kernel Density Estimator method.

4. Results

The spatial distribution of Pafos building stock in 1993 (Figure 9) exhibited a mostly fragmented pattern characterized by scattered buildings and significant empty spaces. The main density cores of buildings were observed in the city center, while dispersed density cores concentrated in the northeastern region (Figure 10).

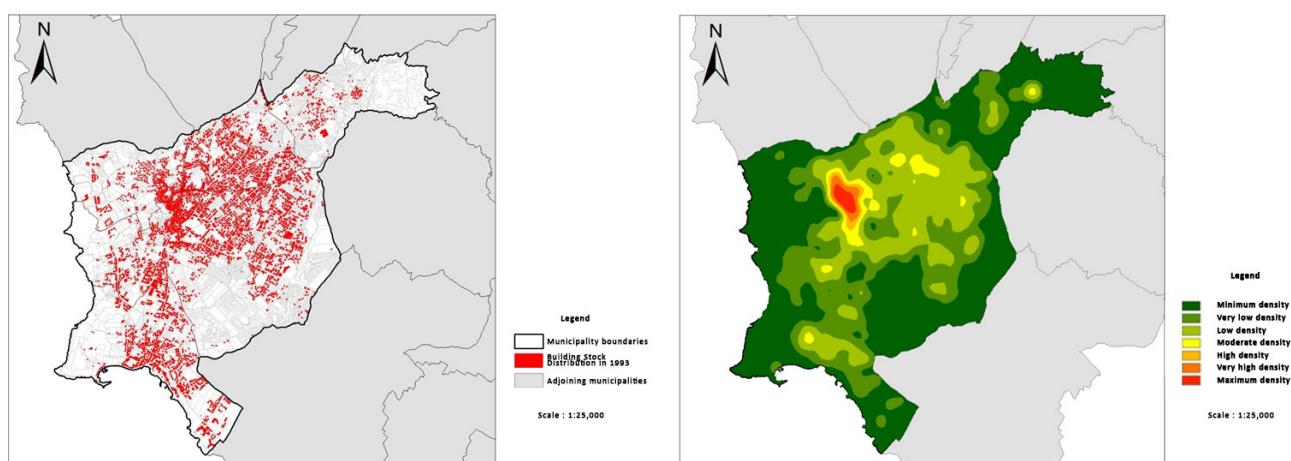


Figure 10. Building stock distribution (left) and density map (right) of Pafos in 1993. The corresponding density map highlights varying levels of density using a red-to-green gradient color scheme. Red signifies areas of high density, while green indicates areas with negligible density.

Similarly, for 2003 (Figure 11), the urban layout maintained a fragmented nature, with buildings showing continuity but still leaving substantial vacant and underutilized areas between them. A significant portion of Pafos exhibited low-to-moderate densities compared with the previous observation year, where the majority of the area, excluding the center, had minimal densities. Regarding the unique high-density core, it remained largely unchanged. This implies that during the past decade, there was no construction activity that could have increased urban density, but rather dispersed development occurred throughout.

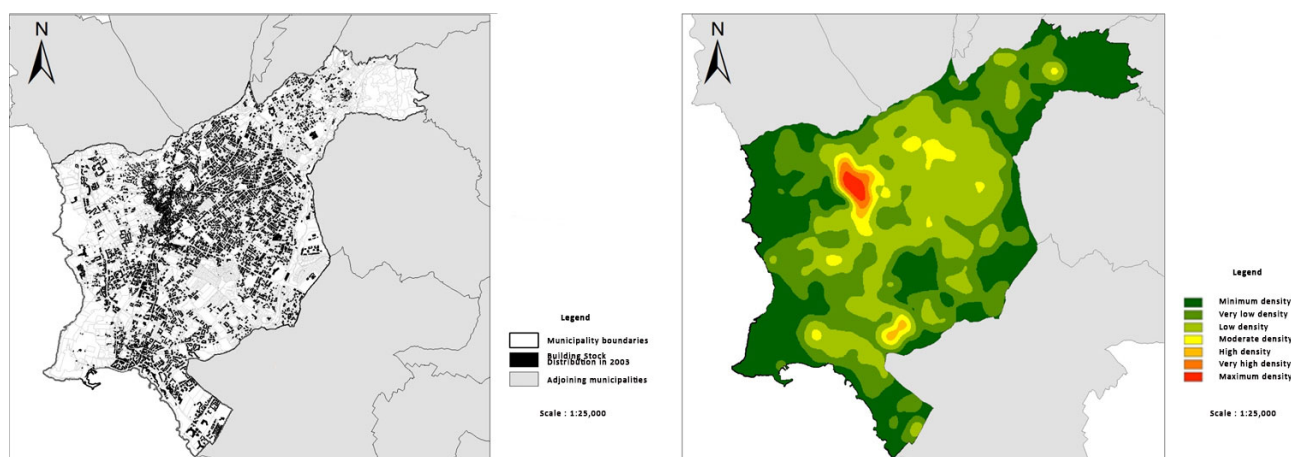


Figure 11. Building stock distribution (left) and density map (right) of Pafos in 2003. The corresponding density map highlights varying levels of density using a red-to-green gradient color scheme. Red signifies areas of high density, while green indicates areas with negligible density.

In 2014 (Figure 12), the rate of urban development exhibited a relatively lower growth pattern, and the density trajectory closely corresponded with the conditions prevailing in 2003. A notable transformation occurred whereby numerous areas characterized by minimal densities underwent a transition towards low- or moderate-density categories. The emphasis was primarily placed on expanding the existing density cores rather than generating new ones. This development can be regarded as a favorable outcome, as it contributed to the consolidation of the city's spatial configuration. However, the presence of high and maximum density zones was limited, with the exception of the historical center, which remained unaltered.

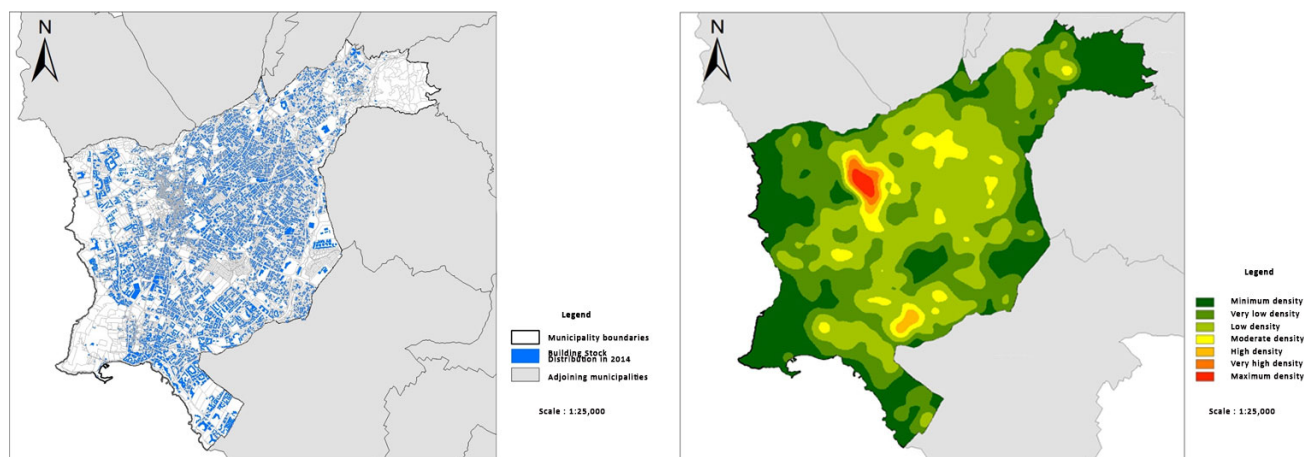


Figure 12. Building stock distribution (left) and density map (right) of Pafos in 2014. The corresponding density map highlights varying levels of density using a red-to-green gradient color scheme. Red signifies areas of high density, while green indicates areas with negligible density.

Examining the present (2021) status map (Figure 13), it is evident that the rate of development has been comparatively lower than in previous periods, most probably as a result of the global financial crisis occurred in the early 21st century [104–107]. However, the buildings within Pafos demonstrated a relatively more compact arrangement when compared to the preceding periods. Construction activity has been less pronounced and dispersed throughout Pafos, lacking concentration in any specific location.

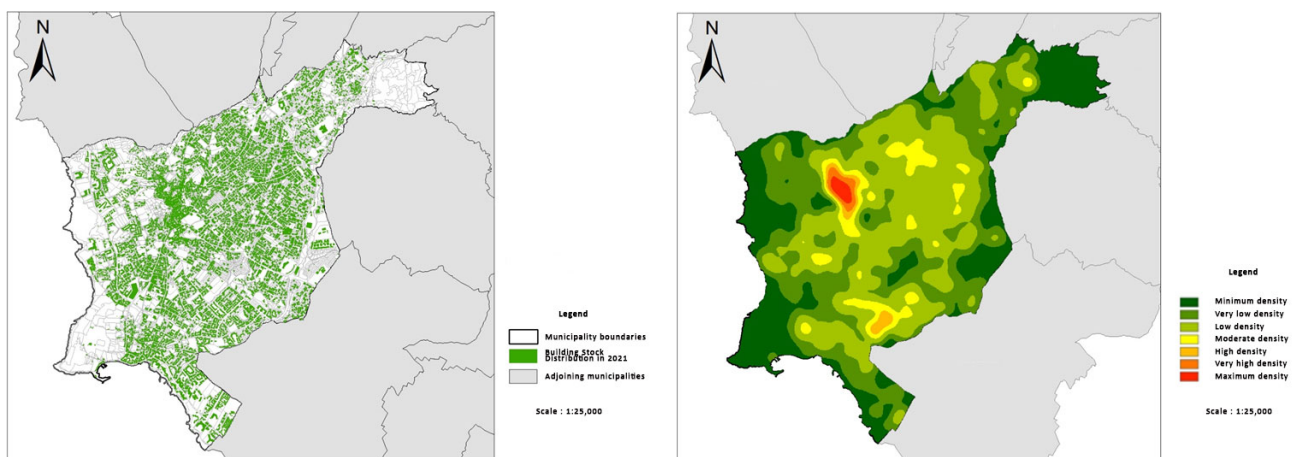


Figure 13. Building stock distribution (left) and density map (right) of Pafos in 2021. The corresponding density map highlights varying levels of density using a red-to-green gradient color scheme. Red means high-density clusters, while green indicates areas with low or negligible density.

A temporal analysis of the building stock maps indicates a gradual evolution of construction activity toward empty spaces (Figure 14). This observation suggests a tendency towards a more compact urban form, although further research incorporating additional data is necessary to draw definitive conclusions. It should be noted that the preservation of vacant spaces is crucial for establishing of a sustainable and compact city [92,108]. In 1993, Pafos building stock included 7724 structures. By 2003, this number had increased to 10,007 buildings, reflecting a growth rate of 3% per year. In 2014, the building stock further expanded to 11,615 structures, growing by 16% compared with 2003. As for 2021, the number of buildings reached 11,958, with a growth rate of 3.8% compared with the previous period. The overall percentage change between the beginning and the end of the study period (1993–2021) amounted to 55% (Table 3).

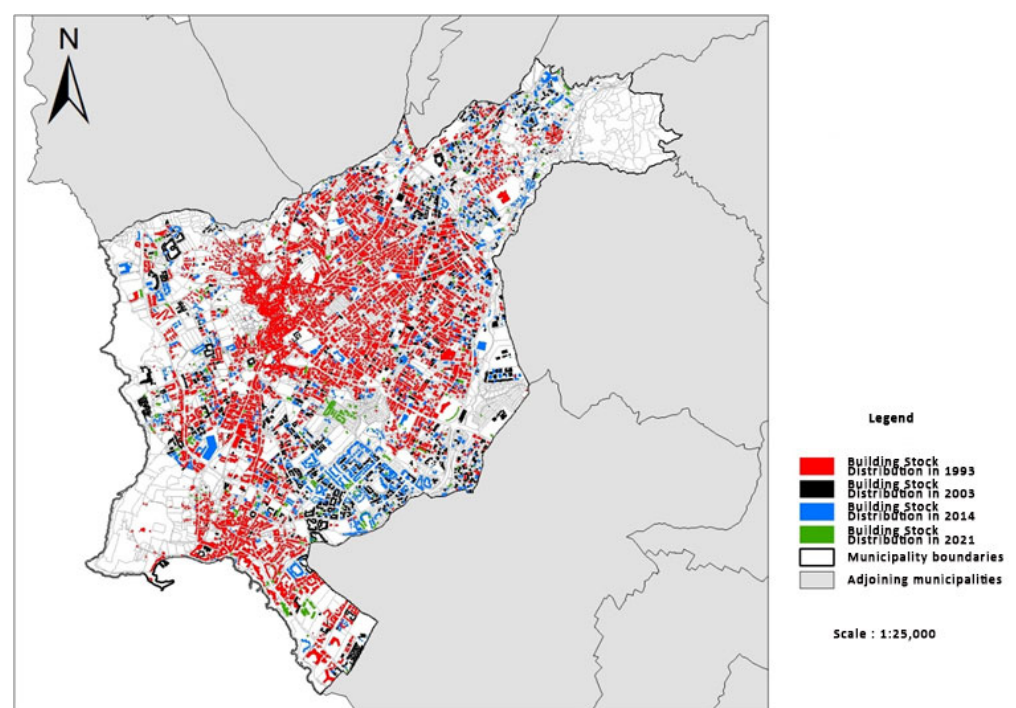
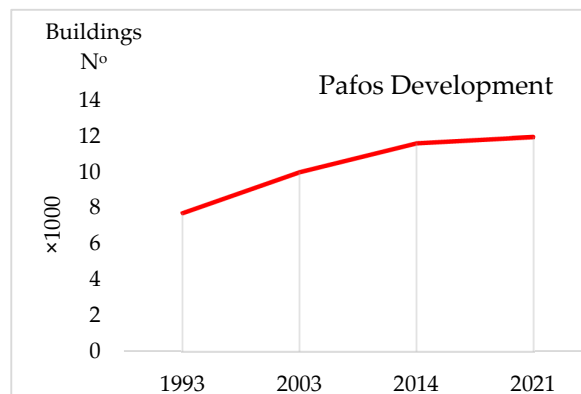


Figure 14. Pafos building stock evolution from 1993 to present (2021).

Table 3. Pafos development from 1993 to 2021.

	Pafos Municipality	Building Stock Distribution in 1993	Building Stock Distribution in 2003	Building Stock Distribution in 2014	Building Stock Distribution in 2021
land area (km ²)	16.93	1.46	1.88	2.3	2.4
proportion within Pafos (%)		8.60	11	13.60	14.10
% change (1993–2021)			64.40%		



Pafos' territorial extent encompasses an area of 16.93 km². Pafos' built-up fabric during the year 1993 occupied a total land area of 1.46 km² (8.6% of total area). By the year 2003, the built-up area expanded to 1.88 km², representing 11% of Pafos' territory. Subsequently, in 2014, the built-up environment encompassed an area of 2.3 km², equivalent to 13.6% of the total territorial extent. In 2021, Pafos' built-up area covered more than 2.3 km², 14.1% of the entire study area. It is worth noting that significant additions to the built environment between 2003 and 2014 included the development of substantial hotel complexes and commercial shopping centers, exemplified by the new mall, spanning a considerable area of 10 hectares. Thus, the analysis of the building stock reveals Pafos' significant development between 1993 and 2003, followed by a smaller growth during 2014–2021. Scattered urban sprawl was observed throughout.

Land use in Pafos in 1993 comprised urban commercial centers, core areas of high activity, infrastructure, and economic significance, and continuous development, with a small proportion of industrial zones (Figure 15). Residential areas dominated the overall region, except for the western coast and a part of the northeast. Tourist and rural zones were concentrated in the center and along the western coastal front. The northeast part mainly consisted of agricultural and rural zones. Public buildings were dispersed throughout. In 2003, certain changes were observed, including the absence of agricultural zones, a decrease in the urban commercial center area, and relatively stable commercial activities outside the center, except in the tourist-focused areas. Residential and rural areas were more prominent in this period. In 2014, and later in 2021, the maps present minimal changes in land uses overall.

Table 4 presents Pafos land-use changes in 1993, 2003, 2014, and 2021 as defined in the respective Local Plans. The changes depicted in the table are minimal, particularly in regard to the land uses of the 2013 and 2019 Local Plans, where they mostly align. This suggests that the logic of land-use determination by the public administration remains unchanged. Notably, land uses pertaining to residential areas across all analyzed Local Plans constitute more than 55% of the total area. Furthermore, changes exhibit both increase–decrease and decrease–increase patterns in their respective areas. A point worth noting is the elimination of agricultural zones, which accounted for 5.1% of the land uses in 1993, and their conversion into residential and rural zones.

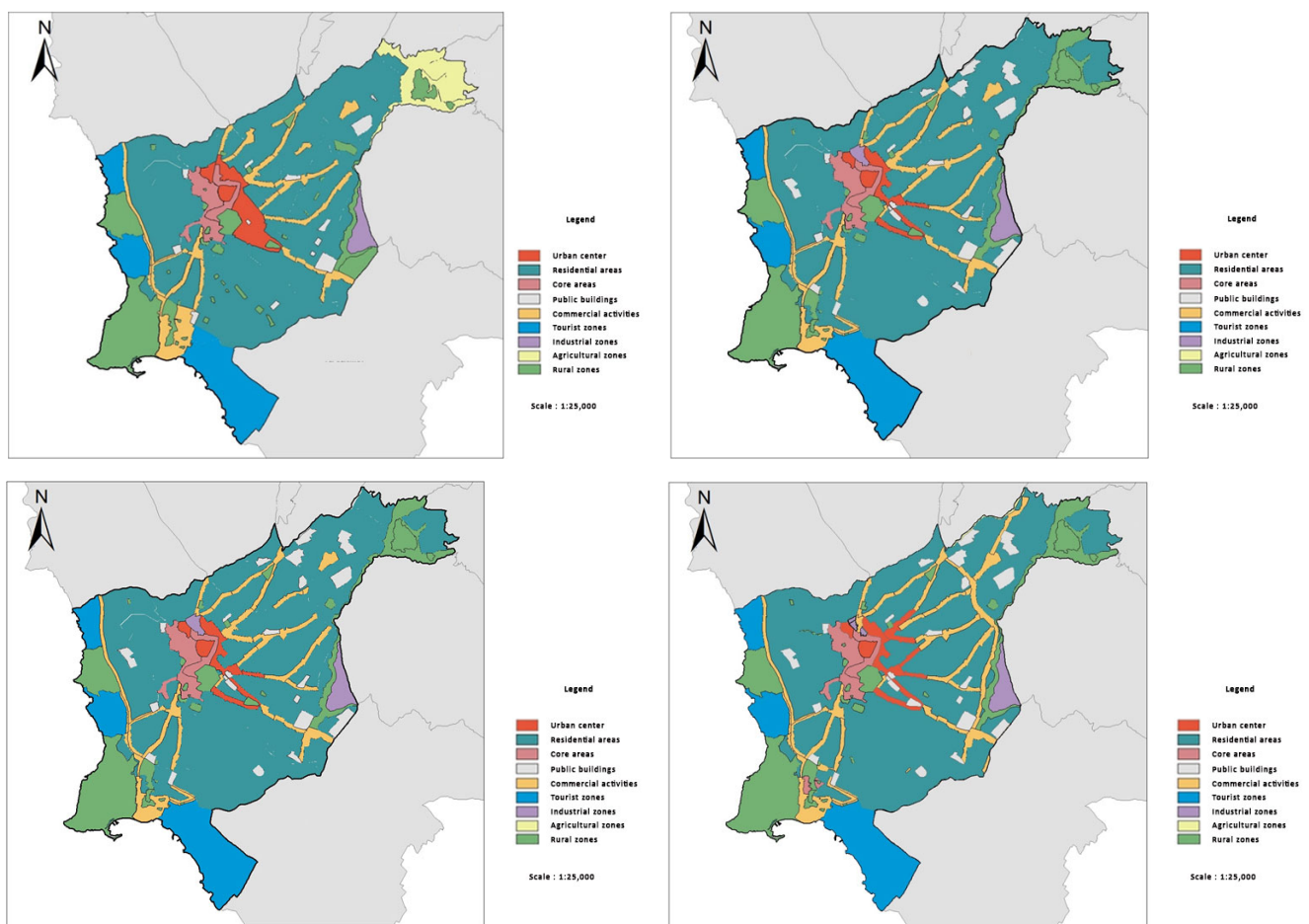


Figure 15. Pafos land use maps for 1993 (top left), 2003 (top right), 2014 (bottom left), and 2021 (bottom right).

Table 4. Temporal evolution of urban planning zones.

	1993	%	2003	%	2014	%	2021	%
Urban commercial center (km ²)	0.53	3.1	0.36	2.1	0.49	2.9	0.47	2.8
Residential areas	9.36	55.3	9.99	59	9.57	56.5	9.57	56.5
Core areas and continuous development zones	0.46	2.7	0.44	2.6	0.48	2.8	0.48	2.8
Commercial activities outside the urban commercial center	1.38	8.2	1.35	8	1.62	9.6	1.62	9.6
Public buildings	0.26	1.5	0.6	3.5	0.6	3.5	0.6	3.5
Tourist zones	1.7	10	1.63	9.6	1.65	9.8	1.64	9.7
Industrial zones	0.21	1.2	0.26	1.5	0.23	1.4	0.23	1.4
Rural zones	2.16	12.8	2.3	13.6	2.29	13.5	2.29	13.5
Agricultural zones	0.87	5.1	-	0.0	-	0.0	0.036	0.2
Total	16.93	100	16.93	100	16.93	100	16.93	100

The analysis and presentation of urban planning zones and land uses are crucial due to their direct correlation with the maximum construction coefficient, which serves as the primary criterion for construction within a city. The maps in Figure 16 depict the maximum construction coefficient for the urban planning zone of Pafos, as defined in the corresponding years' Local Plan. The "construction coefficient" denotes the maximum permissible floor area ratio expressed as a percentage of the land area, representing the extent of construction allowed on a specific plot. Within Cyprus, land usage falls within the purview of the Town Planning and Housing Department, Ministry of Interior. Urban

development in key areas adheres to the guidelines outlined in the Local Plans. Cyprus is partitioned into distinct planning zones (see Figure 15 legend and Table 4). Prior to purchasing land for construction purposes, it is imperative to ensure compliance with relevant building regulations and ascertain the availability of essential amenities such as electricity. Prospective land buyers should consider three interrelated factors:

- Building coverage factor, expressed as the maximum permissible building size in square meters relative to the plot area;
- Area coverage factor, expressed as the maximum permissible ground level coverage of the plot in square meters relative to the plot area;
- Maximum height factor, expressed as the tallest point the building can reach in meters).

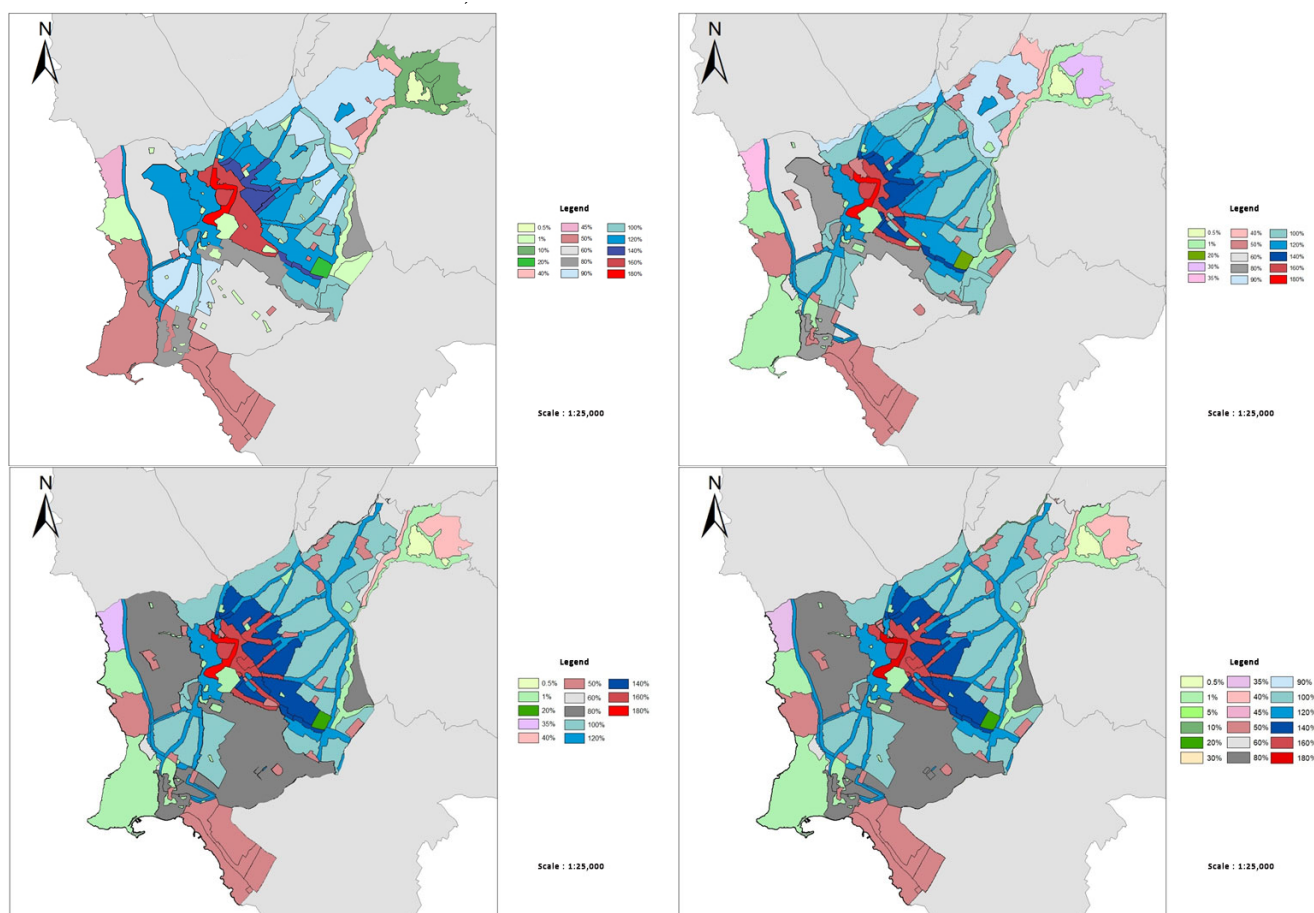


Figure 16. Pafos construction coefficient maps. **Top left**—1993; **top right**—2003; **bottom left**—2014; **bottom right**—2021.

5. Discussion

One of the main characteristics of post-war development in Pafos was found to be the scattered expansion of individual dwellings and urbanization on the outskirts of the city, encroaching upon forested and agricultural land. The economy, land market processes, and social perceptions contributed to the continuous growth of this phenomenon, which is peculiar to the Cypriot reality and one of the most significant issues in urban areas. The fragmentation of land ownership has been and remains a substantial obstacle to the planning and implementation of unified and rational developments. Moreover, the existence of private water supply was a decisive criterion for new developments. The rapid increase in the urban population of Pafos, resulting from the effects of the Turkish invasion and subsequent efforts for economic revitalization, particularly in the tourism sector, greatly accelerated the pace of development. However, the traditional

structure of the city is unable to smoothly absorb the changes in the system and the growth rates that emerged from the aforementioned events. The initial concentration of services, commerce, public administration, and other essential activities in the city center encouraged the radial expansion of the road network, functionally derived from the presence of a single employment center. The subsequent dispersion of employment opportunities and residential areas to broader regions, mainly along major road axes, limited their traffic capacity and population mobility options, as urban sprawl was not supported by substantial improvements in the radial road network. The lack of effective urban planning legislation, combined with the increased demand for land for development and investment, as well as the retention of a significant portion of land for future use or speculation, created conditions that contributed to the degradation of the quality of life for a large part of the population. This phenomenon manifested as scattered residential development, parcel fragmentation, numerous vacant lots, conflicting land uses, and single-story houses and apartment buildings. Alongside these physical characteristics of the area, the inability of low-income groups to secure land and housing within the main urban area is the most significant problem and the root cause of many other issues. The spatial allocation of developments housing various sectors of economic activity presents several challenges. Workshops, shops, and offices are dispersed in the Local Plan area, causing conflicts in functionality, traffic issues, and the degradation of the environment and population amenities, especially in residential areas. Public spaces open for passive or active recreation remain insufficient in the Local Plan area, both in terms of area and organization and management. Severe deficiencies in playgrounds and local/urban parks have been observed in residential areas, although in recent years Local Authorities have made efforts to alleviate these shortcomings. Finally, the tourist development along the coastal front and the wider coastal strip of the city, without prior urban and spatial planning and necessary infrastructure, causes significant environmental problems related to the intensity of development, the absence of required infrastructure, and the lack of respect for landscape sensitivity [109,110].

Based on global instances of successful urban center upgrades, it has been demonstrated that spatial planning and intelligent development strategies can effectively regulate the growth of cities [111]. As long as the human element persists, urban development will remain an ongoing process [112]. Nonetheless, societies are confronted with the challenge of determining the appropriate locations for development and shaping their form. In Cyprus, a country with a population of 750,000 and a land area of 7105 km², urban development has predominantly followed a pattern of continuous expansion towards suburban areas [113]. However, successful urban development necessitates a fundamental shift in the underlying philosophy of spatial planning, as persistent issues cannot be resolved by the policies that gave rise to them [114]. European cities exemplify a perpetual state of transformation, wherein new functions, materials, architectural styles, dimensions, heights, and cosmopolitan influences are continuously introduced, enhancing the overall urban landscape [115]. This dynamic process of producing new urban spaces is intertwined with the creation of a new polity, new policies, a new economy, and novel ways of urban living, which, however, may present challenges in fostering social harmony and justice in the future of metropolitan urban Europe [116].

Remarkable examples of residential development can be found worldwide where city center buildings soar to heights reaching 800 m. In contrast, urban areas in Cyprus adhere to building regulations that permit a much lower building height, possibly in line with guidelines for adaptation to natural hazards, primarily earthquakes. This significant disparity in density raises the question of its underlying cause. In addition, other cities have effectively accommodated various functions, such as tourism [117,118], culture and cultural facilities [119,120], governmental services [121], hospitals [122], sports facilities [123], and universities [124]. In contrast, the city of Pafos, with a population of 40,000 inhabitants, exhibits a pattern of sporadic development. This low-density scenario undermines the realization of the Local Plan's vision, ultimately leading to a decline in residential, commer-

cial, and economic activity within the city center [125]. Consequently, the urban oxymoron arises, where the intended role of the city center fails to align with the actual density, hindering its vitality and potential for growth. Furthermore, it is widely acknowledged that high density serves as a crucial prerequisite for fostering vibrant and thriving urban centers [126,127]. This understanding has prompted numerous cities, both within Europe and worldwide, to adopt the paradigm of compact cities. Given this context, it begs the question as to why such a development model was developed in Pafos, incorporating excessively low building coefficients, which diverge from the contemporary and internationally recognized trends in urban design.

The success of urban developments in achieving the economic revitalization of cities highlights the significant advantage of available land resources. The key question at hand is how these cities can effectively harness the immense potential presented by proper development, rather than fragmenting it in a haphazard manner, as has been observed in the case of Pafos herein. The current research endeavors to address these issues by proposing a series of recommended actions. The pervasive phenomenon of urban sprawl, as exemplified herein, is evident across Pafos. As population growth drives development rates, demand for services, energy, infrastructure, and new installations will definitely increase. However, urban development should adhere to spatial planning principles and employ suitable mechanisms to prevent uncontrolled sprawl [128]. Failure to do so will result in the expansion of urban sprawl with its negative consequences, leading to inefficient land use and the loss of agricultural land [129], gradually disrupting the ecological and environmental equilibrium intrinsic to any traditional settlement, like Pafos [130].

The most effective recommended solution for curbing urban sprawl involves the gradual transformation of dispersed and discontinuous cities into smart and compact urban centers. Drawing insights from successful examples [62,64], it is crucial for all relevant stakeholders to fully comprehend the underlying practices and policies. To address the phenomenon of urban sprawl in Pafos, several specific actions are proposed. These actions aim to promote sustainable urban development and mitigate the negative impacts of sprawl. The recommended measures include the establishment and augmentation of a special fund dedicated to building renovation, adaptive reuse, and the creation of green spaces. This fund will provide financial support for initiatives aimed at enhancing the aesthetics and ecological quality of urban areas. Repurposing underutilized land and buildings promotes efficient land use and revitalizes urban areas. Financial incentives should be introduced to promote the maintenance, preservation, and restoration of buildings with unique architectural character, fostering cultural heritage preservation [131,132]. Limitations on the architectural appearance of new buildings within the urban center should be introduced to promote a cohesive and visually appealing urban environment. Incentives should be also provided to encourage the demolition of single-family homes lacking distinctive architectural features, with a focus on constructing high-density buildings that can accommodate more residents.

Implementation of economic measures and charges for the purchase of second homes [117] can help manage demand and discourage excessive property speculation, thereby curbing urban sprawl. Building coefficients within urban cores should be further increased while simultaneously reducing them in peri-urban areas. This approach encourages higher density development in city centers, optimizing land use and minimizing urban sprawl. To combat unauthorized constructions and ensure compliance with regulations, substantial control measures and strict enforcement mechanisms should be implemented. Unified developments within a specific radius from the urban center should be encouraged, accompanied by simplified land registry procedures to address co-ownership issues more efficiently. Provisions in urban development permits should be improved to ensure more effective delineation of public green spaces. This will help preserve and expand green areas within urban environments. The designation of zones for continuous development and urban commercial centers should be increased.

6. Conclusions

Concentrating development in specific areas fosters compact urban growth and facilitates the provision of services and amenities. Mixed-use development should be introduced within areas predominantly used for housing. Integrating different functions, such as commercial, recreational, and institutional functions, within residential areas promotes vibrant and sustainable communities. Land reuse downtown should be actively encouraged. By adopting these recommended actions, Pafos—and, for generalization, many other regions in the Mediterranean region sharing with Pafos similar socioeconomic and environmental characteristics—can effectively address urban sprawl and foster a sustainable development aligned with modern planning principles and international best practices.

Author Contributions: The research project discussed in this article involved a collaborative approach, with each author making distinct contributions that encompassed diverse perspectives, insights, feedback, and guidance. These contributions may not be easily quantifiable or neatly categorized, yet they collectively enriched the study. Although challenging to summarize precisely, the authors' involvement can be acknowledged by recognizing their individual inputs and the multifaceted nature of their contributions as follows: Conceptualization, I.V. (Ioannis Vardopoulos) and M.G.; Data curation, M.G.; Formal analysis, S.I.; Methodology, S.I.; Project administration, I.V. (Ioannis Vardopoulos), L.S. and Y.E.D.; Resources, M.G.; Software, S.I. and M.G.; Supervision, L.S. and Y.E.D.; Validation, I.V. (Ioannis Vardopoulos), I.V. (Irene Voukkali), L.S. and Y.E.D.; Visualization, S.I. and M.G.; Writing—original draft, I.V. (Ioannis Vardopoulos), S.I., I.V. (Irene Voukkali), and L.S.; Writing—Review and Editing, I.V. (Ioannis Vardopoulos) and L.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created.

Acknowledgments: The authors would like to acknowledge all who have directly or indirectly helped in carrying out this study.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Organisation for Economic Co-operation and Development-OECD. *Rethinking Urban Sprawl: Moving towards Sustainable Cities*; Organisation for Economic Co-operation and Development-OECD: Paris, France, 2018; ISBN 9789264189829.
2. Lemonakis, C.; Alexopoulos, G.; Garefalakis, A.; Garefalakis, S. Trends and New Elements in Urban Hierarchy Research: The Greek Paradigm. *Ann. Reg. Sci.* **2023**, *1*–20. [\[CrossRef\]](#)
3. Mitoula, R.; Gkagkosi, N. Sustainable Urban Resilience: Cities in the Face of Modern Challenges. In *Case Study: The City of Elliniko-Argyroupoli, Greece, Proceedings of the 5th Symposium on Agri-Tech Economics for Sustainable Futures, Newport, UK, 19–20 September 2022*; Paparas, D., Behrendt, K., Eds.; Global Institute for Agri-Tech Economics, Food, Land and Agribusiness Management Department, Harper Adams University: Newport, UK; HAU Publications: Newport, UK, 2022; pp. 45–63; ISBN 9781739818333.
4. European Environment Agency. *Urban Sprawl in Europe—The Ignored Challenge*; Office for Official Publications of the European Communities: Copenhagen, Denmark, 2006; ISBN 92-9167-887-2; ISSN 1725-9177.
5. Perrin, C.; Nougarede, B.; Sini, L.; Branduini, P.; Salvati, L. Governance Changes in Peri-Urban Farmland Protection Following Decentralisation: A Comparison between Montpellier (France) and Rome (Italy). *Land Use Policy* **2018**, *70*, 535–546. [\[CrossRef\]](#)
6. Sadat Nickayin, S.; Bianchini, L.; Egidi, G.; Cividino, S.; Rontos, K.; Salvati, L. 'Pulsing' Cities and 'Swarming' Metropolises: A Simplified, Entropy-Based Approach to Long-Term Urban Development. *Ecol. Indic.* **2022**, *136*, 108605. [\[CrossRef\]](#)
7. Cortinovis, C.; Haase, D.; Zanon, B.; Geneletti, D. Is Urban Spatial Development on the Right Track? Comparing Strategies and Trends in the European Union. *Landsc. Urban Plan.* **2019**, *181*, 22–37. [\[CrossRef\]](#)
8. Salvati, L.; Carlucci, M. Patterns of Sprawl: The Socioeconomic and Territorial Profile of Dispersed Urban Areas in Italy. *Reg. Stud.* **2016**, *50*, 1346–1359. [\[CrossRef\]](#)
9. Vinci, S.; Vardopoulos, I.; Salvati, L. A Tale of a Shrinking City? Exploring the Complex Interplay of Socio-Demographic Dynamics in the Recent Development of Attica, Greece. *Cities* **2023**, *132*, 104089. [\[CrossRef\]](#)
10. Salvati, L.; Zamboni, I.; Chelli, F.M.; Serra, P. Do Spatial Patterns of Urbanization and Land Consumption Reflect Different Socioeconomic Contexts in Europe? *Sci. Total Environ.* **2018**, *625*, 722–730. [\[CrossRef\]](#) [\[PubMed\]](#)

11. Manika, S.; Karalidis, K.; Gospodini, A. Spatial Analysis of Economic Activities as a Tool for Effective Urban Policies. *Smart Cities* **2022**, *5*, 276–293. [\[CrossRef\]](#)
12. López-Gay, A.; Andújar-Llosa, A.; Salvati, L. Residential Mobility, Gentrification and Neighborhood Change in Spanish Cities: A Post-Crisis Perspective. *Spat. Demogr.* **2020**, *8*, 351–378. [\[CrossRef\]](#)
13. Egidi, G.; Zambon, I.; Tombolin, I.; Salvati, L.; Cividino, S.; Seifollahi-Aghmiuni, S.; Kalantari, Z. Unraveling Latent Aspects of Urban Expansion: Desertification Risk Reveals More. *Int. J. Environ. Res. Public Health* **2020**, *17*, 4001. [\[CrossRef\]](#)
14. Tombolini, I.; Zambon, I.; Ippolito, A.; Grigoriadis, S.; Serra, P.; Salvati, L. Revisiting “Southern” Sprawl: Urban Growth, Socio-Spatial Structure and the Influence of Local Economic Contexts. *Economies* **2015**, *3*, 237–259. [\[CrossRef\]](#)
15. Cervero, R.; Wu, K.-L. Polycentrism, Commuting, and Residential Location in the San Francisco Bay Area. *Environ. Plan. A Econ. Space* **1997**, *29*, 865–886. [\[CrossRef\]](#) [\[PubMed\]](#)
16. Laidley, T. The Problem of Urban Sprawl. *Contexts* **2016**, *15*, 74–77. [\[CrossRef\]](#)
17. Bosch, M.; Chenal, J.; Joost, S. Addressing Urban Sprawl from the Complexity Sciences. *Urban Sci.* **2019**, *3*, 60. [\[CrossRef\]](#)
18. Seevarethnam, M.; Rusli, N.; Ling, G.H.T.; Said, I. A Geo-Spatial Analysis for Characterising Urban Sprawl Patterns in the Batticaloa Municipal Council, Sri Lanka. *Land* **2021**, *10*, 636. [\[CrossRef\]](#)
19. Whyte, W.H.J. *Urban Sprawl*; Reprinted; Fortune: Baltimore, MD, USA, 1958.
20. Smiraglia, D.; Salvati, L.; Egidi, G.; Salvia, R.; Giménez-Morera, A.; Halbac-Cotoara-Zamfir, R. Toward a New Urban Cycle? A Closer Look to Sprawl, Demographic Transitions and the Environment in Europe. *Land* **2021**, *10*, 127. [\[CrossRef\]](#)
21. Egidi, G.; Halbac-Cotoara-Zamfir, R.; Cividino, S.; Quaranta, G.; Salvati, L.; Colantoni, A. Rural in Town: Traditional Agriculture, Population Trends, and Long-Term Urban Expansion in Metropolitan Rome. *Land* **2020**, *9*, 53. [\[CrossRef\]](#)
22. Nickayin, S.S.; Salvati, L.; Coluzzi, R.; Lanfredi, M.; Halbac-Cotoara-Zamfir, R.; Salvia, R.; Quaranta, G.; Alhuseen, A.; Gaburova, L. What Happens in the City When Long-Term Urban Expansion and (Un)Sustainable Fringe Development Occur: The Case Study of Rome. *ISPRS Int. J. Geo-Inf.* **2021**, *10*, 231. [\[CrossRef\]](#)
23. Escolano, J.J.; Pedreño, J.N.; Lucas, I.G.; Almendro Candel, M.B.; Zorpas, A.A. Decreased Organic Carbon Associated With Land Management in Mediterranean Environments. In *Soil Management and Climate Change. Effects on Organic Carbon, Nitrogen Dynamics, and Greenhouse Gas Emissions*; Muñoz, M.Á., Zornoza, R., Eds.; Academic Press Books-Elsevier: Cambridge, MA, USA, 2018; pp. 1–13.
24. Rodríguez-Espinosa, T.; Navarro-Pedreño, J.; Gómez-Lucas, I.; Jordán-Vidal, M.M.; Bech-Borrás, J.; Zorpas, A.A. Urban Areas, Human Health and Technosols for the Green Deal. *Environ. Geochem. Health* **2021**, *43*, 5065–5086. [\[CrossRef\]](#)
25. Morelli, V.G.; Salvati, L. *Ad Hoc Urban Sprawl in the Mediterranean City: Dispersing a Compact Tradition?* Edizioni Nuova Cultura: Rome, Italy, 2010; ISBN 9788861345720.
26. Cebrián Abellán, F.; Sánchez Ondoño, I. Urban Sprawl in Inner Medium-Sized Cities: The Behaviour in Some Spanish Cases Since the Beginning of the 21st Century. *Urban Sci.* **2019**, *3*, 10. [\[CrossRef\]](#)
27. Artmann, M.; Inostroza, L.; Fan, P. Urban Sprawl, Compact Urban Development and Green Cities. How Much Do We Know, How Much Do We Agree? *Ecol. Indic.* **2019**, *96*, 3–9. [\[CrossRef\]](#)
28. Fuladlu, K.; Riza, M.; Ilkan, M. Monitoring Urban Sprawl Using Time-Series Data: Famagusta Region of Northern Cyprus. *SAGE Open* **2021**, *11*, 215824402110074. [\[CrossRef\]](#)
29. Chin, N. *Unearthing the Roots of Urban Sprawl: A Critical Analysis of Form, Function and Methodology*; CASA Working Papers 47; Centre for Advanced Spatial Analysis, UCL: London, UK, 2002.
30. Sarzynski, A.; Galster, G.; Stack, L. Typologies of Sprawl: Investigating United States Metropolitan Land Use Patterns. *Urban Geogr.* **2014**, *35*, 48–70. [\[CrossRef\]](#)
31. Cutsinger, J.; Galster, G. There Is No Sprawl Syndrome: A New Typology of Metropolitan Land Use Patterns. *Urban Geogr.* **2006**, *27*, 228–252. [\[CrossRef\]](#)
32. Harvey, R.O.; Clark, W.A. V The Nature and Economics of Urban Sprawl. *Land Econ.* **1965**, *41*, 1–9. [\[CrossRef\]](#)
33. Transportation Research Board. *TCRP Report 39—The Costs of Sprawl—Revisited*; National Academy Press: Washington, DC, USA, 1998.
34. Brueckner, J.K. Urban Sprawl: Diagnosis and Remedies. *Int. Reg. Sci. Rev.* **2000**, *23*, 160–171. [\[CrossRef\]](#)
35. Downs, A. Some Realities about Sprawl and Urban Decline. *Hous. Policy Debate* **1999**, *10*, 955–974. [\[CrossRef\]](#)
36. Johnson, M.P. Environmental Impacts of Urban Sprawl: A Survey of the Literature and Proposed Research Agenda. *Environ. Plan. A Econ. Sp.* **2001**, *33*, 717–735. [\[CrossRef\]](#)
37. Colantoni, A.; Grigoriadis, E.; Sateriano, A.; Venanzoni, G.; Salvati, L. Cities as Selective Land Predators? A Lesson on Urban Growth, Deregulated Planning and Sprawl Containment. *Sci. Total Environ.* **2016**, *545–546*, 329–339. [\[CrossRef\]](#)
38. Ewing, R.H. Characteristics, Causes, and Effects of Sprawl: A Literature Review. In *Urban Ecology*; Marzluff, J.M., Shulenberger, E., Endlicher, W., Alberti, M., Bradley, G., Ryan, C., Simon, U., ZumBrunnen, C., Eds.; Springer: Boston, MA, USA, 2008; pp. 519–535.
39. Razin, E.; Rosentraub, M. Are Fragmentation and Sprawl Interlinked? *Urban Aff. Rev.* **2000**, *35*, 821–836. [\[CrossRef\]](#)
40. Burchfield, M.; Overman, H.G.; Puga, D.; Turner, M.A. Causes of Sprawl: A Portrait from Space. *Q. J. Econ.* **2006**, *121*, 587–633. [\[CrossRef\]](#)
41. Bruegmann, R. *Sprawl: A Compact History*; University of Chicago Press: Chicago, IL, USA, 2005.

42. Maier, G.; Franz, G.; Schrock, P. Urban Sprawl. How Useful Is This Concept? In *Proceedings of the 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean"*, Volos, Greece, 30 August–3 September 2006; European Regional Science Association: Louvain-la-Neuve, Belgium, 2006.
43. Lagarias, A.; Sayas, J. Is There a Common Typology of Urban Sprawl in Mediterranean Cities? *Rev. d'Économie Régionale Urbaine* **2019**, *4*, 813–850. [\[CrossRef\]](#)
44. Dieleman, F.; Wegener, M. Compact City and Urban Sprawl. *Built Environ.* **2004**, *30*, 308–323. [\[CrossRef\]](#)
45. Polyzos, S.; Minetos, D.; Niavis, S. Driving Factors and Empirical Analysis of Urban Sprawl in Greece. *Theor. Empir. Res. Urban Manag.* **2013**, *8*, 5–29.
46. Burton, E. The Compact City: Just or Just Compact? A Preliminary Analysis. *Urban Stud.* **2000**, *37*, 1969–2006. [\[CrossRef\]](#)
47. Shawly, H. Evaluating Compact City Model Implementation as a Sustainable Urban Development Tool to Control Urban Sprawl in the City of Jeddah. *Sustainability* **2022**, *14*, 13218. [\[CrossRef\]](#)
48. Burgess, R. The Compact City Debate: A Global Perspective. In *Compact Cities. Sustainable Urban Forms for Developing Countries*; Burgess, R., Jenks, M., Eds.; Routledge: London, UK, 2000; p. 16; ISBN 9780203478622.
49. Næss, P. Urban Planning and Sustainable Development. *Eur. Plan. Stud.* **2001**, *9*, 503–524. [\[CrossRef\]](#)
50. Williams, K. Urban Intensification Policies in England: Problems and Contradictions. *Land Use Policy* **1999**, *16*, 167–178. [\[CrossRef\]](#)
51. Salvati, L.; Sabbi, A. Identifying Urban Diffusion in Compact Cities through a Comparative Multivariate Procedure. *Ann. Reg. Sci.* **2014**, *53*, 557–575. [\[CrossRef\]](#)
52. Banister, D. *Unsustainable Transport City Transport in the New Century*; Routledge: London, UK, 2005.
53. Neyestani, B. A Proposed Sustainable Transportation and Urban Mobility Design. *SSRN Electron. J.* **2015**, 1–21. [\[CrossRef\]](#)
54. Neuman, M. The Compact City Fallacy. *J. Plan. Educ. Res.* **2005**, *25*, 11–26. [\[CrossRef\]](#)
55. Rode, P. *Governing Compact Cities: How to Connect Planning, Design and Transport*; Edward Elgar: Cheltenham, UK, 2018.
56. Burton, E.; Jenks, M.; Williams, K. (Eds.) *The Compact City*; Routledge: London, UK, 2003; ISBN 9781135816995.
57. Bibri, S.E.; Krogstie, J.; Kärrholm, M. Compact City Planning and Development: Emerging Practices and Strategies for Achieving the Goals of Sustainability. *Dev. Built Environ.* **2020**, *4*, 100021. [\[CrossRef\]](#)
58. Stevenson, M.; Thompson, J.; de Sá, T.H.; Ewing, R.; Mohan, D.; McClure, R.; Roberts, I.; Tiwari, G.; Giles-Corti, B.; Sun, X.; et al. Land Use, Transport, and Population Health: Estimating the Health Benefits of Compact Cities. *Lancet* **2016**, *388*, 2925–2935. [\[CrossRef\]](#)
59. Holden, E.; Norland, I.T. Three Challenges for the Compact City as a Sustainable Urban Form: Household Consumption of Energy and Transport in Eight Residential Areas in the Greater Oslo Region. *Urban Stud.* **2005**, *42*, 2145–2166. [\[CrossRef\]](#)
60. Bibri, S.E. Compact Urbanism and the Synergic Potential of Its Integration with Data-Driven Smart Urbanism: An Extensive Interdisciplinary Literature Review. *Land Use Policy* **2020**, *97*, 104703. [\[CrossRef\]](#)
61. Cortesi, A.; Vardopoulos, I.; Salvati, L. A Partial Least Squares Analysis of the Perceived Impact of Sustainable Real Estate Design upon Wellbeing. *Urban Sci.* **2022**, *6*, 69. [\[CrossRef\]](#)
62. Kempton, Y.; Salvati, L.; Vardopoulos, I. Long-Term Planning and Development for Urban and Regional Inclusion, Safety, Resilience, and Sustainability. Insights from Singapore. *Reg. Peripher.* **2022**, *14*, 59–79. [\[CrossRef\]](#)
63. Vardopoulos, I.; Stamopoulos, C.; Chatzithanasis, G.; Michalakelis, C.; Giannouli, P.; Pastrapa, E. Considering Urban Development Paths and Processes on Account of Adaptive Reuse Projects. *Buildings* **2020**, *10*, 73. [\[CrossRef\]](#)
64. Vardopoulos, I.; Papoui-Evangelou, M.; Nosovo, B.; Salvati, L. Smart 'Tourist Cities' Revisited: Culture-Led Urban Sustainability and the Global Real Estate Market. *Sustainability* **2023**, *15*, 4313. [\[CrossRef\]](#)
65. Kyriakogkonas, P.; Garefalakis, A.; Pappa, E.; Kagias, P. Sustainable Project Management under the Light of ESG Criteria: A Theoretical Approach. *Theor. Econ. Lett.* **2022**, *12*, 1517–1538. [\[CrossRef\]](#)
66. Voukkali, I.; Zorpas, A.A. Evaluation of Urban Metabolism Assessment Methods through SWOT Analysis and Analytical Hierocracy Process. *Sci. Total Environ.* **2022**, *807*, 150700. [\[CrossRef\]](#)
67. Christensen, P.P. Historical Roots for Ecological Economics—Biophysical versus Allocative Approaches. *Ecol. Econ.* **1989**, *1*, 17–36. [\[CrossRef\]](#)
68. Dovers, S.R. Sustainability: Demands on Policy. *J. Public Policy* **1996**, *16*, 303–318. [\[CrossRef\]](#)
69. Vardopoulos, I. Industrial Building Adaptive Reuse for Museum. Factors Affecting Visitors' Perceptions of the Sustainable Urban Development Potential. *Built Environ.* **2022**, *222*, 109391. [\[CrossRef\]](#)
70. Economou, A.; Mitoula, R. Sustainable Environment and Quality of Life in Coastal Urban Area of Vouliagmeni in Attica Region, Greece. *Int. Rev. Soc. Sci.* **2018**, *6*, 227–237.
71. Zorpas, A.A. (Ed.) *Sustainability behind Sustainability*; Nova Science Publishers: Hauppauge, NY, USA, 2014; ISBN 9781633215733.
72. Bai, X.; Surveyer, A.; Elmqvist, T.; Gatzweiler, F.W.; Güneralp, B.; Parnell, S.; Prieur-Richard, A.-H.; Shrivastava, P.; Siri, J.G.; Stafford-Smith, M.; et al. Defining and Advancing a Systems Approach for Sustainable Cities. *Curr. Opin. Environ. Sustain.* **2016**, *23*, 69–78. [\[CrossRef\]](#)
73. Costa, M.S.; Silva, A.N.R.; Ramos, R.A.R. Sustainable Urban Mobility: A Comparative Study And The Basis For A Management System In Brazil And Portugal. In *Urban Transport XI—Urban Transport and the Environment in the 21st Century*; Brebbia, C.A., Wadhwa, L.C., Eds.; WIT Transactions on The Built Environment; WIT Press: Southampton, UK, 2005; Volume 77, pp. 323–332.
74. Chavan, A.; Peralta, C.; Steins, C. (Eds.) *Planetizen: Contemporary Debates in Urban Planning*; Island Press: Washington, DC, USA, 2007.

75. Salvati, L. A Long Way to Complexity: Nonlinear “Growth Stages” and Spatially Uncoordinated Settlement Expansion in a Compact City (Athens, Greece). *Geogr. Anal.* **2023**, *55*, 280–299. [[CrossRef](#)]
76. Girardet, H. *Creating Sustainable Cities*; Green Books: New York, NY, USA, 2009.
77. Sodiq, A.; Baloch, A.A.B.; Khan, S.A.; Sezer, N.; Mahmoud, S.; Jama, M.; Abdelaal, A. Towards Modern Sustainable Cities: Review of Sustainability Principles and Trends. *J. Clean. Prod.* **2019**, *227*, 972–1001. [[CrossRef](#)]
78. Ciaschini, C.; Salvati, L. Enlarging Spatial Divides in Local Job Markets? Insights from Italy, 2004–2013. *GeoJournal* **2022**, *87*, 5087–5100. [[CrossRef](#)]
79. Vardopoulos, I.; Tsilika, E.; Sarantakou, E.; Zorpas, A.A.; Salvati, L.; Tsartas, P. An Integrated SWOT-PESTLE-AHP Model Assessing Sustainability in Adaptive Reuse Projects. *Appl. Sci.* **2021**, *11*, 7134. [[CrossRef](#)]
80. Salvati, L.; Morelli, V.G.; Rontos, K.; Sabbi, A. Latent Exurban Development: City Expansion Along the Rural-To-Urban Gradient in Growing and Declining Regions of Southern Europe. *Urban Geogr.* **2013**, *34*, 376–394. [[CrossRef](#)]
81. Mitoula, R.; Astara, O.-E.; Kaldis, P. *Βιώσιμη Ανάπτυξη: Έννοιες, Διεθνείς Και Ευρωπαϊκές Διαστάσεις*; Rosili: Athens, Greece, 2008; ISBN 9608940727.
82. Benassi, F.; Iglesias-Pascual, R.; Salvati, L. Residential Segregation and Social Diversification: Exploring Spatial Settlement Patterns of Foreign Population in Southern European Cities. *Habitat Int.* **2020**, *101*, 102200. [[CrossRef](#)]
83. Doukas, Y.E.; Maravegius, N.; Chrysomallidis, C. Digitalization in the EU Agricultural Sector: Seeking a European Policy Response. In *Food Policy Modelling Responses to Current Issues*; Mattas, K., Baourakis, G., Zopounidis, C., Staboulis, C., Eds.; Springer: Cham, Germany, 2022; pp. 83–98.
84. Mitoula, R.; Papavasileiou, A. Mega Infrastructure Projects and Their Contribution to Sustainable Development: The Case of the Athens Metro. *Econ. Chang. Restruct.* **2023**, *56*, 1943–1969. [[CrossRef](#)]
85. Issaoui, M.; Jellali, S.; Zorpas, A.A.; Dutournie, P. Membrane Technology for Sustainable Water Resources Management: Challenges and Future Projections. *Sustain. Chem. Pharm.* **2022**, *25*, 100590. [[CrossRef](#)]
86. Vardopoulos, I. Multi-Criteria Analysis for Energy Independence from Renewable Energy Sources Case Study Zakynthos Island, Greece. *Int. J. Environ. Sci. Dev.* **2017**, *8*, 460–465. [[CrossRef](#)]
87. Vardopoulos, I.; Konstantopoulos, I.; Zorpas, A.A.; Bennici, S.; Inglezakis, V.; Voukkali, I. Sustainable Metropolitan Areas Perspectives through Assessment of the Existing Waste Management Strategies. *Environ. Sci. Pollut. Res.* **2020**, *28*, 24305–24320. [[CrossRef](#)] [[PubMed](#)]
88. Vardopoulos, I.; Faliareas, S.; Konstantopoulos, I.; Kaliora, E.; Theodoropoulou, E. Sustainability Assessment of the Agri-Environmental Practices in Greece. Indicators’ Comparative Study. *Int. J. Agric. Resour. Gov. Ecol.* **2018**, *14*, 368–399. [[CrossRef](#)]
89. Salvati, L.; Carlucci, M. A Composite Index of Sustainable Development at the Local Scale: Italy as a Case Study. *Ecol. Indic.* **2014**, *43*, 162–171. [[CrossRef](#)]
90. Ragazou, K.; Passas, I.; Garefalakis, A.; Zafeiriou, E.; Kyriakopoulos, G. The Determinants of the Environmental Performance of EU Financial Institutions: An Empirical Study with a GLM Model. *Energies* **2022**, *15*, 5325. [[CrossRef](#)]
91. Zanganeh Shahraki, S.; Ahmadifard, N.; Farhadikhah, H.; Fotouhi Mehrabani, B.; Haydari, A.; Abdali, Y.; Abbasi Fallah, V.; Farhadi, E.; Cividino, S.; Vinci, S.; et al. Spatial Planning, Urban Governance and the Economic Context: The Case of ‘Mehr’ Housing Plan, Iran. *Land* **2020**, *9*, 169. [[CrossRef](#)]
92. Vardopoulos, I. Adaptive Reuse for Sustainable Development and Land Use: A Multivariate Linear Regression Analysis Estimating Key Determinants of Public Perceptions. *Heritage* **2023**, *6*, 809–828. [[CrossRef](#)]
93. Zakarya, Y.M.; Metwaly, M.M.; AbdelRahman, M.A.E.; Metwalli, M.R.; Koubouris, G. Optimized Land Use through Integrated Land Suitability and GIS Approach in West El-Minia Governorate, Upper Egypt. *Sustainability* **2021**, *13*, 12236. [[CrossRef](#)]
94. D’Agata, A.; Quaranta, G.; Salvia, R.; Carlucci, M.; Salvati, L. Mixed Land Use as an Intrinsic Feature of Sprawl: A Short-Term Analysis of Settlement Growth and Population Distribution Using European Urban Atlas. *Land* **2023**, *12*, 972. [[CrossRef](#)]
95. Di Felicianantonio, C.; Salvati, L.; Sarantakou, E.; Rontos, K. Class Diversification, Economic Growth and Urban Sprawl: Evidences from a Pre-Crisis European City. *Qual. Quant.* **2018**, *52*, 1501–1522. [[CrossRef](#)]
96. Di Felicianantonio, C.; Salvati, L. ‘Southern’ Alternatives of Urban Diffusion: Investigating Settlement Characteristics and Socio-Economic Patterns in Three Mediterranean Regions. *Tijdschr. Econ. Soc. Geogr.* **2015**, *106*, 453–470. [[CrossRef](#)]
97. Zitti, M.; Ferrara, C.; Perini, L.; Carlucci, M.; Salvati, L. Long-Term Urban Growth and Land Use Efficiency in Southern Europe: Implications for Sustainable Land Management. *Sustainability* **2015**, *7*, 3359–3385. [[CrossRef](#)]
98. Duvernoy, I.; Zambon, I.; Sateriano, A.; Salvati, L. Pictures from the Other Side of the Fringe: Urban Growth and Peri-Urban Agriculture in a Post-Industrial City (Toulouse, France). *J. Rural Stud.* **2018**, *57*, 25–35. [[CrossRef](#)]
99. Żróbek-Różańska, A.; Ogryzek, M.; Żróbek-Sokolnik, A. Creating a Healthy Environment for Children: GIS Tools for Improving the Quality of the Social Welfare Management System. *Int. J. Environ. Res. Public Health* **2022**, *19*, 7128. [[CrossRef](#)] [[PubMed](#)]
100. Carballada, A.M.; Balsa-Barreiro, J. Geospatial Analysis and Mapping Strategies for Fine-Grained and Detailed COVID-19 Data with GIS. *ISPRS Int. J. Geo-Inf.* **2021**, *10*, 602. [[CrossRef](#)]
101. Mújica, E.B.; Herdman, A.R.; Danaher, M.W.; González, E.H.; Zettler, L.W. Projected Status of the Ghost Orchid (*Dendrophylax Lindenii*) in Florida during the Next Decade Based on Temporal Dynamic Studies Spanning Six Years. *Plants* **2021**, *10*, 1579. [[CrossRef](#)] [[PubMed](#)]
102. Silverman, B.W. *Density Estimation for Statistics and Data Analysis*; Chapman and Hall: New York, NY, USA, 2018.

103. Kontoes, C.C.; Raptis, V.; Lautner, M.; Oberstadler, R. The Potential of Kernel Classification Techniques for Land Use Mapping in Urban Areas Using 5m-Spatial Resolution IRS-1C Imagery. *Int. J. Remote Sens.* **2000**, *21*, 3145–3151. [\[CrossRef\]](#)
104. WELCH, R. Spatial Resolution Requirements for Urban Studies. *Int. J. Remote Sens.* **1982**, *3*, 139–146. [\[CrossRef\]](#)
105. Dom, G.; Samochowiec, J.; Evans-Lacko, S.; Wahlbeck, K.; Van Hal, G.; McDaid, D. The Impact of the 2008 Economic Crisis on Substance Use Patterns in the Countries of the European Union. *Int. J. Environ. Res. Public Health* **2016**, *13*, 122. [\[CrossRef\]](#)
106. Végh, M. Has Austerity Succeeded in Ameliorating the Economic Climate? The Cases of Ireland, Cyprus and Greece. *Soc. Sci.* **2014**, *3*, 288–307. [\[CrossRef\]](#)
107. Sariannidis, N.; Garefalakis, A.; Ballas, P.; Grigoriou, E. Eco-Efficiency, Sustainable Development and Environmental Accounting in the Tourism Industry during a Crisis. *Corp. Board Role Duties Compos.* **2018**, *14*, 58–64. [\[CrossRef\]](#)
108. Jim, C. Green-Space Preservation and Allocation for Sustainable Greening of Compact Cities. *Cities* **2004**, *21*, 311–320. [\[CrossRef\]](#)
109. Zorpas, A.A.; Voukkali, I.; Loizia, P. The Impact of Tourist Sector in the Waste Management Plans. *Desalin. Water Treat.* **2015**, *56*, 1141–1149. [\[CrossRef\]](#)
110. Zorpas, A.A.; Lasaridi, K.; Voukkali, I.; Loizia, P.; Inglezakis, V.J. Solid Waste from the Hospitality Industry in Cyprus. In *Island Sustainability II, Proceedings of the 2nd International Conference on Island Sustainability, Brac, Croatia, 17–19 September 2012*; Favro, S., Brebbia, C.A., Eds.; WIT Transactions on Ecology and the Environment; WIT Press: Southampton, UK, 2012; pp. 41–49.
111. Salvati, L.; Morelli, V.G. Unveiling Urban Sprawl in the Mediterranean Region: Towards a Latent Urban Transformation? *Int. J. Urban Reg. Res.* **2014**, *38*, 1935–1953. [\[CrossRef\]](#)
112. Tsiligiannis, A. Why Isn't Urban Development Sustainable? *J. Contemp. Urban Aff.* **2020**, *4*, 71–78. [\[CrossRef\]](#)
113. Pissourios, I. Ο Χωροταξικός Σχεδιασμός Στην Κύπρο: Ιστορική Εξέλιξη Και Προοπτικές. In *Κοινωνική, Ιστορική και Πολεοδομική Ανάλυση του Χώρου*; Drakoulis, D.P., Tsotsos, G.P., Eds.; Stamoulis: Athens, Greece, 2014; pp. 465–480.
114. Campbell, S. Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development. *J. Am. Plan. Assoc.* **1996**, *62*, 296–312. [\[CrossRef\]](#)
115. Antrop, M. Landscape Change and the Urbanization Process in Europe. *Landsc. Urban Plan.* **2004**, *67*, 9–26. [\[CrossRef\]](#)
116. Doukas, Y.E.; Maravegias, N.; Andreou, G. (Eds.) *Η Χωρική Διάσταση Της Ευρωπαϊκής Ολοκλήρωσης: Σύγκλιση ή Απόκλιση*; Dionicos: Athens, Greece, 2022.
117. Cuadrado-Ciuraneta, S.; Durà-Guimerà, A.; Salvati, L. Not Only Tourism: Unravelling Suburbanization, Second-Home Expansion and “Rural” Sprawl in Catalonia, Spain. *Urban Geogr.* **2017**, *38*, 66–89. [\[CrossRef\]](#)
118. Xie, Y.; Meng, X.; Cenci, J.; Zhang, J. Spatial Pattern and Formation Mechanism of Rural Tourism Resources in China: Evidence from 1470 National Leisure Villages. *ISPRS Int. J. Geo-Inf.* **2022**, *11*, 455. [\[CrossRef\]](#)
119. Vardopoulos, I.; Theodoropoulou, E. Does the New ‘FIX’ Fit? Adaptive Building Reuse Affecting Local Sustainable Development: Preliminary Results. In *Urban Heritage and the Modern City, Proceedings of the International Academic Forum (IAFOR) Conference on Heritage and the City (HCNY2018), New York, NY, USA, 7–9 November 2018*; Official Conference Proceedings; International Academic Forum (IAFOR): Nagoya, Japan, 2018; pp. 97–114.
120. Manola, M. Contribution of the Venetian Monuments of Rhodes to Cultural Tourism and the Local Development of the Island. *Open J. Res. Econ.* **2022**, *5*, 35–42. [\[CrossRef\]](#)
121. Mitoula, R.; Theodoropoulou, E.; Karnabos, D.; Apostolopoulos, C.D. Contribution of Municipalities to the Cities’ Sustainable Physiognomy. Recording Local’s Opinions and Perceptions. The Case of Kallithea. *Int. J. Sustain. Dev. Plan.* **2012**, *7*, 345–355. [\[CrossRef\]](#)
122. Sallustio, L.; Pettenella, D.; Merlini, P.; Romano, R.; Salvati, L.; Marchetti, M.; Corona, P. Assessing the Economic Marginality of Agricultural Lands in Italy to Support Land Use Planning. *Land Use Policy* **2018**, *76*, 526–534. [\[CrossRef\]](#)
123. Panagiotopoulos, P.; Mitoula, R.; Georgitsoyanni, E.; Theodoropoulou, E. The Contribution of Sports Tourism to Sustainable Development Based on Sustainable Development Indicators—The Case of Greece. *Int. J. Multidiscip. Res. Anal.* **2022**, *5*, 1666–1678. [\[CrossRef\]](#)
124. Mitoula, R.; Stathoulopoulos, T.; Genitsaropoulos, C. Die Regional Universitäten und Deren Beitrag zur Wirtschaftlichen Entwicklung der Region. Der Fall von Livadia in Griechenland. *Zeitschrift für die Reg. Wiss.-Hell. Verband der Reg. Wissenschaftler* **2014**, *5*, 71–79.
125. Doukas, Y.E. Economic Activity and Productivity: The Role of Density in the Greek Urban Space. In *Proceedings of the European Association of Geographers Annual Meeting “Geography: Your World—A European Perspective”, Athens, Greece, 2–5 June 2011*; National and Kapodistrian University of Athens: Athens, Greece, 2011.
126. Ye, Y.; Li, D.; Liu, X. How Block Density and Typology Affect Urban Vitality: An Exploratory Analysis in Shenzhen, China. *Urban Geogr.* **2018**, *39*, 631–652. [\[CrossRef\]](#)
127. Duranton, G.; Puga, D. The Economics of Urban Density. *Econ. Perspect.* **2020**, *34*, 3–26. [\[CrossRef\]](#)
128. Salvati, L.; Sateriano, A.; Bajocco, S. To Grow or to Sprawl? Land Cover Relationships in a Mediterranean City Region and Implications for Land Use Management. *Cities* **2013**, *30*, 113–121. [\[CrossRef\]](#)
129. Karaveli, E.; Doukas, Y.E. Rural Development Policy: An Alternative Development Strategy for The Case of Greece. *Reg. Peripher.* **2012**, *21*–36. [\[CrossRef\]](#)
130. Papamichael, I.; Voukkali, I.; Zorpas, A.A. Mediterranean: Main Environmental Issues and Concerns. *Euro-Mediterranean J. Environ. Integr.* **2022**, *7*, 477–481. [\[CrossRef\]](#)

131. Zhang, J.; Cenci, J.; Becue, V.; Koutra, S. Analysis of Spatial Structure and Influencing Factors of the Distribution of National Industrial Heritage Sites in China Based on Mathematical Calculations. *Environ. Sci. Pollut. Res.* **2022**, *29*, 27124–27139. [[CrossRef](#)]
132. Wang, X.; Zhang, J.; Cenci, J.; Becue, V. Spatial Distribution Characteristics and Influencing Factors of the World Architectural Heritage. *Heritage* **2021**, *4*, 2942–2959. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.