
Toward ‘Unequal Landscapes’? Second-Home Expansion, Tourism Polarities, and Socioeconomic Disparities Revisited

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Abstract

Empirical research examining the interrelations between settlement morphology and functional dynamics in metropolitan regions of advanced economies engages with a field that is both complex and intellectually stimulating. Within this framework, metropolitan systems in the old continent constitute a particularly compelling case, as they exhibit pronounced local specificities while simultaneously revealing (broader) structural trends and functional dynamics. These cities especially display a composite landscape in which diverse settlement morphologies intersect with intricate patterns of socio-spatial segregation. Against this background, the present study focuses on metropolitan Athens, Greece, with the objective of discussing the spatial distribution of residential (private) swimming pools in relation to a restricted set of socioeconomic aspects taken as indicators of territorial disparities. Particular attention has been devoted to evaluating claims that swimming pools act as ‘territorial markers’ of luxury consumption and ‘lock-living’ suburbanization, with implications for local class segregation

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and regional socio-spatial organization. More broadly, the study contributes to an empirical assessment of the evolving relationship between metropolitan expansion, demographic restructuring, and environmental sustainability in Mediterranean landscapes.

Keywords: Regional economics, territorial background, urban-rural gradient, local dynamics, indicators.

Introduction

Urban expansion is intrinsically intertwined with socioeconomic dynamics, rendering the systematic examination of metropolitan transformations a complex and analytically demanding task (Bruegmann, 2005; Cohen, 2006; Hall and Pain, 2006; Angel et al., 2011). Any attempt to identify the main determinants of economic growth and settlement expansion should necessarily consider a wide set of explanatory factors (e.g. Musterd and Ostendorf, 1998; Kazepov, 2005; Cassier and Kesteloot, 2012). In the old continent, the interdependence of these factors is shaped by a millenary urban tradition (Salvati and Gargiulo Morelli, 2014). As a matter of fact, the old continent – and especially Southern Europe – is characterized by an extraordinary multiplicity of landscapes, morphologies, economic structures, and social arrangements – a diversity that complicates the task of developing generalized explanatory models (Leontidou, 1996; Di Felicianantonio and Salvati, 2015; Coluzzi et al., 2022). The long-standing debate on the operational task of defining unifying ‘urban models’ has progressively given way to a more nuanced understanding of settlement structures and socioeconomic trajectories as far as social differentiation, landscape fragmentation, economic isolation, and demographic polarization are concerned (Leontidou, 1990; Burgel, 2004; Salvati et al., 2018).

Despite sharing certain territorial traits within the broader group of ‘Southern’ agglomerations, European Mediterranean cities remain socio-economically distinctive, each displaying singular combinations of historical development paths and spatial arrangements (Salvati et al., 2013; Morelli et al., 2014; Egidi et al., 2020). A key feature across many of them, however, is the enduring informality of metropolitan growth, reflecting a possibly deregulated expansion – especially during the 1950s, the 1960s and the 1970s (Grekousis et al., 2013; Souliotis, 2013; Gounaridis et al., 2019). The emergence of ‘dispersed’ and ‘polycentric’ settlement models has further differentiated metropolitan systems in the Northern Mediterranean

region from their 'Western' European counterparts (Chorianopoulos et al., 2010; Delladetsima, 2012; Rontos et al., 2016). Here, exurban development has reflected a broader 'scale leap' in both size (namely area, population density, and activity concentration) and functions of metropolitan regions (Salvati, 2013), whereby urbanization no longer expands contiguously but unfolds across fragmented, diffuse, and socially heterogeneous landscapes (e.g. Kahn, 2000; Galster et al., 2001; Couch et al., 2007). Such transformations have altered (often significantly) the socio-spatial configuration typical of compact Mediterranean cities, particularly in reference with the so-called 'inverse Burgess model', and has given rise to increasingly polarized social structures (Delladetsima, 2006; Leontidou et al., 2007; Maloutas, 2007; Salvati and Carlucci, 2011).

With this perspective in mind, urban sprawl has produced peculiar landscapes composed of detached villas surrounded by walls and surveillance systems, repurposed farms accommodating multi-nuclear families, villages expanding without planning frameworks, and low-quality linear settlements along arterial roads for commercial purposes, among others (e.g. Catalán et al., 2008; Arapoglou and Sayas, 2009; Salvati et al., 2013). Although such patterns emerged later in Mediterranean Europe than in Western and Central European counterparts, they now contribute to a recognizable (suburban) visual culture, sometimes epitomized as a sort of 'lock-living' settlements (Muñoz, 2003; Salvati et al., 2017; Seifollahi-Aghmiuni et al., 2022). Within this context, residential swimming pools functioned as emblematic elements, often interpreted as suburban landmarks (Salvati and Gargiulo Morelli, 2014).

More specifically, residential (private) swimming pools may reflect broad and unexpected social and environmental contradictions in this type of landscapes. Frequently perceived as luxury goods accessible only to affluent households, they have been associated with both ecological unsustainability – due to intensive water use and (indirect) soil sealing – and class polarization, as their existence symbolizes inequalities in access to scarce resources – both natural and economic (e.g. Kaika, 2003; Domene and Sauri, 2006; Vidal et al., 2011; Sallustio et al., 2018). Public protests in response to emergency water transfers to metropolitan regions (such as Barcelona, Athens, or Rome) well highlighted this symbolism, framing swimming pools as emblematic of metropolitan elites' privilege at the expense of ordinary citizens' basic needs (Sauri, 2003; Domene et al., 2005; Kallis, 2010). Evidence suggests that swimming pools represent a significant component of residential water consumption in semi-arid (or dry) regions, linking resource use to urban morphology and low-density settlement expansion (Swyngedouw, 2004).

The distribution of swimming pools may thus reflect broader patterns of socio-spatial inequalities and natural resources' gaps (Ridolfi et al., 2017). Two contrasting interpretations emerged in this direction: on the one hand, pools can be read as characteristic features of de-localized sprawl landscapes transcending the urban-rural divide; on the other hand, they may be seen as manifestations of resource concentration associated with metropolitan centres – attenuating across regional gradients (e.g. Salvati and Carlucci, 2014). This tension is complicated by the specificities of Mediterranean urbanization, where processes of economic growth, re-polarization, and densification in some contexts coexist with enduring social disparities, while exacerbating them in other contexts – especially under economic crisis (Pacione, 2003). Accordingly, swimming pools may signify homogenization in certain metropolitan settings, while remaining symptomatic of deepening class segregation in others (Di Feliciantonio et al., 2018).

Despite their analytical potential, swimming pools have received limited systematic investigation, and further empirical studies are needed to identify generalizable patterns and contextual specificities in the functional nexus between urban sprawl, socio-spatial differentiation, and water/soil use (Salvati and Zitti, 2005, 2009; Ferrara et al., 2016). A pioneering work in Barcelona (Vidal et al., 2011) documented the diffusion of swimming pools across municipalities of varying income levels, challenging the notion that they are exclusively elite amenities or disproportionate drains on regional water supplies. By contrast, comparable studies in other contexts remained scarce, limiting our understanding of how sprawl interacts with long-standing social structures and segregation patterns (Rontos et al., 2016; Karadimitriou et al., 2021; Ciommi et al., 2022).

Against this background, the present study focuses on metropolitan Athens with the objective of discussing the distribution of residential swimming pools in relation to a restricted set of socioeconomic and territorial variables (Tomao et al., 2021). Particular attention is devoted to evaluating claims that swimming pools function as markers of luxury consumption and 'lock-living' suburbanization, with implications for (local) class segregation and (regional) socio-spatial organization (Salvati et al., 2016). More broadly, the study contributes to an assessment of the evolving relationship between urban expansion, demographic restructuring, and environmental sustainability in the Greek capital city (Zambon et al., 2015, 2019; Mavrakis et al., 2016; Zambon and Salvati, 2019). Methodologically, this kind of investigations should combine official statistics, indicators, and quantitative techniques, with a narrative approach to examine how settlement morphology, socioeconomic

structures, and resource use intersect. With this perspective in mind, starting from Athens, Mediterranean cities have been taken as relevant examples of the transition of contemporary (divided) cities from settlement compactness to fragmentation. By embodying socio-spatial imbalances rooted in earlier (deregulated) expansion stages, this class of cities represents a peculiar context with accelerated dynamics shaped by dual influences of social change and economic globalization.

Athens, A Divided City

Metropolitan Athens, taken as the study area in this work, encompasses approximately 3,000 km², corresponding with Attica peninsula, a triangular landmass that constitutes the core of Greece. This territory is subdivided into local communities, including the insular municipality of Salamina (Salvati et al., 2013). From a morphological perspective, the area includes uplands and mountainous formations that delimit the central plain occupied by Greater Athens' conurbation. The region displays the typical attributes of Mediterranean climate with hot, dry summers and relatively mild winters (e.g. Incerti et al., 2007). Maximum daily temperatures consistently exceed 30°C from June to September, while episodes of intense heat can also occur in the transitional months of May and October (Mavrakis et al., 2016). The area was increasingly exposed to the negative impact of increased weather variability at the local scale (Kosmas et al., 2015) and regional climate change (e.g. Salvati et al., 2012; Colantoni et al., 2015; Francaviglia et al., 2019), possibly alighting soil degradation (Mancino et al., 2016) and early desertification processes (Ferrara et al., 2020).

Demographic upheavals have profoundly shaped the long-term Athens' development path. Substantial (internal) migration since World War I intensified during the ensuing civil conflict following World War II, starting (and, subsequently, consolidating) processes of rapid and unregulated metropolitan expansion (Leontidou, 1990). From the 1950s onward, Athens underwent accelerated growth, marked by a structural transformation from an economic system rooted in industrial production to another model oriented toward services (Venanzoni et al., 2017). Prior to the recent crisis, Athens' economic profile had become strongly oriented toward high value-added (secondary and tertiary) activities (Couch et al., 2007). The 2004 Olympic Games constituted an additional turning point, catalysing large-scale infrastructural investment and shaping the metropolitan footprint in significant ways (Delladetsima, 2006). Spatially, urban development until the early 1990s was concentrated

in and around Athens–Piraeus’ conurbation, with additional (discontinuous) settlement expansion being observed along the coastal belt (Vaiou, 1997). Since the early 1990s, however, urbanization has increasingly extended into peripheral districts located North of the main (urban) core. This shift reflected a broader transformation in the metropolitan structure, shifting from spatially contiguous settlement growth in central locations to peri-urban (spatially discontinuous) expansion.

The Role of Original Indicators Delineating ‘Unequal Fringes’

To investigate the spatial distribution of residential swimming pools in metropolitan Athens, the present contribution made direct use of empirical results from earlier studies adopting a methodological framework already developed in Barcelona (Vidal et al., 2011). This is a Mediterranean territory sharing structural similarities with Athens – namely the compact and high-density configuration of inner cities, the presence of sprawling suburban belts, low-density peri-urban settlements, and a more recent expansion of second-home developments along the coastal fringe (Cuadrado-Ciuraneta et al., 2017). Given the absence of official statistics and the limited accessibility of ancillary information from private manufacturers, these works have compiled a comprehensive map of (residential and private) swimming pools in the study area by exploiting Google Earth imagery for years 2010, 2011, and 2012.

A process of on-screen digitization was additionally undertaken reflecting an extensive coverage of local contexts, and ensuring consistency across the entire region (Zambon et al., 2015). For greater reliability, images were preferentially selected from the summer months of June through September, when swimming pools are typically filled and active (Ridolfi et al., 2017). An independent digitization exercise was run using ortho-photographic maps from the same time period at the highest available resolution (1: 5,000). Additional verification was carried out through comparison with topographic maps in use at local planning authorities (Zambon et al., 2017). These ancillary datasets facilitated, especially in some critical cases, the identification and removal of water surfaces not associated with residential swimming pools, such as ornamental fountains, agricultural ponds, or urban/suburban reservoirs (Vidal et al., 2011). Land-use maps were further employed to refine classification, ensuring the accurate attribution of swimming pools to

residential contexts and improving spatial precision in their geo-location (Di Felicianantonio and Salvati, 2015).

Residential Swimming Pools as an Indicator of Socioeconomic Disparities

Socioeconomic indicators were subsequently summarized through descriptive statistics and cartographic representations. While administrative boundaries are, by definition, somewhat arbitrary measurement units, they are commonly employed as reference domains for socioeconomic analysis (Benassi et al., 2020). Their adoption here ensures consistency with official statistical sources and facilitates reliable comparisons with external datasets produced by national censuses and sampling surveys (Egidi et al., 2020). Thematic interpretability thus enhances the accessibility of research outputs beyond the academic domain (Salvati et al., 2013).

As a matter of fact, municipal administrations usually exercise direct authority over land-use allocation, planning regulations, building volumes, and settlement expansion (European Environment Agency, 2006). For this reason, municipalities constitute not only a practical domain, but also a substantively meaningful analysis' scale for investigation of metropolitan growth and spatial planning (Chorianopoulos et al., 2010, 2014). To contextualize (residential) swimming pools' data (descriptively reported in Table 1), municipal-level indicators were integrated into the analysis, along with complementary information from other institutional sources. Quantitative indicators, grouped into multiple thematic categories, were considered (listed in Table 2). Such indicators capture key dimensions of urban form and settlement expansion, including distance from the metropolitan core, population

Table 1 Elementary statistics illustrating the spatial distribution of residential swimming pools and selected (contextual) features of metropolitan Athens by prefectural unit

Prefecture	Pools (%)	Pools/100 Inhabitants	Pools/km ²	Population Density	Population Growth (%)
Athens	32.2	0.13	8.81	7,322	-0.1
Piraeus	1.9	0.02	0.58	3,320	-0.3
Eastern Attica	64.9	1.26	4.17	331	2.4
Western Attica	2.0	0.12	0.21	161	0.6
Metropolitan Athens	100	0.26	3.22	1,245	0.2
Divergence (max-min)	63.0	1.2	8.6	7,161	2.7

Table 2 Spearman rank correlation coefficients between (a) residential swimming pools per 100 inhabitants or (b) spatial concentration of pools (km²) and selected predictors; significant coefficients were shown after Bonferroni's correction for multiple comparisons at $p < 0.05^*$

Indicators	Spatial Availability of Swimming Pools**			Spatial Concentration of Swimming Pools***		
	Early 2000s	Early 2010s	Change (%)	Early 2000s	Early 2010s	Change (%)
<i>Territorial and topographic variables</i>						
Distance from downtown Athens	0.59	0.61	0.60			
Distance from downtown Piraeus	0.69	0.71	0.68			
Distance from international Airport					-0.43	-0.43
Population density	-0.64	-0.64	-0.63			
Population growth	0.58		0.53	0.49		
Per cent share of farmland	0.51	0.51	0.50			
Dwellings per resident inhabitant	-0.56	-0.60	-0.61			
Per cent share of residential buildings	0.61	0.64	0.63	0.49	0.51	0.48
<i>Per cent share of sealed soil in total landscape</i>						
0	0.50	0.50	0.48			
1-5	0.64	0.64	0.63	0.63	0.63	0.56
6-10	0.62	0.63	0.63	0.71	0.73	0.69
11-15	0.50	0.51	0.51	0.63	0.66	0.62
16-20	0.41	0.42	0.43	0.64	0.68	0.64
21-25				0.63	0.69	0.67
26-30				0.55	0.63	0.62
31-35				0.48	0.55	0.52
36-40					0.45	0.43
61-65	-0.53	-0.53	-0.52			
66-70	-0.56	-0.56	-0.55			
71-75	-0.62	-0.62	-0.60			
76-80	-0.68	-0.69	-0.66			
81-85	-0.71	-0.70	-0.67			
86-90	-0.73	-0.74	-0.71	-0.41		
91-95	-0.74	-0.75	-0.73	-0.45		
96-99	-0.73	-0.75	-0.72	-0.48	-0.44	

(Continued)

Table 2 Continued

Indicators	Spatial Availability of Swimming Pools**			Spatial Concentration of Swimming Pools***		
	Early 2000s	Early 2010s	Change (%)	Early 2000s	Early 2010s	Change (%)
<i>Socioeconomic profile (ESEC classes)</i>						
Class1 (high profile)				0.63	0.65	0.57
Class2				0.49	0.52	0.47
Class3		-0.40	-0.40			
Class4	0.41	0.46	0.48			
Class6		-0.40				
Class7	-0.62	-0.63	-0.60	-0.49	-0.47	-0.42
Class8	-0.43	-0.41		-0.64	-0.64	-0.57
Class9 (low profile)				-0.47	-0.51	-0.48

*Insignificant predictors: municipal surface area, average municipal elevation, distance from OAKA Olympic Stadium at Maroussi (Northern Athens), distance from the sea coast line, per cent share of forests in total landscape, participation rate, as well as soil sealing classes between 41% and 60%; **the number of residential swimming pools per resident inhabitant; ***the number of swimming pool per square kilometer.

density and growth, elevation, municipal surface area, proximity to the sea coast, and land-use patterns (Chorianopoulos et al., 2010; Rontos et al., 2016; Salvati et al., 2018; Vinci et al., 2022). This approach allowed for a systematic and replicable measurement of spatial accessibility and centrality across the metropolitan area (Maloutas, 2004; Arapoglou and Sayas, 2009; Panori et al., 2019).

Two areas with density > 20 pools/km² were identified, namely the suburban areas North-east and South-east of Athens (Table 1). Both areas experienced massive sprawl in the last decades. Disparities in the spatial distribution of swimming pools in metropolitan Athens are evident when quantifying pool density in the different prefectural units of the study area. Nearly 13 pools per 1,000 inhabitants were observed in Eastern Attica (a district with dominant sprawled settlements) compared with 0.2 pools per 1,000 inhabitants recorded in Piraeus' prefecture (with basically compact settlements). Pools' density was found negatively correlated to lower grade professional, administrative and managerial occupations to the total workers in each municipality of metropolitan Athens (Working class 2 of European

Socio-Economic Classification of Jobs and Professions, ESEC). These findings contrast with the positive correlation observed for the working class 1 (high profile) and suggests a strong spatial segregation of the highest social classes in metropolitan Athens which are typically associated to luxury apartments and villas with swimming pools (Table 2). Social segregation is contributing to generate a low-density landscape which is not directly associated with the metropolitan gradient (Kourliouros, 1997).

Revisiting Social Inequalities Along Athens' Fringe

In the present study, socioeconomic disparities have been analyzed through a set of quali-quantitative indicators, supplemented with the examination of ancillary (municipal-level) variables (e.g. Allen et al., 2004). The largest proportion of (residential) swimming pools was observed in the suburban prefecture of Eastern Attica (65% of the total stock), and in Central Athens' prefecture (32%). Only 3% of swimming pools were located in both Piraeus' and Western Attica's prefectures. Eastern Attica encompasses the traditional 'sprawl' district of Messoghia plain, experiencing continuous population growth and dispersed settlement expansion in recent years. Its geographic characteristics – 25 km east of central Athens, low-to-moderate population density, average elevation below 300 m, and gentle slopes – made it suitable for the massive development of low-density residential sprawl (Balampandis et al., 2021; Faka et al., 2021; Ciommi et al., 2022). Conversely, Central Athens is largely composed of a high-density urban core experiencing only moderate population de-concentration in recent times, and featuring compact and medium-density settlements (Karadimitriou et al., 2021; Gourzis et al., 2022; Vinci et al., 2022).

Pools' distribution in metropolitan Athens indicate that the highest absolute numbers of pools are located adjacent to the sea coastline, additionally exhibiting a pronounced East–West polarization, with peak concentrations in the Northern and Southern sections of Eastern Attica. Two areas were identified with pools' density exceeding 20 pools/km², specifically situated Northeast and Southeast of Athens, both of which have undergone extensive suburban sprawl in recent years. Disparities in pool distribution are also evident when considering the total amount of swimming pools per capita. The selected information extensively analyzed in this study reflect pronounced spatial segregation of higher socioeconomic classes, typically associated with luxury villas and apartments equipped with pools (Beriatos and Gospodini, 2004), contributing to the formation of low-density landscapes not directly

tied to any metropolitan gradient (Mallinis et al., 2014; Gounaridis et al., 2018; Salvati et al., 2018). Additionally, pool density was found negatively associated with the expansion of protected areas in both agricultural landscapes and natural habitats (e.g. Salvati et al., 2015; Tomao et al., 2017; Cecchini et al., 2019), underscoring the role of land protection in constraining low-density settlements (e.g. Tomao et al., 2021). This may finally suggest the critical role of diversified measures of local development when determining sustainable land management paths in ecologically fragile metropolitan regions.

Concluding Remarks

This aspect reflects pronounced spatial segregation of higher socioeconomic classes, typically associated with luxury villas and apartments equipped with pools, contributing to the formation of low-density landscapes not directly tied to the urban gradient (correlations with distance to central Athens and Piraeus are non-significant). Additionally, pool density is negatively associated with protected areas, underscoring the role of land protection in constraining low-density settlements, and potentially indicating the role of diversified measures of local development.

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