

Challenges for sustainable suburban communities: comparing suburbanization in Romanian and Italian metropolitan areas

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ABSTRACT

The aim of this research is to highlight the differences in sustainable living between suburban settlements in the metropolitan areas of two European countries, emphasizing the role played by urban planning regulations in managing suburbanization. We study the different attitudes of the Italian and Romanian planning systems regarding the suburban development of metropolitan areas. Using three local administrative units as case studies, we analyze the growth of urban areas using Urban Atlas 2006 and 2018 data. The comparison was based on a qualitative method for assessing criteria related to urban morphology, access to basic infrastructure and landscape quality in the selected study areas. The results showcase significant differences between the Italian and Romanian cases, suggesting that the enforcement of upper-level planning regulations, at provincial or metropolitan level, could play an important role in facilitating better living conditions in suburban areas. The study thus shows the importance of comparative analyses in understanding the role of urban planning provisions and metropolitan governance mechanisms in developing sustainable suburban areas. The paper underlines the role of the proposed qualitative assessment methodology in understanding the differences in suburban living in different geographical areas, with the study areas in Romania having significant issues related to landscape quality and the provision of public services. The qualitative analysis method could also be used to define a set of policies for metropolitan or local councils, targeting quality of life improvement in suburbia.

INTRODUCTION

Overview

Urban growth on the urban-rural interface often develops in the form of urban sprawl (Hersperger et al., 2020), defined as an urbanization pattern characterized by low population density (OECD, 2018). Globally, the rate of increase in built-up land exceeds the population growth rate, leading to a steady decline of residential densities (Li et al., 2022). In the European Union, the current urbanization trends in relation to population development are considered unsustainable (Solly et al., 2021), with more than half of the population residing in suburban and peri-urban areas, outside of densely populated cities (Wandl, 2020). This is underlined by the fact that 78 % of land take in the EU between 2012 and 2018 has occurred in commuting areas (EEA, 2022).

Among the 17 Sustainable Development Goals (SDGs) proposed in 2015 by the United Nations, the goal on sustainable cities and communities, SDG 11, can be considered a transversal goal. It features significant interlinkages with other goals related to health and social welfare (Chen et al., 2022), being specifically linked with the supply of public services (Zhao et al., 2022). Consequently, factors such as access to health and education services (Apparicio et al., 2008; Schnake-Mahl & Sommers, 2017), public space quality (Mantey and Sudra, 2019; Buob et al., 2022), access to green areas (Koprowska et al., 2020; Neuvonen et al., 2007) or the capacity of technical infrastructure (Hlaváček et al., 2019) have gained importance when assessing the sustainability of urban development according to quality of living conditions (D'Agostini & Fantini, 2008).

Land take, referring to the conversion of non-urban areas into urban areas, has significant negative impacts on ecosystems (EEA, 2022), which are widely discussed in urban sprawl literature (EEA and FOEN, 2016; Hutyra et al., 2011; Johnson, 2001; Rubiera-Morollón & Garrido-Yserte, 2020; Wilson & Chakraborty, 2013). The European Union target of no net land take 2050 has been established in 2011, with Member States also being required by the new Soil Strategy for 2030 to set targets for mitigating the negative effects of urbanization (European Commission, 2021).

Nevertheless, local government decisions often conflict with European policy targets regarding land take (Grădinaru et al., 2023), with the strength of land use regulations and local governance systems playing an important role in driving land use changes (Siedentop and Fina, 2012). As local planning practices often encourage urban sprawl in metropolitan areas, higher-level institutions could have an important role in reducing land take (Pagliarin, 2018). In this context, comparative studies across different countries have proven productive, especially in terms of theory building (Nowak et al., 2022). Nevertheless, despite their benefits, such studies are still rare,

especially between countries with different planning systems (Gârjoabă et al., 2023; Nowak et al., 2023). The effects of urban planning regulations on the sustainable development of settlements are rarely discussed (Domingo et al., 2021; Jepson Jr and Haines, 2014), especially in a comparative perspective.

Attempting to fill in this gap, this paper proposes a methodology for comparing urbanization patterns in the metropolitan areas of two different European Union countries: Romania and Italy. The aim is to emphasize the role of spatial planning documents and metropolitan governance mechanisms in shaping suburban communities. We propose a novel methodology for assessing urbanization in metropolitan areas, combining quantitative methods based on Urban Atlas datasets for the years 2006 and 2018 with a qualitative assessment of urban morphology, access to public services and landscape quality, based on empirical field surveys. The latter enables a more in-depth analysis of factors which are more difficult to evaluate through proxy indicators. When discussing the results in relation to the provision of existing urban plans, the Italian case stressed out the importance of coherent upper-level planning and public policy for sustainable urban development. As a result, the research underlines the potential role of spatial planning and metropolitan governance in attaining targets related to sustainable cities and communities, while also pointing out the policy areas which need to be addressed for improving quality of life in suburbia. The structure of the paper closely follows our research flow. The next section in the introduction briefly presents suburban development in Romania and Italy, pointing out the differences in causes and effects in relation to the countries' spatial planning systems. The chapter on materials and methods underlines the main characteristics of the three study areas and presents the quantitative and qualitative methods employed in the research. The results are presented in two separate sections, one focusing on the quantitative and qualitative assessment of suburbanization in the three local administrative units, and the other on the provisions of existing spatial planning instruments at local level. The discussions and conclusions provide an interpretation of the results through an urban planning perspective, highlighting the shortcomings of current planning practices in a post-socialist country compared to the improved control measures employed by a more stable spatial planning system.

Suburban development in Romania and Italy

Ekers et al. identify three types of suburban development: self-built, state-led and private-led (Ekers et al., 2012). In the case of post-socialist countries, the dense, state-led suburban housing characterized by forced urbanization and compact areas (Branković et al., 2016) was followed by self-built, fragmented residential areas around larger cities (Hirt, 2007). Suburbanization was thus mostly driven by the development of housing units occupying former agricultural land, as proven by studies

carried out across Central and Eastern Europe (Csizmady et al., 2022, Kovács et al., 2019, Schmidt et al., 2015, Zeković et al., 2015). Besides property restitution (Bičák et al., 2015, Müller et al., 2009), the deregulation of economic activities and the decentralization of political power have also been cited as factors leading to suburbanization in post-socialist countries (Stanilov & Sýkora, 2014). As the adoption of neo-liberal doctrines in these countries after 1990 prioritized private interests (Hirt & Stanilov, 2009), people's cultural values also shifted towards the Western model inspired by the American way of life in suburban areas (Pichler-Milanović et al., 2007). Moreover, spatial planning instruments have been poorly adapted to address suburban dynamics, especially urban sprawl issues (Nowak et al. 2023). The circumvention of planning provisions is one of the main problems identified in post-socialist countries when discussing the difficulties of implementing the provisions of spatial plans (Nowak et al., 2022).

In the case of Romania, the planning system has evolved with the decentralization process and transition to an open market economy (Stan, 2021). The main suburbanization drivers in Romania have been property restitution after the fall of communism (Sandu and de Lille, 2021), often followed by agricultural land abandonment (Grădinaru et al., 2015). The result is often perceived as an un-controlled suburbanization (Dumitrache et al., 2016; Grigorescu et al., 2012), mainly affecting the communes located closest to the core cities (Drăghia et al., 2023). Among the negative effects on the quality of living, the poor accessibility to public social infrastructure is often highlighted (Halbac-Cotoara-Zamfir et al., 2021; Suditu, 2012). Like in the case of other post-socialist countries, Romania is characterized by a more liberal planning system, where no strict requirements are imposed for the provision of public services when approving the development of new housing areas (Mikuła, 2023). In Italy, suburban development in the last decades was characterized by urban diffusion around the largest cities, a pattern which is typical for Mediterranean countries (Arribas-Bel et al., 2011). Suburbanization had its roots in the diffused urbanization of the 1960s and 1970s, led by self-built detached houses, followed in the 1970s and 1990s by private-led mono-functional fragments in the form of residential lots, industrial areas or shopping malls (Tosi and Renzoni, 2018). Sprawl models differ in Northern, Central and Southern Italy, with the former being characterized by suburbanization patterns similar to the ones in Europe's most developed regions (Salvati & Carlucci, 2016).

Differences in suburbanization patterns in Romania and Italy could partly be explained by metropolitan planning and governance in the two countries – see Table 1. Metropolitan areas in Romania are voluntary associations of local administrative units, characterized by purely formal governance arrangements (Munteanu and Servillo, 2014). A special law on Metropolitan Areas in Romania has only recently been approved, in July 2022 (Law no. 246/2022 regarding metropolitan areas). The creation of metropolitan areas around the country's most important cities was strongly stimulated by the access to specially designated EU funds during the 2007-2013 programming period (Benedek and Cristea, 2014). During that time, seven of the largest cities in Romania, designated as National Growth Poles, were obliged to develop Integrated Development Plans and Sustainable Urban Mobility Plans at

metropolitan level in order to receive EU funding for sustainable urban development investments. However, the drafting of these strategic plans at metropolitan level was no longer mandatory after 2013.

Table 1 – A comparative view of planning instruments and governance arrangements in metropolitan areas: Romania and Italy.

Country	Planning instruments	Governance arrangements
Romania	Peri-urban / Metropolitan Territorial Development Strategy* (SDT-P/M) Integrated Urban Development Strategy (SIDU) Sustainable Urban Mobility Plan (PMUD)	Metropolitan Intercommunity Development Association** Transfer of responsibilities (including spatial planning) from LAUs to the Metropolitan Area.
Italy	Metropolitan General Territorial Plan (PTGM) Metropolitan Strategic Plan (PSM) Sustainable Urban Mobility Plan (PUMS)	Metropolitan City, led by (Fedeli, 2017) the mayor of the main city, a Metropolitan Council (executive body) and a Metropolitan Conference (comprising all mayors in the metropolitan area).

Note: * - strategic, non-regulatory and non-mandatory spatial planning instrument. ** - voluntary association of LAUs – private organizations of public utility.

Source: Authors.

Furthermore, there are currently no regulatory spatial planning instruments at metropolitan level, with each local administrative unit developing and approving their own General Urban Plan (GUP). The latter is a legally-binding local zoning master-plan (Nowak et al., 2022), establishing urban growth boundaries and regulating activities and building characteristics, including building density, across the entire local administrative unit’s territory (Law no. 350/2001 regarding territorial and urban planning). However, the GUPs of many local administrative units have not been updated for a long time and are no longer valid (Luca et al., 2021). Given the lack of upper-level planning regulations for controlling urbanization, local administrative units in Romania have developed an entrepreneurial approach to suburbanization (Stanilov and Šykora, 2014). Decision-making regarding housing development is often based on zonal urban plans approved locally, as a derogation from existing GUPs (Grădinaru et al., 2020). This also helps communes increase budgetary allocations received from the Government by expanding urban growth boundaries (Suditu, 2012). In Italy, the Constitutional changes in 2001 led to spatial planning being a competence shared by the national and regional levels, with regional laws developed on the topic of government of territory (Cochechi and D’Orazio, 2019). As a result, there are important differences at regional level in the structure of planning instruments. Metropolitan Areas have been added as a new form of administrative division with the approval of Law 56/2014 (Delrio Law). However, the institutional effectiveness of metropolitan authorities is questioned (Vinci, 2019). The institutionalization of metropolitan areas within the boundaries of previous provinces, assuming their former responsibilities, did not address territorial functional relationships (Fedeli, 2017). The strong local identities of municipalities can also be regarded as a barrier for fostering metropolitan identity (Mariano, 2012). Three planning instruments are proposed at

metropolitan level. The Metropolitan General Territorial Plan (PTGM) is similar to the former Provincial Coordinating Territorial Plan (PTC2), comprising steering norms directing communal planning, also in relation to the control of soil consumption. The Metropolitan Strategic Plan, developed every three years, and the Sustainable Urban Mobility Plan are strategic planning instruments with no direct effect on land use. While the predominance of the zoning-based master plan (General Regulatory Plan – PRG) at local level remains strong, the standards introduced in 1967 ensure that certain coefficients, like minimum percentage of public space, are respected in every land-use transformation (Servillo and Lingua, 2014). The coherence of local level PRGs with the prescriptions of the PTGM is also verified by the Metropolitan Area in the former's approval process.

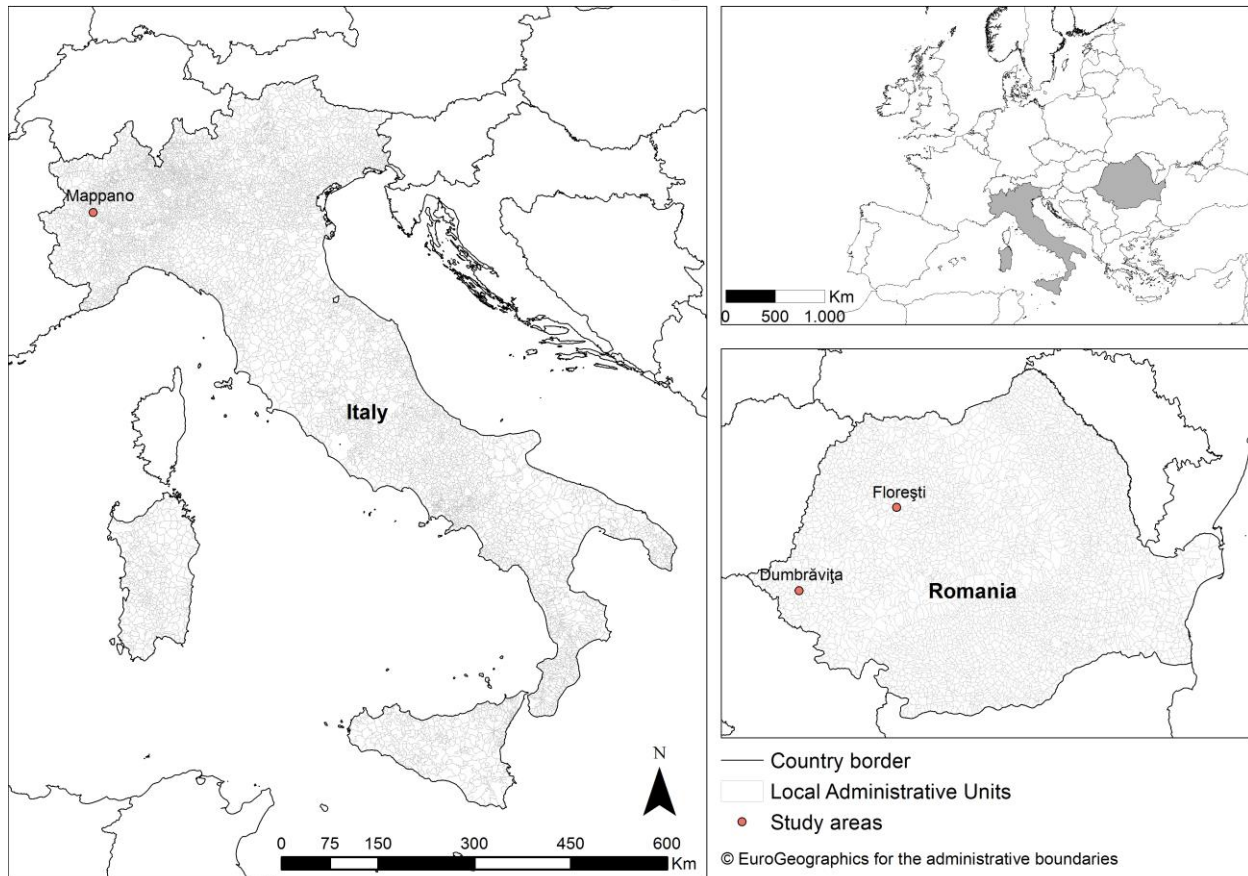
MATERIALS AND METHODS

For the comparative analysis, we chose two communes in Romania (Florești, in Cluj-Napoca metropolitan area, and Dumbrăvița, in Timișoara metropolitan area) and one commune in Italy: Mappano, in Torino metropolitan area – see Figure 1. On the one hand, the choice of the Romanian case studies was aided by previous research regarding urban sprawl in metropolitan areas, which highlighted Dumbrăvița and Florești as the most dynamic suburban communes in the country (Coheci & Petrișor, 2023). On the other hand, Mappano was chosen given its similar status as a suburban commune located in the immediate vicinity of a major city acting as a polarizing center for its nearby peri-urban area. While acknowledging the differences between the spatial planning systems in the two countries, the territorial fragmentation of Mappano, before its individualization as a municipality, was a unique characteristic. As a result, we believed that this fragmentation might have led to similar issues to the ones in Romania, given the difficulties of the spatial planning system to address cross-jurisdictional urban development in metropolitan areas.

Located to the west of the municipality of Cluj-Napoca, Florești is the largest commune in Romania, with a population of over 52,000 residents according to the 2021 National Census. The commune's significant population growth (Simon and Bogan, 2016) was mainly driven by young people moving in from the city of Cluj-Napoca (Coheci and Mitrea, 2018). The commune has thus become a dormitory suburbia for people that work and study in the city, generating car-dependent areas putting significant pressure on existing infrastructure (Baciu et al., 2015; Cadar et al., 2015).

The commune of Dumbrăvița, located to the north of Timișoara, presents some similarities with Florești. It has registered a significant population growth (Gaman et al., 2014; Halbac-Cotoara-Zamfir et al., 2021), reaching 20,000 residents according to the 2021 National Census. It has also experienced urban sprawl due to individual housing development (Bica and Belci, 2014) and high traffic volumes due to commuting (Mustață et al., 2023).

Figure 1 - Location of the countries (Romania and Italy) in Europe. Location of the study areas in the two countries, represented by a red circle.



Source: Authors' Elaboration on data from Eurogeographics.

Mappano became an independent municipality in 2017, formed on the territory of a conurbation extending over four municipalities - Torino, Borgaro Torinese, Caselle Torinese, Leini and Settimo Torinese (Pileri and Scalenghe, 2016). The estimated population is around 7,400 inhabitants (website Tuttitalia). Although the northern periurban area of Torino is characterized by a concentration of agricultural activities (Cinà and Sini, 2015), suburbanization processes in Mappano in the last three decades have led to an important fragmentation of agricultural areas (Corrado et al., 2019). The zoning plans drafted by the four municipalities had limited coordination on the Mappano area, leading to a mix of residential and production areas of expansion (Pileri and Scalenghe, 2016).

In order to quantify recent suburbanization patterns, the Urban Atlas vectorial datasets for the years 2006 and 2018 were analysed using ArcGIS software. The vectors for each of the three communes were rasterized on a 10 x 10 metres cell size and reclassified in order to single out urbanized areas (Urban Atlas codes 11100, 11210, 11220, 11230, 11240, 11300 and 12100 – see Table 2). These built-up areas include urban fabric of different density typologies, irrespective of their form of property, as well as isolated structures and industrial, commercial, public, military and private

units. The reclassification allowed for a comparison of the rasters, individualizing the areas urbanized between 2006 and 2018. For the three local administrative units, we compared the total expansion of built-up surface, the rate of built-up area growth (%) between 2006 and 2018 and the fragmentation of new urbanized areas, measured as the average area of new built-up patches. A 500 x 500 m grid was then generated, covering the expansion areas in all three communes, with one 500 x 500 meters cell in each local administrative unit selected for the field survey analysis.

Table 2 – The first column presents the datasets used in the spatial analysis, and the second one specifies the data type for each dataset, while the third one mentions each dataset’s source.

Dataset	Type	Source
Urban Atlas 2006, 2018	Vectorial (polygon*)	Copernicus Land Monitoring Service
Local administrative units’ boundaries, 2021	Vectorial (polygon)	Eurostat
Points of Interest, 2023	Vectorial (polygon**; point***)	Open Street Map project

Note: *codes 11100 Continuous Urban Fabric (S.L. 80%), 11210 Discontinuous Dense Urban Fabric (S.L. 50% - 80%), 11220 Discontinuous Medium Density Urban Fabric (S.L. : 30% - 50%), 11230 Discontinuous Low Density Urban Fabric (S.L. : 10% - 30%), 11240 Discontinuous Very Low Density Urban Fabric (S.L. 10%), 11300 Isolated Structures and 12100 Industrial, commercial, public, military and private units.

** For classes ‘park’, ‘kindergarten’, ‘school’.

*** For classes ‘clinic’, ‘pharmacy’.

Source: Authors.

For the on-site field survey, observation files were completed in order to qualitatively assess urban morphology characteristics, access to public infrastructure and services and landscape quality. Each criterion was rated on a scale from 1 (Bad) to 3 (Good), depending on certain characteristics – see Table 3.

Table 3 – Observation file used for the field survey, including criteria related to urban morphology, access to public infrastructure and services and landscape quality, rated on a scale from 1 (Bad) to 3 (Good).

Domain	Criterion	1 (Bad)	2 (Medium)	3 (Good)
Urban morphology	Street network	Irregular with narrow cul-de sacs	Narrow streets, cul-de-sacs are an exception	Organized network with decent street width
	Ratio: maximum building height and distance between buildings	Height greater than distance	Height smaller than distance	Height approximately equal to distance
	Lot coverage	Over 60 %	Under 30 %	Around 45 %
	Street front coherence	Discontinuous, no coherent alignment of buildings	Coherent alignment of buildings, no rhythm	Coherent alignment of buildings, with rhythm

Domain	Criterion	1 (Bad)	2 (Medium)	3 (Good)
Access to public infrastructure and services	Energy network	Both gas and public lighting are missing	Either public lighting or gas is missing	Access to both gas and public lighting
	Water and sewage network	Both water and sewage are missing	Sewage is missing	Access to both water and sewage
	Education	No public or private schools and kindergartens within 1 km	Private schools or kindergartens within 1 km*	Public schools and kindergartens within 1 km
	Healthcare	No public or private healthcare or pharmacies within 1 km	Private healthcare or pharmacies within 1 km*	Public healthcare and pharmacies within 1 km
	Leisure	No park or green space within 1 km	No park or green space within 300 meters**	Park or green space within 300 meters**
Landscape quality	Green areas	Green areas are missing or their quality is bad	Well-maintained green areas on private lots	Well maintained green areas on private lots and public streets
	Waste management	No sanitation services, waste is visible in public areas	Waste collected by sanitary operators, but no street cleaning	Access to sanitation services, including street cleaning
	Aesthetics of the facades	Degraded image or use of strident colours and materials	Well-maintained, lack of homogeneity in colours or materials	Well maintained and unitary approach to colours and materials
	Public space	Dirt or cobbled streets, no social activities possible***	Mostly paved streets, few social activities possible	Paved streets, quality of public space encourages social activities

Note: * Or 15 minutes walking distance (Moreno et al., 2021).

** See the 3-30-300 rule regarding green areas (Konijnendijk, 2023).

*** Assessing if the quality of public spaces encourages social activities (Gehl, 2011).

Source: Authors.

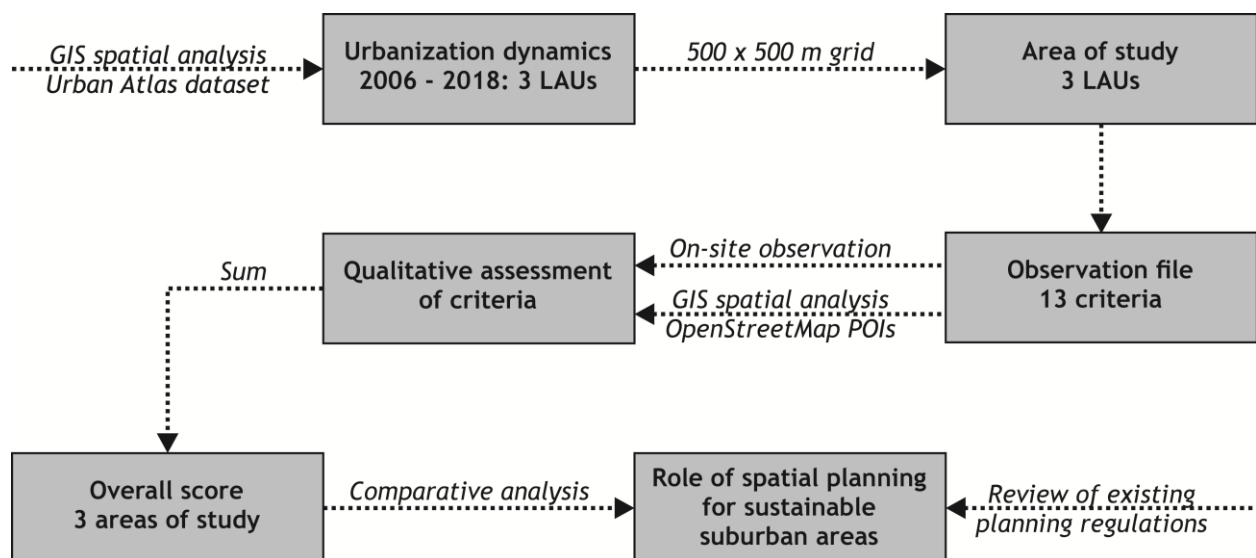
For rating the criteria related to urban morphology and landscape quality, direct on-site observation was used. As far as urban morphology was concerned, the qualitative assessment was based on the general recommendations of Romanian law (Government Decision no. 525/1996) regarding residential areas. We considered lower densities (smaller lot coverage, bigger distance between buildings compared to their height) to be preferable to very high densities, given that the latter are not characteristic for Romanian rural areas, leading to a loss of identity (Ianoş and Jones, 2019). For the criteria related to access to public infrastructure and services, the conclusions of the direct observation were completed by an accessibility analysis, based on generated buffers for the Points of Interest data provided by Open Street Map for both Italy and

Romania. The qualitative assessment was based on the 15-minute city principle of having basic services close to the household (Moreno et al., 2021). As a result, a buffer distance of 1 km was used in the analysis, roughly estimating a 15-minute walk at a pace of 4 km/h. The choice of categories to be analysed when referring to the access to public infrastructure and services was based on the provisions of the Romanian law regarding the need to ensure access to technical infrastructure (energy, water, sewage – see Government Decision no 525/1996), as well as existing norms and recommendations related to the provision of public education and healthcare services (Romanian Registry of Urban Planners, 2014) and the accessibility to green areas (Konijnendijk, 2023).

As far as the assessment of urban landscape quality was concerned, the analysis was partially based on the visual assessment criteria proposed in previous research, which combined landscape components related to buildings (aesthetics, colour), urban infrastructure (roads, sidewalks, public waste management, playgrounds) and green infrastructures (Gavrilidis et al., 2016).

In the end, a general score was computed for each of the three selected areas in the analysed local administrative units. The results were discussed comparatively, taking into account the regulations of existing spatial planning documents and their effects on the sustainable development of suburban areas. For this analysis, the publicly available spatial planning documents published on-line were used. Figure 2 synthesizes the workflow used in the assessment of the selected urbanized areas.

Figure 2 - Research flow of the spatial analyses performed in the study.



Source: Authors.

RESULTS

Quantitative and qualitative assessment of urbanization 2006 - 2018

Overall, the expansion of built-up areas between 2006 and 2018 was 332.52 hectares in Florești, 275.87 hectares in Dumbrăvița and only 28.06 hectares in Mappano. Consequently, the increase rate of built-up areas between 2006 and 2018 was 73.25 % in Florești, 66.68 % in Dumbrăvița and 11.67 % in Mappano. As far as the fragmentation of new urbanized areas is concerned, the average size of new urbanized land was similar: 1.80 hectares in Florești, 1.89 hectares in Dumbrăvița and 1.75 hectares in Mappano.

We selected for the qualitative assessment the areas where most of the urbanization between 2006 and 2018 took place. In Florești, most of the expansion of built-up areas was concentrated to the south of the main settlement. Dumbrăvița was characterized between 2006 and 2018 by a more scattered urbanization, especially in the western part of the commune. On the other hand, urbanization in Mappano was reduced, apart from the production areas located to the north of the main settlement – see Figure 3.

All areas of study in the three local administrative units have good provision of technical infrastructure (energy network, water and sewage network), as well as adequate street front coherence. The differences between the studied areas are discussed below – see also Table 4 and Figure 4.

Table 4 – Results of the criteria evaluation for the three areas selected for detailed analysis. Each criterion was rated on a scale from 1 (Bad) to 3 (Good).

Domain	Criterion	Florești	Dumbrăvița	Mappano
Urban morphology	Street network*	2	3	3
	Ratio: maximum building height and distance between buildings*	2	3	3
	Lot coverage*	1	2	1
	Street front coherence*	2	2	2
Access to public infrastructure and services	Energy network*	3	3	3
	Water and sewage network*	3	3	3
	Education**	2	1	3
	Healthcare**	2	1	2
Landscape quality	Leisure**	3	1	3
	Green areas*	1	2	3
	Waste management*	2	2	3
	Aesthetics of the facades*	1	3	2
	Public space*	2	2	3
Overall score		26	28	34

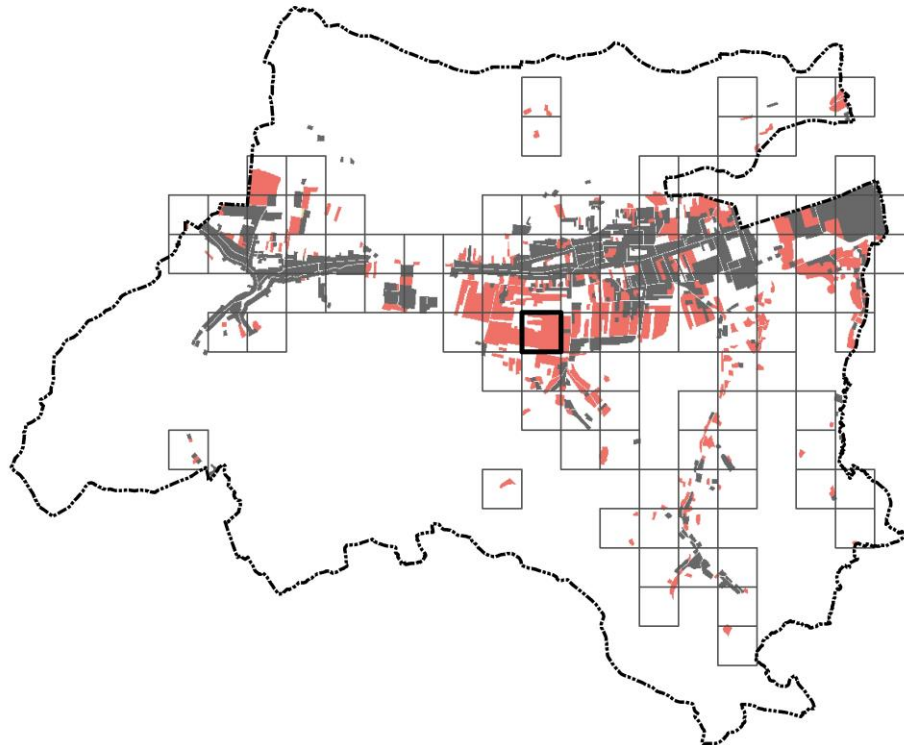
Note: * Based on direct on-site observation.

** Based on direct on-site observation and spatial analysis of accessibility to amenities using OpenStreetMap Points of Interest datasets.

Source: Authors.

Figure 3 - Urbanization dynamics according to Urban Atlas 2006 – 2018.

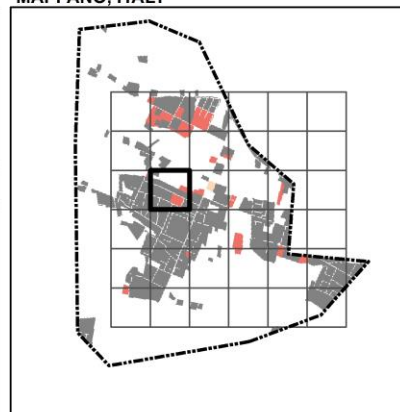
FLOREȘTI, ROMANIA



DUMBRĂVIȚA, ROMANIA



MAPPANO, ITALY



LAU limit

Areas selected for detailed analysis

Grid 500 x 500 m - built-up areas

Dynamics according to Urban Atlas 2006 - 2012

Built-up areas since 2006

Urbanization 2006 - 2018

De-urbanization 2006 - 2018



Red colour represents the areas urbanized between 2006 – 2018, while gray colour represents the built-up areas since 2006. The areas selected for the qualitative assessment are represented with a thick black contour. The figure illustrates the significant expansion of built-up areas in Florești and Dumbrăvița compared to Mappano.

Source: Authors' Elaboration.

Figure 4- Provision of infrastructure and services in the vicinity of the analysed areas in the three Local Administrative Units



Educational facilities – light blue areas; healthcare facilities – blue circles; parks and green areas – light green areas. The figure illustrates the low accessibility to amenities in the Dumbrăvița selected area, compared to the areas in Florești and Mappano.

Source: Authors' Elaboration.

The study area in Florești, Romania, consists mainly of collective housing, in the form of isolated buildings with 4-5 levels. Due to the high density of new collective housing buildings, the study area has the lowest rating in both the lot coverage and ratio between maximum building height and distance between buildings criteria. However, the area benefits from the proximity of private education and healthcare facilities, as well as small green areas located in the vicinity. The lack of green areas and degradation of the buildings' facades also mean that the study area in Florești has registered the lowest score (only 6 out of 12) for the landscape quality criteria. This was also caused by the lack of homogeneity in the materials and colors used for the building facades, as well as the low quality of public spaces, which are mostly occupied by parking lots for residents. All in all, the study area has the lowest overall score (26 out of 39).

In Dumbrăvița, Romania, the study area is characterized by detached single-family housing with 2-3 levels. The urbanization patterns in this area have led to lower building densities compared to the other two areas, with setbacks from the parcel limits determining a good ratio between the height of the buildings and the distance between them. There is also a unitary approach regarding the colors and materials used for the building facades, which leads to an overall good landscape quality (9 out of 12 possible points). Nevertheless, because of the lack of educational facilities, health facilities and public green areas within 1 km, the area has registered the lowest score for the access to public infrastructure and services criteria (9 out of 15). However, the overall score remains higher than in Florești (28 out of 39).

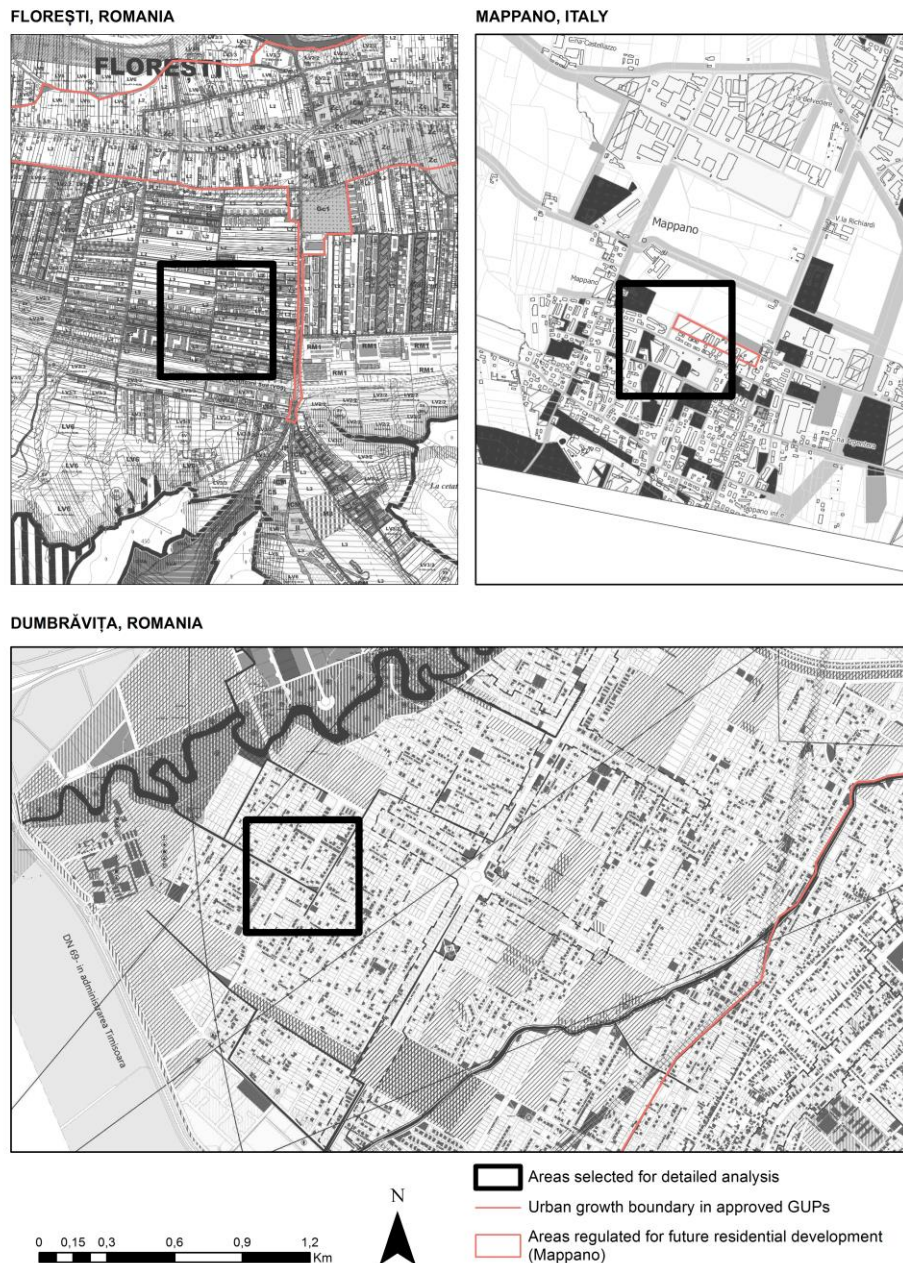
Finally, the study area in Mappano is represented by a mix of collective (5-6 levels) and single-family housing units (2-3 levels) created on previously un-developed parcels of land to the north of the settlement. Like in the case of Florești, the new collective housing buildings have a higher density, determining lower scores for the urban morphology criteria (9 out of 12). However, the area registers the highest score for both landscape quality (11 out of 12) and provision of public infrastructure and services (14 out of 15), leading to the highest overall score from the three studied areas (34 out of 39).

Provisions of urban planning regulations

The General Urban Plan of Florești commune was approved in 2005 and established an urban growth boundary (limit of possible built-up area) that did not take into account future housing developments. As a result, suburbanization occurred through individual Zonal Urban Plans, which allowed, after approval, the extension of the urban growth boundary in order to accommodate the proposed housing developments. A similar process happened in Dumbrăvița, where the General Urban Plan was approved in 2000. The entire area developed in the west part of the commune after 2006 was not included within the urban growth boundary – see Figure 5. While suburbanization was also made possible through individual Zonal Urban Plans which gradually extended the limit of the possible built-up area, the commune benefitted from a steering Zonal Urban Plan for future urban developments. Approved in 2004, this plan regulated the street network, areas for public amenities and general provisions

regarding the development of new housing units (including setbacks and maximum height).

Figure 5- Status of study areas in existing urban planning regulations



The areas in both Florești and Dumbrăvița are located outside of the urban growth boundary (red line) established in the approved General Urban Plans. In the case of Mappano, the study area was partially included in an area for future residential development (red polygon) in the General Regulatory Plan of Caselle Torinese commune (before Mappano gained local autonomy).

Source: Authors' Elaboration.

The General Urban Plans in both Florești and Dumbrăvița are currently expired. In both communes, the process of updating the General Urban Plan has already begun some years ago, with the documents now undergoing approval procedures by different institutions. The current versions under approval are publicly accessible on the local administrative units' websites (Dumbrăvița commune website; Florești commune website). They were used to illustrate the urban growth boundary in the older General Urban Plans. In both cases, the General Urban Plans under approval propose significant extensions of the urban growth boundary: from 381.32 hectares to 3,663.21 hectares in the case of Florești and from 1,078.35 hectares (56.85 %) to 1,789.35 hectares (94.32 % of the administrative territory) in Dumbrăvița.

All GRPs in the metropolitan area of Torino are available on-line and are presented in a unitary manner, using a standardized legend for illustrating land use provisions (Metropolitan Area of Torino website). As Mappano has become a separate local administrative unit in 2017, the General Regulatory Plan (GRP) of Caselle Torinese, approved in 2001 and last updated in 2016, was analysed. The proposed extensions for the selected study area were limited, with an area to the north of the existing built-up land being regulated for residential development. All in all, the expansion of built-up areas in the studied area of Mappano did not exceed the limits imposed by the approved regulatory urban plans.

DISCUSSION

Urban planning shaping (un)sustainable suburbanization

Built-up area expansion according to the Urban Atlas datasets showcase the differences between the local administrative units in Romania, strongly affected by suburbanization processes, and the local administrative unit in Italy. Between 2006 and 2018, built-up areas increased in both Florești and Dumbrăvița by over 250 hectares, meaning that more than two-thirds of the existing built-up land was urbanized in just twelve years. In contrast, the rhythm of urban expansion in Mappano was much lower. This can be explained by the differences between the two countries in terms of urbanization phases (Van den Berg et al., 1982).

On the one hand, metropolitan areas in Romania are clearly in a suburbanization phase, characterized by important housing developments in the communes around the country's main cities. Romania thus falls into the same pattern as other post-socialist countries, where suburbanization processes were triggered by the privatization of state assets, de-regulation of economic activities and de-centralization of decisions regarding land use development (Stanilov and Šykora, 2014).

On the other hand, in Italy, metropolitan areas have gone through the suburbanization phase earlier, starting from the 1960s and 1970s (Tosi and Renzoni, 2018). Like in the case of other Western European countries, some Italian cities are currently in a phase of re-urbanization (Couch and Fowles, 2019), as core cities regain attractiveness and population growth rates in suburban areas decrease.

Analysed in comparison, the results of the qualitative assessment clearly point out the increased sustainability of residential areas in Mappano. The main differences were

registered in the criteria related to the accessibility of public services and infrastructure, as well as those related to landscape quality. The study area in Mappano benefitted from a close proximity to public services (educational facilities), as well as the presence of important green public spaces along the river. While the coherence of the new residential areas is questionable, given the mix between high-rise and low-rise residential areas, the provision of public amenities and overall landscape quality offers the premises for a sustainable suburban development in the future. The fact that suburbanization is controlled through spatial planning instruments is evident from the local urban plan, which minimize the future built-up areas. This is also in line with the provisions of the Metropolitan General Territorial Plan for the metropolitan area of Torino, which places the containment of urban land use as one of the central themes of metropolitan urban policy (Città Metropolitana di Torino, 2022).

In contrast, the study areas in Florești and Dumbrăvița demonstrated the failure of current urban planning instruments in controlling suburban development. In the case of Florești, the new residential areas have been a result of individual planning decisions regarding the development of collective housing complexes on former agricultural land. While the study area had better access to education and healthcare facilities, it should be stressed that these were private schools and pharmacies. Their emergence can be attributed to higher population densities in the new residential areas, which encouraged private entities offering the necessary basic educational and healthcare services.

On the other hand, the scattered, low-density residential development in Dumbrăvița has not yet led to the emergence of private entities providing educational and healthcare services. If certain density thresholds are not met, it will be difficult to ensure the development of commercial or educational activities, as well as efficient public transport networks (Whitehead, 2008). The steering Zonal Urban Plan approved in 2004 ensured a coherent suburban development in terms of urban planning regulations: building height, setbacks from property limits, lot coverage, street front coherence or unitary approach to the colours and materials used. Nevertheless, the areas for neighbourhood amenities and green areas, included in the steering Zonal Urban Plan, were never implemented by the municipality.

Both study areas in Romania confirm the conclusions of previous research: because of low budgets, local governments tried to increase their revenues by approving the development of new residential areas, without having the resources to provide the required basic infrastructure and amenities (Stănuș et al., 2021).

In this regard, our research on the provision of urban planning documents confirms the gap between national policy objectives, related to EU policy, and local governments' decision regarding land development (Grădinaru et al., 2023). In spite of chaotic suburbanization which determined the development of residential areas lacking basic public services, the new General Urban Plans for Florești and Dumbrăvița, currently undergoing approval procedures, continue to propose significant extensions of the existing urban growth boundaries. The extension of urban growth boundaries might be justified given population growth trends in the two communes in the last two decades. However, Romania's spatial planning system is currently lacking both an upper-level metropolitan planning instrument for steering suburban development

across different municipalities and clear standards that could ensure sustainable suburbanization in terms of density, accessibility and provision of public services. In this context, there is a significant risk of expanding already un-sustainable suburban areas.

The case of Mappano might provide an answer for improving metropolitan planning in Romania. The settlement developed in an unfavourable context, given the fact that it was a conurbation stretching across the borders of five different municipalities, with no clear coordination between the provisions of their local urban plans. However, the suburban area benefits from increased sustainability compared to the Romanian case studies. Firstly, existing standards for land-use changes at national level have guaranteed that certain coefficient targets are met. Secondly, provisions of upper-level provincial or metropolitan spatial planning instruments aiming to reduce soil consumption have ensured that there is an intermediate level between the state or region and the local administrative unit which can enforce or verify the compliance to national or regional policy objectives.

Implications for urban planning and policy

The proposed methodology for the qualitative assessment of residential suburban areas can be a useful tool for both experts in the field of spatial planning and policymakers. The methodology is based on an observation file, with clear instructions regarding the rating of different criteria, and open-source datasets like OpenStreetMap. Consequently, the methodology is constructed in a way which ensures its application in different local administrative units or even countries, as demonstrated by this research. By using a comparative approach, the qualitative assessment can point out the areas which need to be addressed. Firstly, this applies to urban planning instruments as urban planning regulations could be improved in order to ensure greater morphological coherence or landscape quality. Secondly, the qualitative assessment can point out the areas where public policies or programs need to be designed and implemented. Some examples include the extension of public infrastructure, improving waste management, refurbishment of public spaces and green areas.

The comparative analysis of urban planning documents can aid in identifying best practice examples that could be adapted in the case of other local administrative units. The case of Mappano has already underlined how upper-level planning documents, coupled with standards for land use transformations, can support land containment policies. Despite being affected by the same legislative shortcomings as Florești, the steering Zonal Urban Plan in Dumbrăvița illustrated a possible approach to ensure that at least some urban planning regulations are applied coherently on the entire administrative territory.

The analysis of urban planning documents also served to underline some major flaws of the current Romanian spatial planning system. Firstly, the derogatory use of individual Zonal Urban Plans in order to continuously expand urban growth boundaries has led to the un-controlled suburbanization often discussed in research. Secondly, the low capacity and political will of local governments to develop updated General Urban Plans has been highlighted, as, the approved General Urban Plans have

expired in both Florești and Dumbrăvița. This can be regarded as a discrepancy between the spatial planning system's discourse at national level, often formally adjusted according to EU policy (Janin Rivolin, 2012), and the practice of spatial planning at local level.

Romania's spatial planning system is currently undergoing a legislative reform, with a proposed Code for Spatial Planning and Constructions. One of the subjects addressed is metropolitan planning. The legislative project, currently debated in the Romanian Parliament, proposes a General Metropolitan Urban Plan that would ensure coordinated land use regulations across all local administrative units in metropolitan areas. It also clarifies the procedures needed for urbanizing land, including taxes that should be paid by the real estate developers in order to facilitate the provision of public infrastructure and services by local public authorities.

If approved in this form, the above-mentioned norms could support the sustainable development of future suburban residential areas in Romanian metropolitan areas. However, the issues determined by the already existing suburban residential areas still persist. This highlights the need of interventions related to densification and regeneration (Solly et al., 2020), including retrofitting of urban sprawl developments (Talen, 2011).

Limits of the study and future research directions

As the qualitative assessment methodology is based on field surveys, the evaluation is influenced by the subjectivity of the observer in rating the different criteria. Subjective assessment could be limited by detailing the rules for rating each criterion. Visual elements (schemes, photographs) could also be added to ensure a more objective assessment. The accessibility to parks, educational and healthcare facilities was based on OpenStreetMap data. This approach has certain limitations, given the fact that data on points of interest is not official, being based on crowd-sourced, collaborative mapping. This could be improved by individually mapping all points of interest (educational and healthcare facilities, parks) in the analysed local administrative units. In the case of Romania, the limited availability of urban planning documents proved to be an issue. As the approved (and expired) General Urban Plan of Florești was not publicly available online, the updated version of the plan, currently undergoing approval procedures, was used in order to determine the limit of the urban growth boundary in the 2005 General Urban Plan. The same approach was then used for Dumbrăvița, as it facilitated the comparison of current trends in the urban planning of the two communes.

The qualitative assessment methodology could be further developed and applied in other study areas. The 500 x 500 meters grid could be replaced with other contours, like the ones provided by population grids. This would enable the inclusion of population dynamics, supporting the analysis of the ratio between land consumption rate and population growth rate, relevant for SDG targets.

Another possible research avenue is the impact of urban planning regulations on suburbanization. This research has already underlined, in the case of Romania, the negative impact of individual planning decisions, based on private-led, un-coordinated

detailed local plans proposing the extension of urban growth boundaries. Future research could also include data on budget revenues, in order to better understand why local public authorities accepted such approaches in the first place.

Lastly, the methodological approach could be used in order to compare suburban areas in countries with similar spatial planning systems and historical evolution. The comparison between Romanian and Italian metropolitan areas allowed the identification of certain instruments that could be applied in the former's case. Nevertheless, comparing two post-socialist countries would provide a deeper understanding of how local governments in similar planning systems responded to similar challenges after 1990.

CONCLUSIONS

The paper aimed to highlight the differences in the sustainable development of suburban areas in Romanian and Italian metropolitan areas. The comparison was made possible by analysing the evolution of built-up areas using Urban Atlas 2006 and 2018 datasets. It illustrated significant suburbanization processes in the two Romanian communes, Florești and Dumbrăvița, compared to Mappano in Italy. A more in-depth qualitative analysis, focusing on aspects related to urban morphology, landscape quality and access to basic public infrastructure and services, underlined the lack of educational and healthcare facilities in Romanian suburbs. In the end, the analysis of existing urban planning regulations served as a possible explanation for the differences between the two countries. In Romania, urban planning instruments have encouraged private initiative in the development of new residential suburban areas. Derogatory local urban plans, approved locally, allowed the continuous extension of urban growth boundaries, without considering the capacity of the local administrations to provide technical infrastructure and invest in public amenities. On the other hand, upper-level norms in Italy, including national standards which need to be respected in every land use transformation project, ensured a more coherent and sustainable development of suburban areas.

The novel qualitative assessment methodology proved useful in carrying out comparative analyses of suburban areas in different countries. In this context, the analysis of urban planning regulations underlined the flaws of the Romanian spatial planning system when it comes to ensuring the sustainable development of metropolitan areas. The research could be developed by including new datasets, like population grids, relevant for the assessment of SDG targets, or by studying in more detail the impact of urban planning regulations on suburbanization.

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