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ANALYSIS OF THE DEGREE OF BUILT DEVELOPMENT DISPERSION IN SELECTED RURAL AREAS OF THE MAŁOPOLSKA REGION IN 2014–2024, APPLYING SPATIAL AUTOCORRELATION INDICES

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ABSTRACT

Aim of the study
The purpose of the study was to determine the degree of build development dispersion (urban sprawl) in selected rural areas of the Małopolska Region in the years 2014 and 2024, using spatial autocorrelation indices (Moran's I). The hypothesis that we tested considered greater clustering of built development in areas with high coverage of local spatial development plans (MPZP) compared to areas developed primarily based on planning permits ("decision on the conditions of building and site development," WZiZT).

Material and methods
The research included an analysis of four municipalities with varying degrees of local spatial development plan coverage during the years 2014–2024, utilizing BDOT10k data. Both global and local Moran's I statistics were calculated in a QGIS environment for the selected areas. The analysis was based on a 250 × 250 m square grid.

Results and conclusions
In all municipalities, the global Moran's I index values were positive (0.36–0.49), indicating a trend towards the clustering of built development, albeit with a clear contribution of dispersion (sprawl). The index value increased in every municipality (from 3% to 9%) over the 10-year period. The local analysis showed the stability of the main clusters of compact development (HH) and undeveloped areas (LL). The results did not confirm the hypothesis; although an increase in spatial autocorrelation was observed in all study areas, its intensity was not proportional to the degree of coverage by local spatial development plans.

Keywords: rural areas, local spatial development plan, spatial autocorrelation, buildings, global and local Moran's index

INTRODUCTION

Rural areas are undergoing numerous transformations, continually generating new challenges and problems (Firlej et al., 2019). Expanding built development and changing rural functions are shaping the landscape, which is becoming increasingly urbanized (Cygankiewicz, 2011). The loss of characteristic features of the rural landscape, of the spatial order, and of local identity, are among the main consequences of urbanization processes (Cygankiewicz, 2011). As a result of these transformations, natural agricultural

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lands are gradually being transformed into built-up areas and infrastructure, leading to a reduction in the size of open areas. Although open lands in rural areas are not always classified as environmentally valuable, they often serve important ecological and landscape functions. Preserving these areas requires responsible land management and promoting the principles of sustainable development. Such actions can contribute to the preservation of their ecological and landscape values, while ensuring a balance between development and environmental protection (Pazdan, 2023).

In the literature on the subject, the dispersion of built development is often presented as a result of the lack of local zoning plans (local spatial development plans) and zoning decisions ("decisions on the conditions of building and site development"), or the result of allocating excessive land reserves in local plans for residential purposes (Gorzym-Wilkowski, 2021). These activities lead to the development of spread-out, non-compact rural areas. The phenomenon was dubbed by Kolipiński (2003) as the "easy space policy". However, it should be noted that other conditions − namely, other than those related to planning − may have a significant impact on the pattern of development. These include, above all, physiographic conditions, including topography of the terrain, soil conditions, water conditions, flood or landslide hazard, which naturally limit or favor specific development locations (Krzyk and Maślanka, 2011). The availability of technical infrastructure – the existing road network and the degree of land development (i.e. site development in terms of utilities) – may also play a significant role. Furthermore, development layout can be determined by economic and social factors such as land prices, investor and property owner pressure, resident preferences, and migration (Śleszyński and Kukołowicz, 2021). We might also consider the historical context – as structural factors resulting, for example, from the existing settlement pattern and former ownership divisions can significantly impact spatial development (Kowalewski et al., 2020).

Properly conducted spatial planning, supported by appropriate legal regulations, plays a crucial role in shaping built development. The existing spatial planning system in Poland determines the conditions for new development. New development can be implemented in accordance with the assumptions of local spatial development plans (zoning plans), while in areas that are not covered by plans, it can be implemented based on "decisions on the conditions of building and site development" (zoning decisions) or decisions establishing the location of public purpose investments (Ustawa, 2003). In the current legal system, a local plan is an optional act of local law, subject to exceptions imposing a mandatory requirement for its preparation. In Poland, still only a small portion of the country's territory is covered by local development plans. In 2024, this coverage amounted to only 32.5% of the country's area (Local Data Bank). There are municipalities where local development plans cover 100% of their area, but at the same time, there are those where no local plan whatsoever has been adopted. New development is less predictable in the absence of a local development plan − and that poses a significant challenge for municipalities responsible for infrastructure planning (Śleszyński, 2018a) and local resource management (Gibas and Heffner 2018a), as well as for local communities. Furthermore, this kind of dispersion negatively impacts landscape values (Chmielewski et al., 2018) and it generates significant environmental costs (Chmielewski et al., 2018). Poland is currently undergoing a process of changes to its spatial planning system, and new rules for the preparation and application of planning documents will come into effect in mid-2026. The new regulations and municipal master plans, which will be in effect from 2026 onwards, are intended to limit the sprawl of built development. Achieving a balance between civilizational needs and environmental protection is a significant contemporary challenge.

The urbanization process in rural areas in Poland, especially in suburban areas, is happening in a disorderly manner; among other things, it is characterized by the occurrence of low-density areas with gaps in the continuity of development, as well as uneven land use. This phenomenon is accompanied by poor spatial centralization, which results in the dispersion of functions as well as difficult or limited access between facilities and functions within the given area (Gibas and Heffner, 2018b). Uncontrolled urban sprawl and the dispersion of development cause enormous social and economic losses (Kowalewski et al., 2020).

The goal of the present analysis is to determine the degree of built development dispersion in the study areas located within rural areas, by applying the global and local Moran index, which indicates the level of spatial autocorrelation between values describing built development intensity. The study aims to answer the question of whether built development in a given area is compact (clustered) or dispersed (chaotic), which is one of the key criteria for assessing the phenomenon of urban sprawl. The analysis included both areas covered by local development plans and those where no such plans are in effect. It would appear that the degree of coverage by local development plans should significantly differentiate the spatial character of built development. Taking theoretical premises into account, the following research hypotheses were formulated: In areas with a high degree of coverage by local development plans, built development will exhibit characteristics of a compact structure, whereas in areas where new development is primarily based on zoning decisions, it will be dispersed.

MATERIALS AND METHODS

Considering the study's intended goals, assumptions regarding the research area were made. The main goal was to identify units in rural areas, using administrative criteria. In the literature, the concept of rural areas is complex and defined in many different ways, depending on the criteria adopted – administrative, demographic, economic, or functional. Another important criterion was the degree of coverage by local development (zoning) plans. When selecting the study area, we omitted parts located in the immediate vicinity of large urban centers, where the impact of urbanization processes is particularly strong, leading to spatial transformations of a suburban nature. Figure 1A presents data on the coverage of individual municipalities in the Małopolska region with applicable spatial development plans in 2014. The largest group consisted of municipalities where local plans covered over 90% of the municipal area. However, there were also municipalities where local plans were not applied − either at all, or only to a limited extent. Over the analyzed 10-year period, the coverage of municipalities with local plans in the Małopolska region increased. The scope of these changes is presented in Figure 1B.

In order to capture the diversity of planning conditions, four municipalities located in the central part of the Małopolska region were selected as the study area (Fig. 2):

1. A municipality whose area is fully covered by local development plans i.e. zoning plans (MPZP), serving as an example of an entity whose investment processes are based on the applicable provisions of local plans – the Słopnice municipality in Limanowa county (the coverage rate in 2014 and 2024 was 99.9%);
2. A municipality with a very low coverage rate of MPZP zoning plans (up to 5%), where development has been based almost exclusively on planning permints ("decision on the conditions of building and site development," WZiZT) over the years – the Limanowa municipality in Limanowa county (the coverage rate of MPZP zoning plans in 2014 was 1.3%, and in 2024 was 1.4%);
3. A municipality with partial coverage of the local zoning plan – Kamienica municipality in Limanowa county (the coverage level in 2014 was approximately 50%, with a slight decrease in the analyzed period to 42% coverage in 2024);
4. A municipality for which full planning coverage was achieved during the analyzed period, enabling an assessment of the impact on the development of new development structures – Iwkowa municipality in Brzesko county (the coverage level in 2014 was 0.2% of the municipality's area, while in 2024 it was 100%).

The largest of the analyzed municipalities is Limanowa municipality, covering an area of 152 km^2. It is also characterized by a relatively high population density, which increased from 162 people/km^2 in 2014 to 171 people/km^2 in 2024. The Iwkowa municipality covers an area of 47.2 km^2 and saw an increase from 133 to 140 people/km^2 over the same period. The Słopnice municipality, although smaller (57 km^2), is characterized by moderate population density, which increased from 114.6 people/km^2 to 123.7 people/km^2 during the analyzed period. In 2024, the Kamienica municipality covered an area of 95 km^2 and had the lowest population density among the selected areas. In 2014, it was 81.7 people/km^2, and in 2024, 81.9 people/km^2 (BDL, 2025).

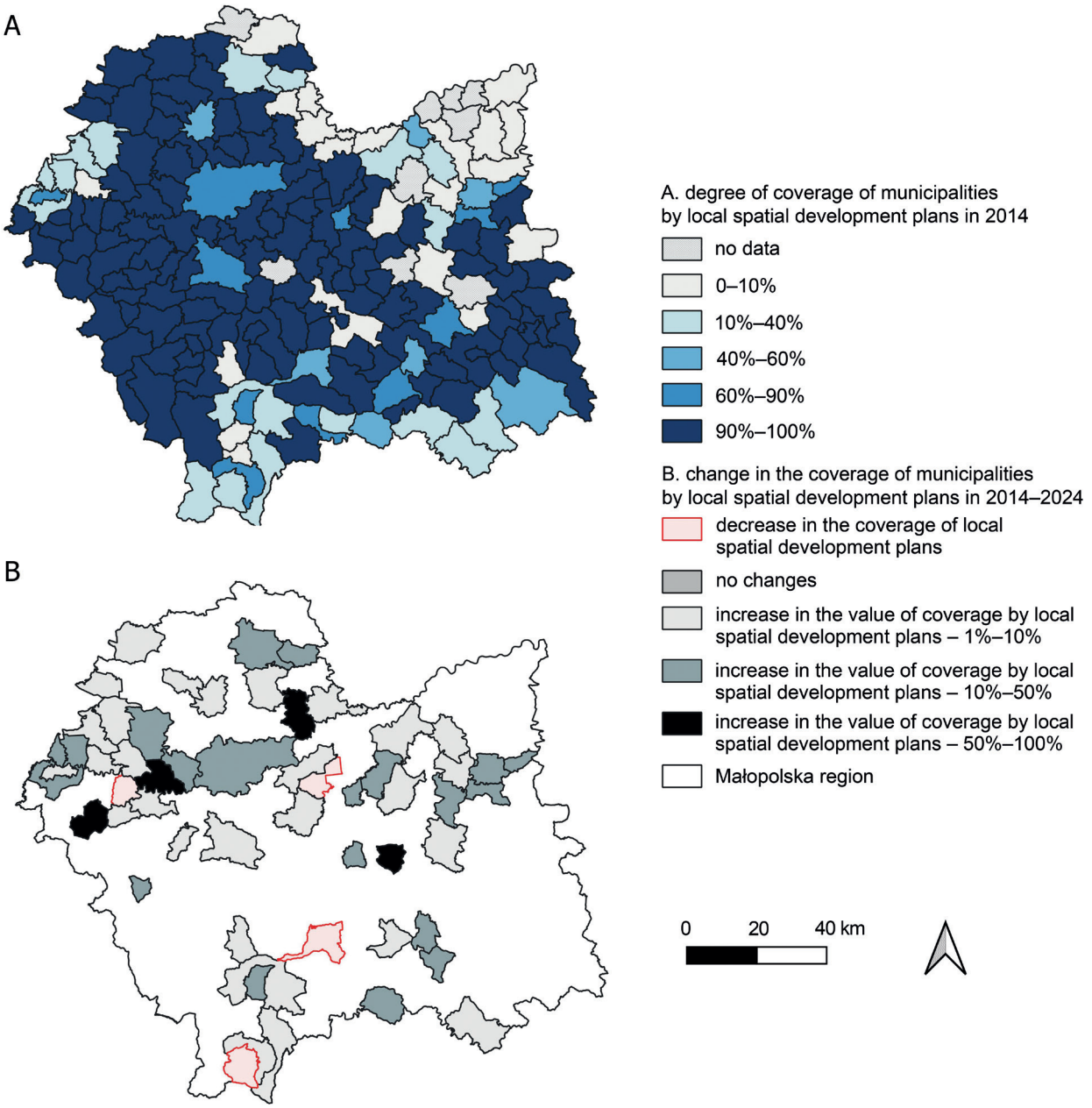

Fig. 1. A. The extent of land coverage of municipalities in the Małopolska region by valid spatial development plans in 2014. B. Changes in the coverage of municipal areas in the Małopolska region by local spatial development plans between 2014 and 2024 (Source: author's own elaboration based on data from the Local Data Bank – Bank Danych Lokalnych, BDL)

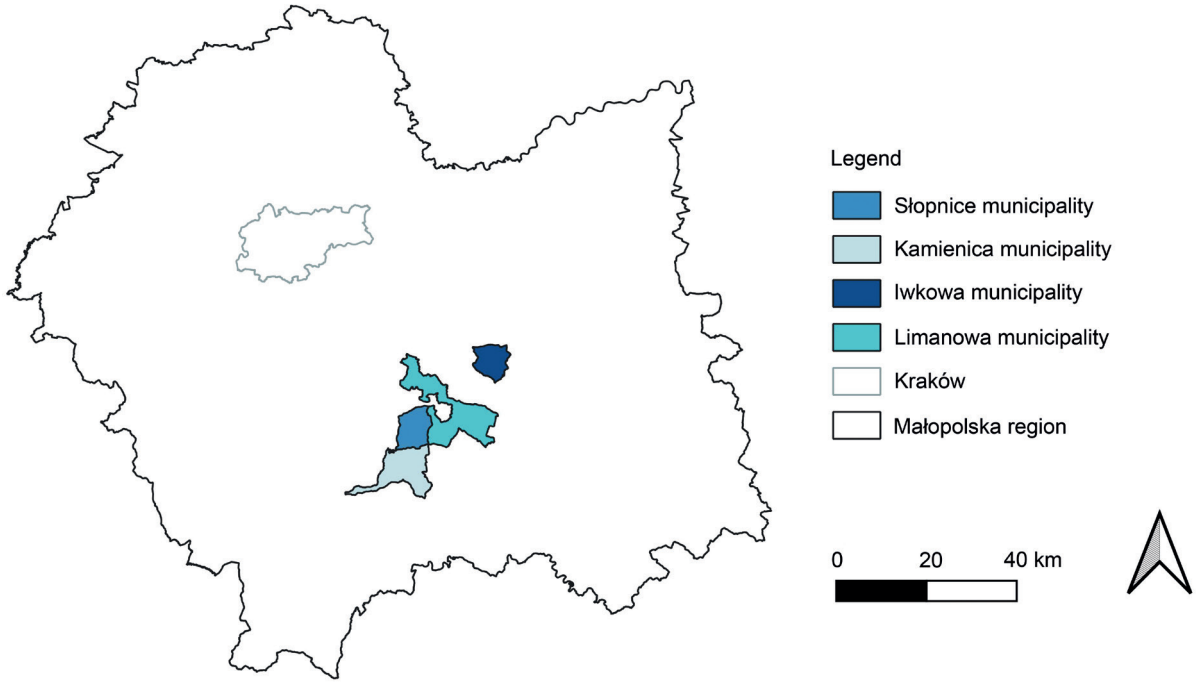

Fig. 2. Location of selected areas against the background of the Małopolska region (Source: author's own elaboration based on data from the National Register of Boundaries – Państwowy Rejestr Granic)

The analysis utilized current and archived data from the Database of Topographic Objects at a scale of 1:10,000 (BDOT10k), which contains detailed information on the structure and distribution of buildings. These data served as the basis for identifying changes in the intensity and extent of built development in selected spatial units during the analyzed period. The analyses were conducted using QGIS software.

In order to determine local spatial relationships within the selected area, we used the global Moran I statistic and the local Moran I_i statistic, which is an example of one of the LISA (Local Indicators of Spatial Association) indices. LISA is a general concept of local spatial autocorrelation indices proposed by Anselin (1995). The said indices allow for the identification of local clusters and anomalies hidden in global statistics. These methods are particularly useful in exploratory analyses of geographic data and are widely used in geoinformatics, spatial economics, planning, and the natural sciences. Moran's I global statistic allows us to determine the general similarities between spatial units within the analyzed phenomenon. Significant positive values of this measure indicate the presence of spatial autocorrelation, i.e., similarity between the studied objects within a specific distance. Negative values, on the other hand, indicate negative spatial autocorrelation, signaling the diversity of the neighbouring studied units. Applying Moran's global statistic to each spatial unit yields one of five solutions (Janc, 2006):

1. Spatial units with high values of the studied variable along with neighboring units with similarly high values.
2. Spatial units with low values of the studied variable along with neighboring units with similarly low values.
3. Spatial units with high values of the studied variable along with neighboring units with low values.
4. Spatial units with low values of the studied variable along with neighboring units with high values.
5. Spatial units without statistically significant spatial autocorrelation (for which $p \geq 0.05$).

The results of the analysis are most often presented in the form of a cluster map. Applications of these

statistics can be found in works by Anselin (1995), Kossowski (2010), Kołodziejczak (2015), Głębocki et al. (2018), Steurer and Bayr (2020), and Hariyanto (2024), among others.

Square grids with sides of 250 × 250 m were selected as the spatial units for the analysis. The use of a regular square grid allows for data uniformity and facilitates the interpretation of results across the entire study area, unlike administrative or cadastral boundaries, which are often irregular and change over time. Each grid cell constituted a spatial unit in the study, and its attribute value corresponded to the number of buildings located within a given square. A "queen" spatial weight matrix was used to define neighborhoods, where cells sharing a common side or vertex were considered neighbours.

The global Moran's I index is calculated using the following formula:

$$I = \frac{N}{W} \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}\left(x_i - \bar{x}\right)\left(x_j - \bar{x}\right)}{\sum_{i=1}^{N}\left(x_i - \bar{x}\right)^2}$$

where:

N – number of spatial units marked with indexes i and j,
x – studied variable,
$\bar{x}$ – mean value of the studied variable for all studied objects,
w_{ij} – elements of spatial weights matrices with zeros on the diagonal (hollow matrix),
W – sum of all w_{ij} ($W = \sum_{i=1}^{N}\sum_{j=1}^{N}$).

In turn, the local Moran's I index is calculated using the following formula:

$$I_i = \frac{x_i - \bar{x}}{m_2} \sum_{j=1}^{N} w_{ij}\left(x_j - \bar{x}\right) \quad \text{where:}$$

$$m_2 = \frac{\sum_{i=1}^{N}\left(x_i - \bar{x}\right)^2}{N} \quad \text{then:}$$

$$I = \sum_{i=1}^{N} \frac{I_i}{N}$$

I – the result of Global Moran's I, a measure of global autocorrelation,
I_i – the local correlation result,
x – studied variable,
$\bar{x}$ – mean value of the studied variable for all studied objects,
w_{ij} – elements of spatial weights matrices,
N – number of analysed spatial units on the map.

RESULTS

From 2014 to 2024, all four analyzed areas saw an increase in the number of buildings. The highest increase was recorded in the Słopnice municipality, at 21.33%. For the Kamienica and Limanowa municipalities, the increase in the number of buildings was similar at 10.76% and 10.98%, respectively. The lowest increase in the number of buildings was recorded in the Iwkowa municipality (6.59%). The Moran's I index ranges from –1 to +1. A positive value (close to +1) indicates a statistically significant clustering of similar values (a high number of buildings neighbours other cells with a high number of buildings). A negative value (close to –1) indicates dispersion, where high values neighbour low values (e.g., densely built-up areas are adjacent to empty or sparsely built-up areas). A result close to zero indicates a lack of spatial pattern, and therefore a random distribution. The global Moran's I index values for selected study areas in the two time periods are summarized in Table 1. These values indicate an increase in all studied areas in the analyzed years, confirming an increase in the spatial concentration of built development. The index value increased in the Iwkowa municipality from 0.468281 to 0.48266 (3.07% increase), in the Kamienica municipality from 0.45745 to 0.49009 (7.14% increase), in the Limanowa municipality from 0.38171 to 0.39884 (4.49% increase), and in the Słopnice municipality from 0.36077 to 0.39313 (8.98% increase).

For each spatial unit (e.g., grid cell), a local Moran's Index (Local Moran's I) was calculated. This result allowed for the classification of units into one of five spatial groups. The High–High (HH) category denotes a high value of the variable surrounded by high values and occurs in densely built-up areas, such as the center of a housing estate. The Low–Low (LL) category – a low value of the variable surrounded by low values – most often denotes undeveloped

Table 1. Characteristics of the study area with the result of the Global Moran's I index (Source: author's own elaboration based on BDOT10K data)

Analysed area	Number of buildings		Degree of coverage with local development plans [%]		Value of global Moran I index	
	2014	2024	2014	2024	2014	2024
Iwkowa municipality	4127	4399	0.2	100.0	0.46828	0.48266
Kamienica municipality	4184	4634	55.1	42.8	0.45745	0.49009
Limanowa municipality	14013	15551	1.3	1.4	0.38171	0.39884
Słopnice municipality	3004	3645	99.9	99.9	0.36077	0.39317

or agricultural areas. The High–Low (HL) category represents a high value of the variable surrounded by low values – typical for single clusters of buildings in a dispersed development, an example of sprawl. The Low–High (LH) category is characterized by a low value of the variable surrounded by high values – denoting empty areas within a dense built development structure. Figure 3 presents the results of the analyses of the local Moran statistics for two research areas, i.e. the Iwkowa municipality in 2014 (Fig. 3A) and in 2024 (Fig. 3B), the Limanowa municipality in 2014 (Fig. 3C) and in 2024 (Fig. 3D).

The main development core (HH hotspots) for the Iwkowa municipality runs diagonally from the upper-middle part of the map towards the center and to the right. This is the main built-up area of the municipality. Undeveloped areas (Low–Low) are located in the northwestern part of the municipality, with smaller areas in the southwestern part. In most cases, these are dense forest complexes or large agricultural areas. Within the Iwkowa municipality, there are isolated Low-High areas, mainly on the outskirts of the main cluster and as isolated points elsewhere. When comparing the results of the data analysis from the year 2014 with those from the year 2024, we see that the basic spatial structure of the municipality is stable. The main clusters of high and low density built development are located almost exactly in the same places. In 2024, the HH cluster absorbed and strengthened some areas in its southwestern edge (middle part of the map). We also note that a significant portion of the area is covered by the vast majority of "insignificant fields." This means that for these areas, the observed pattern of building density is not statistically significant – it may be a result of chance, or the local correlations are too weak for the algorithm to recognize them as significant. The dense development cluster (HH) for the Limanowa municipality in 2014 ran through its central part, stretching along the east-west axis. This cluster is compact, although it has irregular boundaries. In 2024, this belt expanded and densified minimally, absorbing adjacent areas (e.g., along main roads). Distinct, large clusters of undeveloped areas (LL) in 2014 were located primarily on the northern outskirts of the municipality and on the eastern and western edges. In 2024, their shape and location remain almost unchanged. In 2014, the HL areas occurred individually, and there were no distinct clusters of these areas. They were mainly scattered on the outskirts of the main cluster (HH) in the central part of the municipality. In 2024, their number is smaller and they are more dispersed. In the Limanowa municipality, areas (LH) appear sporadically, mainly within the main band of the HH cluster. In 2024, their number is significantly greater, appearing both within and on the outskirts of the main settlement zone.

Figure 4 presents the results of local Moran's statistics analyses for two study areas, i.e., the Słopnice and Kamienica municipalities, in 2014 (Fig. 4A) and in 2024 (Fig. 4B). In both periods, clearly elongated HH clusters are observed, located along the center of

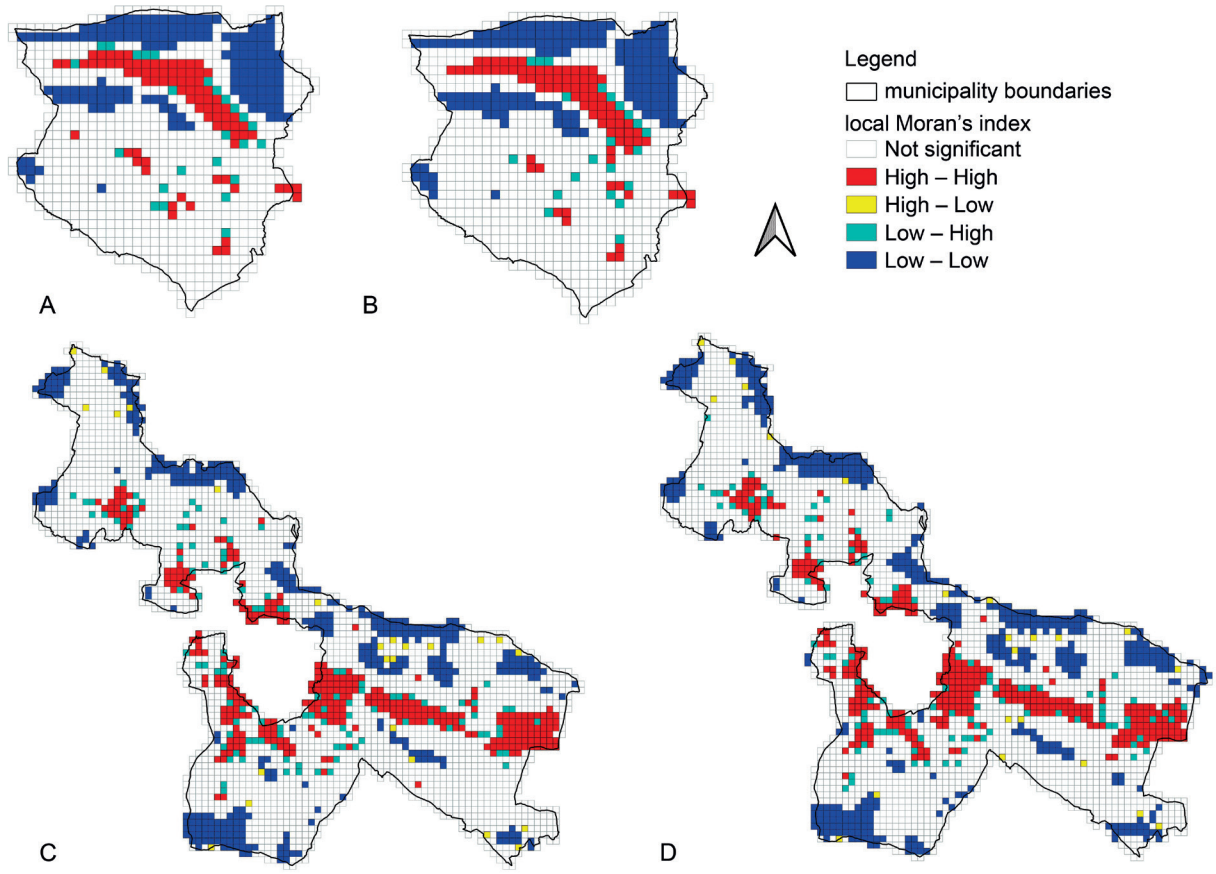

Fig. 3. Results of the Local Moran's I index: A. Iwkowa municipality in 2014. B. Iwkowa municipality in 2024. C. Limanowa municipality in 2014. D. Limanowa municipality in 2024 (Source: author's own elaboration)

the Słopnice municipality. Compared to 2014, the main cluster in 2024 shows a tendency towards minimal expansion and densification. Spatial outliers occurred in 2014 on the outskirts of the HH clusters. In 2024, this is reduced by inclusion in the main HH cluster. There are no Low–Low or Low–High clusters in the analyzed area. The most part of the analyzed area is marked as statistically insignificant (Not Significant). The area in question, characterized by a random or typical distribution of built development density, retains its extent in both periods, providing a stable background for the identified clustering processes. Within the Kamienica municipality, two main, distinct HH clusters are clearly visible. The larger one is located in the southern part of the municipality, and the smaller one in the central-northern part thereof. In the 2014–2024 period, both areas show a slight tendency to strengthen through the absorption of HL areas located on their outskirts. Within the Kamienica and Słopnice municipalities, there are no statistically significant, compact Low–Low or Low–High clusters. The spaces between the clusters are predominantly Not Significant areas.

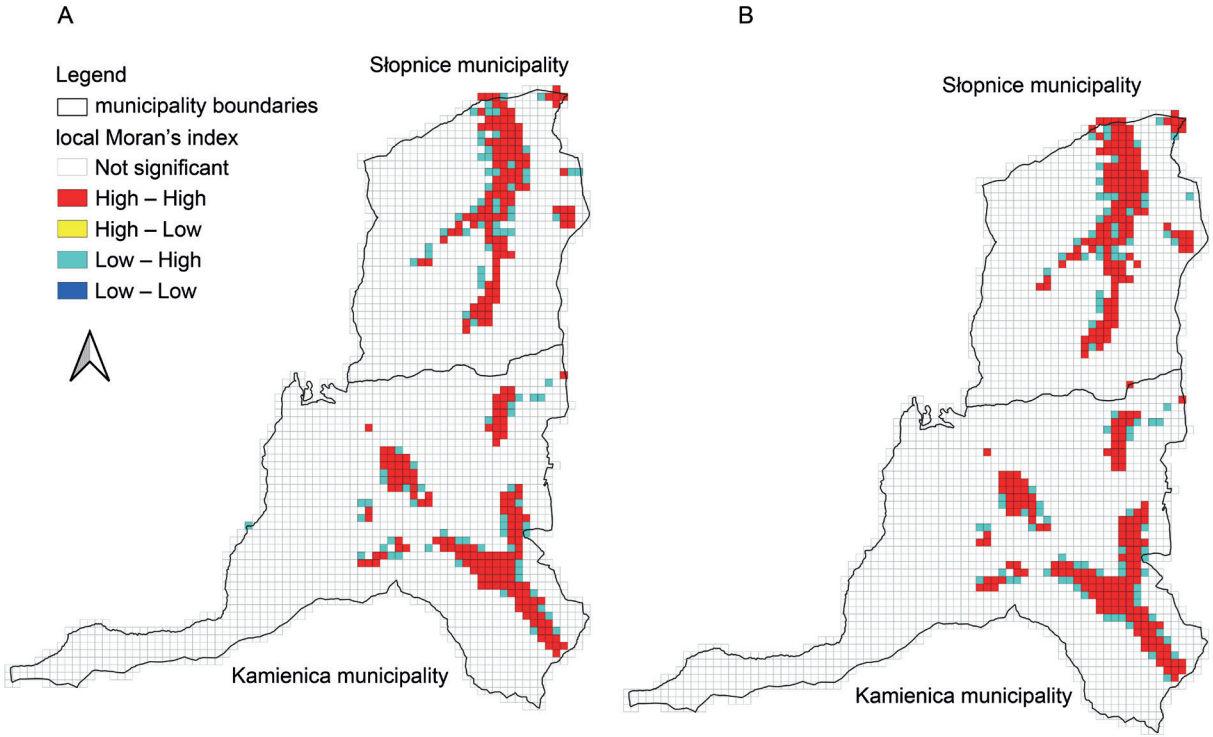

Fig. 4. Results of the Local Moran's I index : A. Słopnice municipality and Kamienica municipality in 2014, B. Słopnice municipality and Kamienica municipality in 2024 (Source: author's own elaboration)

DISCUSSION

In the literature, Moran's I index values are interpreted in the context of the strength of spatial autocorrelation of the studied phenomenon. An index close to 1 indicates strong clustering (positive autocorrelation), close to 0 indicates random dispersion of values (no autocorrelation), and –1 indicates a dispersion of contrasting values (negative autocorrelation). According to the hypothesis, areas with high coverage of local spatial development plans (MPZP) should tend to higher index values, which would reflect planned, condensed spatial development. In all four studied areas, Moran's I index values are positive, ranging from 0.3 to 0.5. This indicates a degree of clustering, with a clear contribution of dispersed built development, but without complete randomness. Studies on the distribution of built development density worldwide often show positive spatial autocorrelation (e.g., Salvati and Carlucci, 2014; Rosati, 2025). This phenomenon stems from the nature of settlement process – people tend to concentrate around the existing infrastructure and centers, which naturally leads to the formation of clusters.

In the present study, differences between municipalities lie in the degree and the intensity of this clustering. An increase of several percentage points (3% to 9%) over the years indicates a clear, albeit not abrupt, progress in the consolidation of built development. The Słopnice municipality shows the weakest trend towards clustering among the studied areas, despite full coverage by local spatial development plans. The Kamienica municipality recorded the highest increase in clustering strength despite incomplete coverage by local spatial development plans − in fact, the aforementioned coverage even decreased (from 55.1% to 42.8%) during the analyzed period. Due to the lack of planning regulations in the form of applicable local spatial development plans, the clustering strength in the Limanowa municipality increased slightly during the analyzed period. In the Iwkowa municipality

(whose local spatial development plan coverage in 2014 was 0.2%, and in 2024 it went up to 100%) recorded an increase in the global Moran's index, which is consistent with the hypothesis, but the dynamics of that increase are not strong and the impact thereof is weaker than in the other study areas. All four areas recorded an increase in the global Moran's index I, meaning that the trend towards built development concentration has strengthened globally in all of the studied areas. Over the past 10 years, construction has expanded, manifesting itself primarily through the densification of the main settlement core. Therefore, the hypothesis was not confirmed.

Areas with statistically significant low building density (LL) demonstrated high stability and retained their character as large undeveloped areas. This suggests an effective barrier (either legal, physiographic, or market-related) protecting these areas from urbanization. The obtained results confirm that the correlation between the degree of land coverage by local spatial development plans and the development pattern is not clear-cut. In many cases, there were areas with a low degree of coverage with local development plans, in which a concentration of new development was observed. The results indicate that the development pattern was determined to a greater extent by factors other than planning. Given the location of the study area in mountainous and foothill areas, it is possible that physiographic factors such as topography, soil and water conditions, and the availability of technical infrastructure naturally guide the location of new development.

It is also worth noting that the literature on the subject points to two phenomena. The first is the lack of local spatial development plans (MPZP), which favors uncontrolled development through individual planning decisions (WZiZT). On the other hand, there are municipalities with adopted local spatial development plans with an oversupply of construction land (for instance, due to pressure from landowners, or in pursuit of high tax revenues). In many municipalities, local spatial development plans designate areas for development whose demographic capacity exceeds the municipality's population several times over (Śleszyński, 2018b). Local spatial development plans do not establish a spatial development sequence, therefore, the order in which individual areas are developed is random. This type of action may also be one of the causes for the dispertion of built development. Nevertheless, these actions are not intentional in nature; instead, they result from an insufficiently integrated approach to spatial policy.

When analyzing the local Moran index (LISA) for the municipalities of Kamienica and Słopnice, we see a high percentage of statistically insignificant cells (classed as "Not Significant") relative to the total number of objects in the grid. A statistically insignificant result indicates that the development pattern in these specific cells is random and does not exhibit a statistically significant tendency toward either clustering or dispersion. This area does not provide significant information about the spatial distribution of the phenomenon. In the context of municipalities with a specific, dispersed physiography, the scale used may be inadequate when it comes to capturing local settlement processes. This leads to the modified unit problem (MUAP), as described by Wong (2009) and Openshaw (1983). To increase statistical power, it is recommended that a local Moran's I analysis be conducted using a varied grid size, which will allow for the identification of hidden areas.

CONCLUSION

Spatial autocorrelation analysis conducted using global and local Moran's I index revealed complex and often inconsistent theoretical correlations between the degree of land coverage by local development plans and the spatial development pattern. The results did not clearly confirm the hypothesis that a high level of planning coverage guarantees greater development concentration, while its absence leads to dispersion. The values of the global Moran's index indicated that the correlation between the existence of local development plans and the degree of built development order is not linear. This means that the planning tool itself is not a sufficient factor in determining spatial development. The obtained results suggest that other factors (for instance, physiographic conditions such as topography of the terrain, soil and water conditions, availability of technical infrastructure, market dynamics) likely had a greater impact on the evolution of the development pattern than the planning tool itself, i.e., the local spatial development plan. In turn, the local Moran's I index maps

enabled the identification of local patterns of built development's clustering and dispersion. In the context of urban sprawl, this tool allows for an intuitive grasp of the spatial variation in urbanization processes. The results of the conducted analyses should be interpreted with certain methodological limitations in mind. The applied statistical-spatial approach, based on Moran's index, is sensitive to the Modifiable Area Unit Problem (MAUP) and to the adopted scale of analysis, which may impact the detection of local autocorrelation patterns.

Further research directions should include the integration of various spatial data sources and the application of multivariate methods that allow for the consideration of socioeconomic, physiographic, and communication factors. Supplementing the analysis with spatial regression models or information entropy indices could enable a deeper understanding of the mechanisms of built development dispersion and their relationship with planning policies and the dynamics of local development.

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ANALIZA STOPNIA ROZPROSZENIA ZABUDOWY NA WYBRANYCH OBSZARACH WIEJSKICH WOJEWÓDZTWA MAŁOPOLSKIEGO Z WYKORZYSTANIEM WSKAŹNIKÓW AUTOKORELACJI PRZESTRZENNEJ W LATACH 2014–2024

ABSTRAKT

Cel pracy

Celem pracy było określenie stopnia rozproszenia zabudowy na wybranych obszarach wiejskich województwa małopolskiego w latach 2014–2024 z wykorzystaniem wskaźników autokorelacji przestrzennej (Morana I). Testowano hipotezę o większym skupieniu zabudowy na obszarach z wysokim pokryciem miejscowymi planami zagospodarowania przestrzennego (mpzp) w porównaniu z terenami rozwijanymi głównie na podstawie decyzji o warunkach zabudowy.

Materiał i metody

Badanie obejmowało analizę czterech gmin o różnym stopniu pokrycia miejscowymi planami zagospodarowania przestrzennego w latach 2014–2024, z wykorzystaniem danych BDOT10k. Obliczono statystyki globalne i lokalne Morana I w środowisku QGIS dla wybranych obszarów. Analiza opierała się na siatce kwadratów 250 × 250 m.

Wyniki i wnioski

We wszystkich gminach wartości globalnego wskaźnika Morana były dodatnie (0,36–0,49), wskazując na tendencję do skupienia zabudowy, z wyraźnym udziałem rozproszenia. Wartość wskaźnika wzrosła w każdej gminie (od 3% do 9%) na przestrzeni 10 lat. Analiza lokalna wykazała stabilność głównych klastrów zwartej zabudowy (HH) oraz terenów niezabudowanych (LL). Uzyskane wyniki nie potwierdziły hipotezy – wzrost autokorelacji przestrzennej zaobserwowano we wszystkich badanych obszarach, ale jego intensywność nie była proporcjonalna do stopnia pokrycia miejscowymi planami zagospodarowania przestrzennego.

Słowa kluczowe: miejscowy plan zagospodarowania przestrzennego, obszary wiejskie, autokorelacja przestrzenna, nowa zabudowa, globalny i lokalny indeks Morana