

Demand for and Development of Greenery in Historic Town Squares: The Case of Zakliczyn

Olga Dagmara Kania

olga.kania@pk.edu.pl |  <https://orcid.org/0000-0002-5785-3413>

Cracow University of Technology,
Faculty of Architecture

Daniel Baldwin Hess

 <https://orcid.org/0000-0003-2239-236X>

University at Buffalo, State University of New York,
Department of Urban and Regional Planning

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Abstract

This article explores the historic development of greenery in market square spaces using the example of the Polish town of Zakliczyn in Lesser Poland. Contemporary Polish conservation policy aimed at preserving a public space's historic values is often at odds with the needs and demands of the general public, whose members appear to be in consensus that urban public spaces, especially market squares, should feature more greenery. This study traces the spatial development of Zakliczyn's market square throughout the last 150 years based on historic cartography and iconography, as well as contemporary orthophotomaps, and demonstrates that greenery in this historic market square is indeed a relatively recent phenomenon, although scant fragments of it did appear as early as immediately before World War II. It also contrasts the greenery in market squares from the People's Republic of Poland period (1947 to 1989) with the most recent revitalizations occurring during the past 5 years.

Keywords: market square, public greenery, revitalization, small town

1. Introduction

One definition of a city is that it is an arrangement of buildings and the spaces between them, enabling residents to lead safe, healthy, and fulfilling lives (Czepczyński, 2012). By this definition, it can be assumed that both the buildings and the space between them, in the eyes of the population, constitute an inseparable whole that reflects the image of the heart of the city. Market squares, known since ancient times as main squares, served formal, social and commercial functions in the centers of cities and towns. The Greek agora combined political, religious and commercial functions and through its center ran the most important street in the city. The Roman forum, as well as squares formed at the intersection of the main axes of the *castrum romanum* military camps – *cardo* and *decumanus*, in addition to buildings related to trade, adorned the most important temples, and the forums themselves were known as arenas for debates and the exchange of political ideas. The model of a central square with the now-familiar features widespread in European cities, was formed in its present form between the Middle Ages and the 19th century (Strzatecka, 2020).

The evolution of public spaces, especially town squares, provides a window into understanding urban transformation projects and how such efforts can be polarizing for professionals and residents. In particular, recent years have seen an expansion of public awareness of ecological concerns, and members of the public have more opportunities to learn about urban greenery and its effects on climate change. A report by the Urban Policy Observatory of the Institute for Urban and Regional Development entitled “Greenery in the centers of Polish cities: Status, Functions and Challenges” reports that one of the greatest concerns that affects the spread of environmental awareness among Poles is the Alarm Smogowy (smog alert) initiative (Warchalska-Troll, Pistelok, 2023). In addition, concerns about climate change and its perceived impact on quality of life have begun to penetrate the political and journalistic discourse to become a kind of manifesto for the younger generation. The surge of interest and awareness among citizens is particularly focused on enhancing urban greenery and avoiding *concretosis* (Mencwel, 2020), a negative term for the oversupply of paved surfaces in urban developments.

Over the past two decades, cities have made efforts to obtain funding from the European Union Cohesion Fund and also from the Polish national Integrated Regional Development Program, which facilitates investment in city markets. Due to the public debate in recent years about the challenges of revitalizing public spaces, it has been customary to focus special attention on revitalization activities related to city squares. This problem has gained a dimension beyond the scientific debate and has lived to see a systemic treatment. In 2021, the Polish Ministry of Culture, Heritage and Sports, together with the Ministry of Climate and Environment, announced allied actions to change the image of urban market spaces, supporting a campaign for greening cities to reverse the trend of concrete-favoring revitalization. There is also a shift in conservation interpretation regarding the revitalization of city markets. Individual cities are taking steps to restore public spaces to their human-friendly character. For example, in Kłobuck a team has been appointed to develop a tree planting plan, and in Kielce city leaders have initiated a project to restore the former green character of the market space. However, the challenges related to the decline of central urban markets must be viewed objectively on a broader scale, taking into account the voices of professionals and the expectations of city residents.

2. Objective, Research Method, and State of the Art

The purpose of this article is to present an analysis of the possibility of providing a historic public square – the market – with greenery in a way that takes into account its historical development and historic values. This analysis was motivated by the calls visible in the public discourse to introduce as much greenery as possible into public places to avoid “concretosis” (*betonozą*) and an aim to determine whether or not the restoration of greenery in its historical form can significantly affect the adaptation of public spaces of Polish cities and towns to climate change, in particular by increasing small-scale water retention and counteracting the urban heat island effect.

Concretosis was one of the most frequently described critical phenomena in a study of 40 cities in the Lublin Voivodeship (Dymek, Jóźwik, 2021). As part of a wide-ranging study that summarized the quality of projects in public spaces, including market squares, the Institute for Urban and Regional Design issued a report in 2015 summarizing the most common problems concerning these projects, listing poor integration with infrastructure, clashes between heritage conservation policy and contemporary needs and demands, and superficial or perfunctory public consultations, often done in a way that minimizes or outright nullifies their impact (Mróz, Pistelok, Salsta-Kochanowski, 2023).

Concrete spaces and grassroots efforts by residents to remove concrete from town square surfaces are explored by W. Szwedkowski (Szwedkowski, 2022). In turn, the article by M. Gargala-Polar, A. Gajdek and I. Kaspruk presented the case of the market square in Gorlice, which, due to public pressure, lived to see a new planting project, breaking the concrete tendencies (Gargala-Polar, Gajdek, Kaspruk, 2022). The subject of the problem of flash floods and flooding in connection with the concreting of urban spaces was dealt with in his works by W. Wojciechowicz (2018). Climate changes in urban space are felt especially by the elderly, who are more likely to experience health problems. The impact of the degradation of the public space of the market on the quality of life in a small city, especially in the context of the quality of life of the aging population, was discussed by K. Starzecka (Starzecka, 2020).

Another problem described in the literature is the reconciliation of perspectives derived from conservation doctrine, namely restoring the original historical expression of market squares. D. Gawryluk, in her study, analyzed the markets of small towns in northeastern Poland in terms of the relationship of greenery led to the space of markets in the 20th century and the possibility of preserving the original, historical character of markets in a way that meets the needs of their users today (Gawryluk, 2015). A. Januchta-Szostak, in the publication *Woda w małym mieście*, notes that market squares, despite serving functions other than parks and garden squares, should today carry a compromise between historical truth and the preservation of green spaces, especially in the expectations of the public (Januchta-Szostak, 2022).

The issue of preserving old trees is discussed by A. Cieślak-Arkuszewska who notes that trees provide optimal benefits in the face of the urban heat island effect (Cieślak-Arkuszewska, 2024). The importance of greenery in public perception is evidenced by the results of a study conducted by T. Mikołajczyk, who analyzed the results of voting in the Civic Budget of Łódź, a policy tool that allows residents to introduce their own concepts of change in urban space, projects that concern green areas and environmental protection ranked second (Mikołajczyk, 2024). Civic Budget spending on green space projects is also the highest. At the same time, the area of green space per capita has increased nationwide (Mróz, 2023).

Based on the above, we conclude that the presence of greenery in historic town squares in Poland and the reaction of the general population towards its perceived reduction or removal are topical and relevant subjects. To our knowledge, no specific studies of the evolution of historic greenery in small town market squares have been conducted with a specific view towards

concretosis, which can be argued to constitute a research gap. This study intends to fill this gap by analyzing Zakliczyn's market square and its latest revitalization project.

3. Historical development of Market Squares in Poland

Traditionally, every city and town had a main square, which functioned as its center and both a multifunctional and integrative space. Due to their formal functions, town squares were considered the “elegant salon of the city”. In addition to the aforementioned social and functional roles, town squares also had a compositional function, creating characteristic urban layouts, often specific to each city. These squares usually had a square or rectangular shape surrounded by block buildings, while in some cases the market was an extended street.

Market buildings were planned with formal front facades facing town squares, which over time were often enriched with administrative (town halls) or commercial (cloth halls) buildings. Large cities had auxiliary squares, taking over the commercial function. In small towns, the market was usually the main and most important commercial space. In addition, in smaller cities, the urban layout of the market squares was sometimes somewhat less complex and generally had one or two streets parallel to it (Słodczyk, 2012). Very often there was a church near the square, around which trees were usually the only tall green accent in the market space (Mazur-Belzyt, 2016), and in the immediate vicinity there was usually a cemetery (Wróblewski, 2011).

Economic and political changes, which began at the turn of the 16th century, influenced the trajectory of decline of Polish cities, which manifested itself in the loss of municipal rights or degradation of the urban fabric. In the 19th century, market squares became formal spaces and this status evolved in the 20th century. Their commercial character was gradually supplanted, and cultural, political and religious events were held in the markets. Significantly, greenery in market spaces began to appear on a larger scale only with the municipal sanitary reform movement (Przesmycka, 2009). With the passage of time and the changing political situation, especially during the period of reconstruction from the World War II, the market squares of cities and small towns underwent further transformation.

The second half of the 20th century brought changes in road layouts, the planting of tall greenery, or the erection of monuments that were symbols of the dominant political system (Kuśnierz-Krupa, Krupa, 2015). The greenery did not primarily perform its original function, but was intended to serve as a partial restriction of mass gatherings. Greenery was rarely a traditional compositional element of the original market layouts. Only the post-World War II years brought a noticeable trend related to the appearance of plantings and the creation of a market square on the model of an “urban park” (Kuśnierz-Krupa, Krupa, 2008). The introduction of greenery into the space of markets was tied to a number of benefits for local communities (Wejchert, 1947). In many towns, the emerging plantings were not orderly, and their appearance resulted from unpaid voluntary work promoted by the communist regime (Gawryluk, 2015).

With the turn of the 20th and 21st centuries, more and more changes began to appear in the approach to market spaces. Significant areas were dedicated to transportation infrastructure, most often parking lots for cars; in addition, commercial use in the form of a place for a cyclical market was often maintained. A clear improvement in the aesthetics and organization of city squares can be dated to the period of Poland's accession to the European Union, which was associated with an influx of funds, the exchange of good practices or the beginning of the spread of education about the role of public space in the city. At that time, however, discussions about climate change were largely absent from public discourse on a scale comparable to today.

Today, with increased public awareness and widespread access to ecology resources, as well as residents' lived experiences with extreme weather conditions, expectations and requirements for market spaces have changed. The reorganization of transport in the form of eliminating vehicular traffic from the market space is receiving less and less criticism as 'car free' streets and zones become more popular in European cities. As the results of public consultations show, residents value the presence of greenery in the space of the market squares regardless of its origin. It may seem that the complete preservation of historical authenticity is not a priority at the present time over the benefits to be derived from maintaining and preserving greenery in the space of city squares. Reconciling conservation doctrine with public expectations and needs is one of the issues towards which working out a compromise is one of the more difficult challenges.

4. Exploring the Market Square in Zakliczyn

The market square in Zakliczyn – a small town located in the Lesser Poland Voivodeship, Tarnów County, with a well-documented history of urban development and preserved iconography which depicts historic urban spaces containing greenery – was selected for analysis. It contains historic public space where greenery used to exist but has been removed in modern times.

The study is carried out using a modified version of the multistage method of analyzing the historical development of city and town plans proposed by D. Kuśnierz-Krupa to study the development of the historical urban layout of Skawina (Kuśnierz-Krupa, 2019a) and a number of cities in Lesser Poland and Subcarpathia (Kuśnierz-Krupa, 2019b). Our study employs publicly available historical cartographic materials, including a digital version of the Third Military Survey of the Habsburg Monarchy from 1869–1887. We analyze the historic evolution of Zakliczyn's urban layout using archival maps, including those available in the literature, primarily the 1848 Galician Cadastre and the First Military Survey Map of Galicia and Lodomeria from 1769–1783 (Kuśnierz-Krupa et al., 2022). These materials were compared with publicly available historical iconography, primarily postcards and photographs of the town from various periods.

This information was set against the general historical background of the development of market squares in Poland, which shows that greenery had not always been a fixture of these spaces, but it was used in some instances, and in others, it became the predominant element, essentially changing market squares into park spaces, for instance in Jordanów.

This study makes a scholarly contribution about how historic city spaces can be better adapted to climate change in terms of combating the urban heat island effect and enhancing water retention, two key areas of concern in climate change discourse (Masson et al. 2014). Green areas in historic city centers, especially those with a high paved-to-non-paved surface ratio, can be used as rain gardens and thus aid in lowering the necessary capacity of surface runoff drainage systems and can also help regulate outdoor thermal comfort (Majidi et al., 2019). Likewise, opting for less sealed spaces as part of land use policies and increasing the share of biologically vital areas can, contribute to lowering the urban heat island effect, as observed by Tepanosyan et al. in Yerevan, Armenia (2021) and as observed by Yang et al. (2022), who explored greenery's potential to cool urban spaces. This cooling and shading potential has also been analyzed from the standpoint of ecosystem services and, more recently, cultural ecosystem services (Pan et al., 2024), with a sizeable body of literature dedicated to this subject (Hølleland et al., 2017).

5. Analysis and Findings

Analysis of available historical maps of Zakliczyn, including the Galician Cadaster and the First and Third Military Survey of the Habsburg Empire, corroborated that the overall layout of Zakliczyn's urban core has not changed significantly up to the present. Since individual trees and patches of greenery were not depicted on these maps, it is difficult to ascertain whether or not greenery had been present in Zakliczyn's market square at the time of the survey. Figure 1 presents the town's layout in the period when the Third Military Survey was drafted between 1869 and 1887.



Fig. 1. Zakliczyn as show on the Third Military Survey of the Habsburg Empire (1869–1887), the map does not include trees; source: <https://maps.arcanum.com/en/map/thirdsurvey25000/?layers=129&bbox=2313050.6332363654%2C6418508.464451649%2C2319079.603842359%2C6423209.341691188> (accessed: 10.11.2024)

Our further exploration of historic iconography brings with it more information. A surviving postcard reputedly from the early 20th century displays a pharmacy and school located in Zakliczyn (Figure 2, left side). Based on the attire of the people and the bicycle rider, the image can be dated to the late 1920s or 1930s. The image clearly shows a grouping of trees and a small fragment of a lawn in front of the building, and the trees appear to tall enough that it can be assumed they had been planted at least a decade earlier. An analysis of the architectural detail of the building and publicly available contemporary Google Street View imagery shows that the building in the postcard is located on the corner of Różana Street and Rynek; this location is the southern terminus of the market square's western frontage. A contemporary view of the building has been presented in Figure 5 further in the paper. Another postcard, also from the early 20th century and shown in the right part of Figure 2, shows the Zakliczyn market square as viewed from the general area of its northwest corner. There is a patch of greenery that can be seen in the lower right corner of this photo, but it does not appear to be landscaped greenery and instead depicts loose shrubbery that grows out of the square's earthen surface, as there appears to be no paving or gravel on it.



Fig. 2. Left: historical postcard depicting the pharmacy and school in Zakliczyn in the interwar period of the early 20th century (1918–1939); right: historical postcard depicting the market square in Zakliczyn as viewed from the northwest corner; source: <https://zakliczyn.org/archiwum/stare-zdjecia/pocztowki/> (accessed: 10.11.2024)

Between 2019 and 2022, Zakliczyn's market square was renovated according to a 2017 design by Artur Grodziński Architekci, a project approved by the Voivodeship Conservator of Monuments for Lesser Poland. The conservator deemed the greenery in the western part of the square, referenced in a 1970s orthophotomap as shown in Figure 3, as ahistorical and in violation of the square's original composition (Michalczyk, 2022). Removal of this greenery was recommended by the conservator. An orthophotomap showing the state of the market square after the 2019 revitalization shows that the greenery in the western part of the square was removed, including elements that can be seen in the archival postcard, and in its place, rows of new trees were planted along the streets that circumnavigate the square during the revitalization.

While the postcard seen in the left side of Figure 2 does show a part of the greenery that is visible in Figure 3, the postcard only depicts a small portion of the square. The greenery seen in Figure 3 along the road that runs diagonally through the square is not present in the right section of Figure 2, which supports the argument that it was introduced later, and depending on the historicity cutoff threshold adopted, can indeed be considered ahistorical.

Fig. 3. Zakliczyn as shown on an orthophotomap preceding the revitalization that took place in 2019–2022; source: <https://maps.arcnum.com/en/map/thirdsurvey25000/?bbox=2315740.8577414737%2C6420899.937838427%2C2317248.1003929717%2C6422075.157148312&layers=here-aerial> (accessed: 10.11.2024)



Fig. 4. Zakliczyn as shown in an orthophotomap from after the revitalization of 2019–2022; source: geoportal.gov.pl (accessed: 10.11.2024)



The analysis presented here suggests that while there is evidence that points to the presence of some forms of greenery on Zakliczyn's square in the decades preceding World War II, the greenspace is scant and is not indicative of the presence of larger landscaped forms. Therefore, the argument of the ahistoricity of the greenery introduced into the square's space after

World War II can be considered valid. Likewise, the presence of a larger amount of greenery in the square must also be considered a historical fact, even if the associated period is generally perceived negatively both politically and in conservation terms. This attitude is rooted in the Polish perception of the socialist period as associated with authoritarian repressions, a disdain for or outright negation of historical architectural and planning patterns, the universal drabness of what replaced them, and consequently as something whose traces do not merit preservation.



Fig. 5. Google Street View image showing the building on the corner of Różana Street and Rynek, which corresponds to the view from the postcard in Figure 2; source: https://www.google.com/maps/@49.855888,20.8071414,3a,75y,294.53h,88.06t/data=!3m7!1e1!3m5!1svDd1PGqN0yzV4j0FUwKINw!2e0!6shttps:%2F%2Fstreetviewpixels-pa.googleapis.com%2Fv1%2Fthumbnail%3Fcb_client%3Dmapsv.tactile%26w%3D900%26h%3D600%26pitch%3D1.9401386462878065%26panoid%3DvDd1PGqN0yzV4j0FUwKINw%26yaw%3D294.5314519659497!7i16384!8i8192?authuser=0&entry=tту&g_ep=EgoyMDIOMTEwNi4wIKXMDSoASAFQAw%3D%3D (accessed: 10.11.2024)

6. Discussion and Conclusion

From a climatic standpoint, the revitalization of this square can be said to have negatively affected the market square space. Biologically vital and permeable surfaces have been all but removed from the square, and while new trees have been planted along the frontages, they appear to be smaller varieties that will not produce a significant amount of shade when mature. It should be noted that the trees have been almost fully surrounded with paved surfaces, leaving square-shaped areas of biologically vital surface approximately one square meter around their trunks, which can be seen in Figure 5. This has effectively removed any capacity for small-scale water retention in the square and may result in adverse effects on the capacity of the town's stormwater drainage system in the event of of torrential rain. The amount of greenery that had been present in the square before the revitalization can likewise be considered to be, overall, quite low when viewed from an urban heat island effect standpoint, since there is typically little difference in thermal readings for areas with less than 20% of land cover for greenery (Tepanosyan et al., 2021).

While Zakliczyn itself probably does not need to fear this effect on account of its small size, spot thermal comfort can be expected to suffer as a result of the lack of shade and green surfaces, as they contribute to cooling. This may have adverse health effects on young children (Schapiro et al., 2024) and seniors (Ou et al., 2023).

This study finds that there is little evidence of the presence of large green areas in Zakliczyn's market square before the World War II. Historic maps were found to be poor sources of information on this matter, as most were drawn to a scale that made it unfeasible to depict landscaping features like hedges, individual trees or grassy lawns and gardens if these were not part of cadastral land use. What little evidence of urban greenery exists comes in the form of iconography, mostly postcards and old photographs, but there are challenges with exact dating of resources and with obtaining a complete image of the market square in a given time period. We also find that

the current site development of the square in Zakliczyn largely ignores current best practices in climate-resilient public space design. Likewise, its return to a form similar to its prewar condition, with little greenery, is aligned with the trend of “concretosis”. Existing greenery, even ahistoric in nature, is frequently removed from historic public spaces, depriving residents and visitors of their desires to be surrounded by greenspace.

References

- Cieślak-Arkuszewska, A. (2024). Zieleń wysoka jako tworzywo urbanistyczne placów miejskich i jej znaczenie w kontekście przeciwdziałania skutkom zmian klimatu. Wybrane zagadnienia. *Builder*, 323(6), 7-11.
- Czepczyński, M. (2012). Przestrzeń publiczna jako forma reprezentacji społeczności lokalnych Między hibernacją a animacją centrów małych miast woj. pomorskiego Public Space as a Representation of Local Societies. between Hibernation and Animation of Small Towns Centres of Pomorskie Voivodship. *Studia KPZK*.
- Dymek, D., & Józwik, J. (2021). Kształtowanie placów miejskich na przykładzie miast województwa lubelskiego. *Annales Universitatis Mariae Curie-Skłodowska, sectio B–Geographia, Geologia, Mineralogia et Petrographia*, 76, 1-28.
- Gargała-Polar, M., Gajdek, A., & Kaspruk, I. (2022). „Zielona” rewitalizacja starówki w Gorlicach.
- Gawryluk, D. (2015). Czy zieleń stanowi zagrożenie zabytkowej przestrzeni rynków małych miast północno-wschodniej Polski?. *Przestrzeń Urbanistyka Architektura*, 2015(Volume 1), 121-130.
- Hølleland, H., Skrede, J., & Holmgaard, S. B. (2017). Cultural Heritage and Ecosystem Services: A Literature Review. *Conservation and Management of Archaeological Sites*, 19(3), 210–237. <https://doi.org/10.1080/13505033.2017.1342069>
- Januchta-Szostak, A. Woda w małym mieście.
- Januchta-Szostak, A., Ogorzelska, A., & Peplińska, S. (2023). Modernizacja rynków małych i średnich miast wobec wyzwań adaptacji do zmian klimatu. *Zeszyty Naukowe Politechniki Poznańskiej. Architektura, Urbanistyka, Architektura Wnętrz*.
- Kucharska, A., & Janiszewska-Ostrowska, K. (2020). Problematyka kształtowania wnętrz urbanistycznych w aspekcie zmian klimatycznych. *Builder*, 274(5), 33-35.
- Kuśnierz-Krupa, D. (2019). *XIV-wieczne układy urbanistyczne w Małopolsce i na Podkarpaciu: stan zachowania, ochrona i rewitalizacja*, Politechnika Krakowska im. Tadeusza Kościuszki, Wydaw. PK.
- Kuśnierz-Krupa, D. (2019a). *Original historical spatial development research methodology on the example of the town of Skawina in Lesser Poland*. *Landscape Architecture and Art*, 14, 18–23. <https://doi.org/10.22616/j.landarchart.2019.14.02>
- Kuśnierz-Krupa, D. (2019b). *Original historical spatial development research methodology on the example of the town of Skawina in Lesser Poland*, *Landscape Architecture and Art*, 14, 18–23. <https://doi.org/10.22616/j.landarchart.2019.14.02>
- Kuśnierz-Krupa, D., & Krupa, M. (2008). Średniowieczny rynek jako „serce miasta”: (na przykładzie rynku Skawiny w Małopolsce). *Czasopismo Techniczne. Architektura*, 105(3-A), 119-125.
- Kuśnierz-Krupa, D., & Krupa, M. (2015). Zmiany w aranżacji placów rynkowych miast lokacyjnych w Polsce południowo-wschodniej po 1945 roku (na wybranych przykładach). *Wiadomości Konserwatorskie*, (41), 49-58.
- Kuśnierz-Krupa, D., Kuśnierz, K., Hryniewicz, M., Ivashko, J., & Bober, D. (2022). *Conservation of the Renaissance towns of Southern Poland based on*

- selected examples: an introduction to research*, Architectus, 83–90. <https://doi.org/10.37190/arc220408>
- Majidi, A. N., Vojinovic, Z., Alves, A., Weesakul, S., Sanchez, A., Boogaard, F., & Kluck, J. (2019). *Planning nature-based solutions for urban flood reduction and thermal comfort enhancement*. Sustainability, 11(22), 6361.
- Masson, V., Marchadier, C., Adolphe, L., Aguejdad, R., Avner, P., Bonhomme, M., ... & Zibouche, K. (2014). *Adapting cities to climate change: A systemic modelling approach*, Urban climate, 10, 407-429.
- Mędrzycki, R. (2021). Metropolie wobec wyzwań i problemów społecznych. Nowicka, Rutkowska, Poznań, Wydawnictwo Politechniki Poznańskiej.
- Mencwel, J. (2020). Betonoza: jak się niszczy polskie miasta. Wydawnictwo Krytyki Politycznej.
- Mikołajczyk, T. (2024). Budżet obywatelski a zagospodarowanie przestrzeni publicznych–przykład Łodzi= Participatory budgeting and the development of public spaces–the case study of Łódź. Przegląd Geograficzny, 96(2), 153-174.
- Mróz A., (2023), Zieleń miejska jako element przestrzeni publicznej. (Nie) obecność zagadnienia w wybranych lokalnych dokumentach, Urban Development Issues, vol. 74, 05, 53-64, Kraków–Warszawa: Instytut Rozwoju Miast i Regionów.
- Mróz, A., Pistelok, P., & Salata-Kochanowski, P. (2023). Rynki, place i deptaki–jakość inwestycji w przestrzeni publicznej po 2015 roku. Badania Obserwatorium Polityki Miejskiej, Instytut Rozwoju Miast i Regionów, Warszawa–Kraków.
- Ou, Y., Wang, F., Zhao, J., & Deng, Q. (2023). *Risk of heatstroke in healthy elderly during heatwaves: A thermoregulatory modeling study*. Building and Environment, 237, 110324.
- Pan, Y., Nik Hashim, N.H. & Goh, H.C. (2024). Public perception of cultural ecosystem services in historic districts based on biterm topic model. Scientific Reports, 14, 1171. <https://doi.org/10.1038/s41598-024-62770-0>
- Przesmycka, E. (2009). Rynki małych miast Polski południowo-wschodniej wczoraj i dziś. *Architektura Krajobrazu*, 48-56. References.
- Schapiro, L.H., McShane, M.A., Marwah, H.K., Callaghan, M.E., & Neudecker M.L. (2024). *Impact of extreme heat and heatwaves on children's health: A scoping review*, The Journal of Climate Change and Health, 19, 100335. <https://doi.org/10.1016/j.joclim.2024.100335>
- Starzecka, K. (2020). Degradacja rynków w małych miastach jako jedna z przyczyn pogorszenia jakości życia osób starszych na przykładzie rynku w Kórniku. Zeszyty Naukowe Politechniki Poznańskiej. Architektura, Urbanistyka, Architektura Wnętrz.
- Starzecka, K. (2020). Degradacja rynków w małych miastach jako jedna z przyczyn pogorszenia jakości życia osób starszych na przykładzie rynku w Kórniku. Zeszyty Naukowe Politechniki Poznańskiej. Architektura, Urbanistyka, Architektura Wnętrz.
- Szmygin, B. (2000). *Kształtowanie koncepcji zabytku i doktryny konserwatorskiej w Polsce w XX wieku*, Lublin: Wydawnictwo Politechniki Lubelskiej.
- Tepanosyan, G., Muradyan, V., Hovsepyan, A., Pinigin, G., Medvedev, A., & Asmaryan, S. (2021). *Studying spatial-temporal changes and relationship of land cover and surface Urban Heat Island derived through remote sensing in Yerevan, Armenia*. Building and Environment, 187, 107390.
- Warchalska-Troll, A., & Pistelok, P. (2023). Zieleń w centrach polskich miast. Stan, funkcje i wyzwania, Badania Obserwatorium Polityki Miejskiej, instytut Rozwoju Miast i Regionów, Warszawa–Kraków. DOI, 10.
- Wojciechowicz, W. (2018). Miejska infiltracja. Zieleń Miejska, Poznań: ABRYS Sp. z o.o.

- Mazur-Belzyt, K. (2016). Efekty rewitalizacji przestrzeni centralnych małych miast. Rynek-scena miejskiego życia bez aktorów/Revitalization Effects of Central Areas in Small Towns. Marketplace—a Scene of Urban Life without an Actors. *Studia KPZK*.
- Michalczyk P. (2022). Zakliczyn. Rynek w Zakliczynie oficjalnie otwarty po rewitalizacji, jego przebudowa trwała ponad dwa lata i pochłonęła 12,6 mln zł. Tarnów Nasze Miasto. <https://tarnow.naszemiasto.pl/zakliczyn-rynek-w-zakliczynie-oficjalnie-otwarty-po/ar/c1-8828045> (accessed: 10.11.2024).
- Wejchert, K. (1947). *Miasteczka polskie jako zagadnienie urbanistyczne*. Warszawa: Wydawnictwo Trzaska, Evert i Michalski.
- Wróblewski, S. (2011). Zieleń w krajobrazie kulturowym rynków miejscowości w centralnej Polsce. *Architektura Krajobrazu*. Wrocław, Uniwersytet Przyrodniczy we Wrocławiu.
- Yang, J., Shi, Q., Menenti, M., Xie, Y., Wu, Z., Xu, Y., & Abbas, S. (2022). *Characterizing the thermal effects of vegetation on urban surface temperature*. *Urban Climate*, 44, 101204.