



Changes in the spatial layouts of the villages around the Czorsztyn Reservoir

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Abstract. The aim of the article is to analyse the changes that have taken place in the spatial layouts of villages located in the vicinity of the Czorsztyn Reservoir from the 19th century to the present day. Rural settlements located in the following communes were selected for the study: Czorsztyn, Krościenko nad Dunajcem, Łapsze Niżne and Nowy Targ (Małopolskie Province, Poland). The text presents and characterises the rural layouts of the localities under study. Initially, the following spatial layouts were created in the vicinity of the Czorsztyn Reservoir: double row forest villages, small circular villages, oval villages and multi-road villages. They survived almost unchanged until the beginning of the 20th century. After the construction of the reservoir, a lot of villages changed their former layout. The transformation of historical forms of planning and their subsequent changes were the result of many factors, e.g. the development of tourism and the local population's departure from agriculture, which influenced the expansion of built-up areas and the creation of a new road network. The most significant transformations of the rural layouts took place in the villages located in the immediate vicinity of the Czorsztyn Reservoir. The text discusses research issues on the basis of selected villages. The villages were selected to represent as accurately as possible each spatial layout that has emerged and the fundamental changes that have taken place within it. The following methods were used in the study: the monographic method, the genetic method, the genetic-metrological method, the retrograde record method, the method of analysing aerial photographs and orthophotomaps, and the cartographic method. The considerations were based on cartographic materials obtained from the National Archives in Krakow and the Military Geographical Institute.

Keywords: village, settlement, spatial layout (spatial pattern), historical geography, Czorsztyn Reservoir.

Introduction

One of the main trends in geographical and historical research is the analysis of transformations of the cultural landscape, with particular emphasis on the development of the settlement network and the evolution of rural spatial layouts. Today, Poland features a variety of village forms, each influenced by their origin, location, and period of establishment. The changes that took place within the boundaries of rural settlements were influenced by, among others, administrative, political and social factors. To this day, numerous relics of historical rural systems have been preserved in Poland, which may increase the tourist attractiveness of a given area in the future. Due to the lack of in-depth analyses of the issue of spatial layouts on a local basis (Szulc, 1995; Jackson, 2008; Szymańska, 2013), the present study investigates this issue in a selected study area.

The scope of research comprised villages situated in the vicinity of the Czorsztyn Reservoir in the communes of: Czorsztyn, Krościenko nad Dunajcem, Łapsze Niżne and Nowy Targ (Małopolskie Province, Poland) (Fig. 1). The choice of the research area was guided

Literature review

Researchers (particularly geographers) have been interested in rural settlement for a long time. Their research includes, among other things, the analysis of morphological structures and village layouts. One of the most important representatives of Polish settlement geography is Szulc (1969, 1976, 1995, and 2003). She is the author of numerous studies on the spatial layouts of villages in Poland. The analyses carried out by Szulc were useful in selecting the topic and objective of this article. They also served to define the spatial layouts of the settlement units under study and to capture their subsequent transformations.

Research on the identification of the spatial forms of the studied villages also drew upon material collected by Chilczuk (1970) making use of his method of aerial photograph analysis. Knowledge on the morphogenesis and transformations of rural systems was also drawn from numerous publications by Polish and foreign researchers, including among others, Meitzen (1895), Zaborski (1926), Lienau (1967), Kiełczewska-Zaleska (1972), Cloke (1979), Williams (2002), Szymańska (2013), Szymytkie (2014), and Peleg-Barkat et al., (2025). The above mentioned authors repeatedly refer to the lack of local research on the spatial layouts of villages. This knowledge was therefore one of the main reasons for selecting this research topic. A thorough analysis of the cited studies also served as inspiration to address the existing research gap concerning the transformations in rural layouts in the vicinity of the water reservoir. These works proved helpful in selecting the research area.

An important contribution to this study was made by scholarly works devoted to settlement issues in the Małopolskie Province. Of particular value were the studies by Dobrowolska (1958, 1959), in which she analysed rural settlement layouts in southern part of Lesser Poland and examined transformations in the socio-economic structure in this region. Prochownik (1968) conducted similar research a few years later, focusing on changes of settlement and agricultural structures. Korzeniowska (2021) illustrated the spatial transformations of the villages of the Spiš Zamagurie region. Studies on the settlement structures of rural settlements in Podhale were conducted by Dobrowolski (1935), Solecki (1977), and Czepiel (1999).

The text was based primarily on studies relating to the rural landscape around the artificial Czorsztyn Lake. These publications cover, among other things, the history of the construction of the dam and reservoir on the Dunajec (Ciołek, 1948; Wołek, 1997) and their characteristics (Jaguś & Rzętała, 2010). Particularly valuable were studies examining landscape changes around water reservoirs in the Pieniny Mountains (Forczek-Brataniec, 2010), together with research addressing the spatial transformations of selected villages situated in the vicinity of the Czorsztyn Reservoir (Mikołajczyk & Świątek, 2015). The article also drew on studies concerning the tourist appeal of the Czorsztyn Reservoir (Bielak, 2007; Niedziółka & Perchał, 2014). The above mentioned studies have deepened the understanding of the conditions and course of settlement in the selected study area from historical, geographical, economic and environmental perspective.

During the course of the analysis, information was drawn from numerous publications, primarily in the fields of settlement geography and spatial planning, as well as history and tourism studies. The study also drew upon a wide range of cartographic materials, including the Galician Cadastre and the Tactical Map of Poland. These publications contributed to a broader understanding of the research topic and provided an appropriate background for the issues addressed in this article.

Methodology

The study's research procedures integrated the author's own analyses and archival queries with contributions of specialists investigating spatial transformations in rural areas. The research was conducted using a combination of methods, including the monographic method, the genetic method, the genetic-metrological method, the retrograde record method, the analysis of aerial photographs and orthophotomaps, and the cartographic method.

The starting point for the work was the monographic method, which involved studying available literature, maps and village plans and assessing their potential use in the research. Scientific literature was acquired during study visits to the University of Lodz Library, the Jan Kochanowski University Library in Kielce, the Jagiellonian Library in Kraków, and the Nowy Sącz Public Library. A review of the collected literature provided a deeper understanding of the origins of the studied settlement units, their spatial layouts, and the factors that have shaped the transformations occurring within them (Hodder & Krishnan, 2025; Nel et al., 2025). Archival research was carried out at the National Archives in Kraków and the Military Geographical Institute. The queries were conducted both on-site and remotely. Cartographic materials found during the archival research constituted the primary basis for reconstructing the spatial layouts of the villages during the periods under investigation. The main sources obtained were the Galician cadastre (a land register created for the purpose of calculating taxes for Galicia in the mid-19th century) and the Tactical Maps of Poland.

The materials obtained through archival and library research were subsequently sorted in such a way as to relate to the research problem under analysis. At this stage of the research, large-scale maps that did not depict village layouts were excluded from further analysis. Only those sources that enabled the reconstruction of spatial layouts were retained for further analysis.

In the subsequent stage of the research, the historical spatial configurations of the analysed settlement units in the nineteenth century were reconstructed using the genetic-metrological method and the retrograde record method (Zaborski, 1926; Szulc, 1995; Tkocz, 1998; Szmytkie, 2014). The lack of available cartographic sources precluded the reconstruction of village spatial patterns for earlier historical periods. The aforementioned Galician cadastre, available for the settlements under study at the National Archives in Kraków, constitutes one of the earliest sources from which settlement morphological types can be identified. Despite extensive archival research, the relevant sheets could not be identified for all the settlements in the study. For the villages for which the relevant sheets could not be located, the spatial layouts of the settlements were identified with the use of Galicia on the Josephine Topographic Map of 1779-1783 (Bukowski et al., 2012/2013). Subsequently, based on the morphological typology of villages proposed by Szulc (1995), the village forms occurring in the study area were distinguished.

Once the nineteenth-century village types had been identified, an analysis of their forms during the interwar period was undertaken, using the Tactical Maps of Poland from the collections of the Military Geographical Institute. One limitation of these maps is that they allow the identification of the forms of the settlement sites but do not provide information on the shape of land layout. It was also not possible to obtain any other sources

that would allow the reconstruction of land layouts for the interwar period. For this reason, the analysis presented in the article is limited to the sites.

The final stage of the study involved the identification of relics of historical spatial forms within the contemporary cultural landscape, the determination of current settlement forms, and the characterization of the transformations that have occurred within them. The study employed aerial photography and orthophotomap analysis (Chilczuk, 1970; Hodder & Krishnan, 2025; Liu et al., 2025). In all of the villages examined, remnants of the former settlement layouts were identified. Contemporary spatial layouts were derived from cartographic data available via National Geoportal¹. At this stage of the research, the genetic method was also employed to distinguish historical forms from contemporary ones and to trace the genesis of the transformations that have occurred within them (Kiełczewska-Zaleska, 1972). The cartographic method was also applied to visualise the historical spatial layouts of the villages, the transformations they have undergone, and their present-day forms (Mazur, 2013). The aforementioned methods were employed to facilitate an in-depth examination of the geographical area and its spatial structures, with particular emphasis on the internal relationships and interactions.

Research results

Spatial forms of the villages in the 19th century

In the nineteenth century, double row forest villages predominated within the borders of the studied communes. These villages stretched for several kilometres (Szulc, 1995), e.g. Klikuszowa (NAK, Galician cadastre, ref. 2353) (Fig. 2), or consisted of only a few houses in a shape resembling a hamlet, e.g. Dębno (NAK, Galician cadastre, ref. 2251) and Krauszów (NAK, Galician cadastre, ref. 2379). In the analysed double row forest villages, the houses were arranged in a loose (e.g. Klikuszowa and Lasek), and concentrated system (e.g. Grywałd, Mizerna) (NAK, Galician cadastre, ref. 2293, 2353, 3437 and 2407; Zaborski, 1926). The double row forest village in Ludźmierz (Fig. 3) had a unique shape for this region, consisting of three separate settlements connected by a road (NAK, Galician cadastre, ref. 2420). All analysed double row forest villages were characterised by two-sided buildings and an irregular site shape. Double row forest villages in the studied area were located along the stream (Cepil, 2022), in configurations; the stream flowed behind the buildings parallel to them (e.g. Krauszów) or the stream flowed through the centre of the estate parallel to the houses and the main compositional axis of the village (e.g. Grywałd, Klikuszowa) (NAK, Galician cadastre, ref. 2379, 2293, 2353). An untypical site layout classified as a double row forest village was found in Sromowce Niżne. Its appearance resembled a clustered twin village, with the difference that one settlement was larger than the other (it cannot be ruled out that they were the same size in the past). Two separate sites located on the banks of the Dunajec River are connected by a road (NAK, Galician cadastre, ref. 2671).

In addition to double row forest villages, within the studied communes there were also villages from the group of square site layouts (Kiełczewska-Zaleska, 1972). The village of Maniowy (Mikołajczyk & Świątek, 2015) had the form of a small circular village, but

¹ National Geoportal (25 June 2025).



Fig. 2. Fragment of a site in the village of Klikuszowa (mid-19th century)

Source: National Archives in Cracow, Galician cadastral, ref. 2353.



Fig. 3. The site in Ludźmierz (mid-18th century)

Source: Bukowski et al. (2012/2013), Volume 1, Part A, Section 2.

over time the settlement took the shape of a concentrated multi-road village (Godyń, 2015). In the village the houses were located along the central square and along the side roads (Zaborski, 1926). Small circular layout with a round square in the middle was characteristic of Szlembark². An oval shape characterised Nowa Wieś and Kacwin. In both cases the houses were arranged in the system of an elongated spindle, which constituted the central square of the village, on which, among others, a church was built. After analysing the available source materials, it can be seen that in Nowa Wieś the central square was built-up, while in Kacwin it was not. An oval shape with side roads was present in the village of Frydman (Szymańska, 2013). A square layout was also observed in the settlement of Krempachy (Michałowicz-Kubal & Kubal, 2000)².

Another form occurring in the analysed area were small multi-road villages, e.g. Długopole, Waksmund and Ostrowsko². The original shape of the village was influenced by natural factors such as the relief (mountainous areas – the sites were located in the valleys), the forests and hydrological conditions and periodic river flooding (Kondracki, 1965; Forczek-Brataniec, 2010; Pouš, 2024).

Based on the available cartographic materials, it can be concluded that in the 19th century, villages typical of mountain areas dominated – double row forest villages, constituting 69.5% of the total. Double row forest villages occurred within each of the analysed communes. 15.5% of all site layouts were oval villages, found in the communes: Łapsze Niżne and Nowy Targ. Small circular villages, accounting for 7.5% of all site layouts, were located near the present-day border of Czorsztyn and Nowy Targ communes. The same percentage as small circular villages was characterised by multi-road layouts located in the commune of Nowy Targ (Appendix 1 and Fig. 4). This spatial structure persisted until the beginning of the 20th century (Appendix 1 and 2).

² Arcanum Maps. (n.d.). Galizien und Lodomerien (1779-1783) – Josephinische Landesaufnahme.

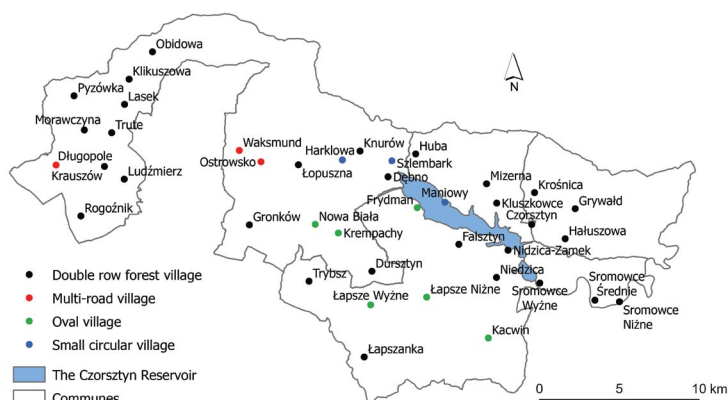


Fig. 4. Distribution of villages from the 19th century divided into spatial layouts against the background of modern Poland, with the then non-existent Czorsztyn Reservoir marked

Spatial transformations of the village from the beginning of the 20th century until the creation of the Czorsztyn Reservoir

Social and political transformations in various historical periods had an impact on the condition and spatial development of settlements and on the development of agricultural economy. The interwar period marked the rebirth of the Polish state, interrupted by the outbreak of the Second World War (Wieczorkiewicz, 1995). In the interwar period and after World War II, settlement changes occurred in connection with the development of nearby health resorts (e.g. Szczawnica) and summer resorts (Michałowicz-Kubal & Kubal, 2000; Cepil, 2022), which resulted in the emergence of the first tourism infrastructure. New single-family and service buildings (Solecki, 1977) started to emerge at a rapid pace, which, however, did not change much the sites of the villages. The landscape was still dominated by double row forest layouts (MGI, Tactical Map of Poland, A50 B30, A51 B31), constituting 65% of all rural layouts (Appendix 1). The main changes in double row forest villages were driven by the influx of tourists in the study area: the dispersion of buildings along the main communication axes of villages (Solecki, 1977), e.g. Krauszów (Fig. 5 and 6) (MGI, Tactical Map of Poland, A51 B30), development of buildings within rural settlements caused by land parcellation. Some former dirt roads began to function as streets. A small development of buildings within the boundaries of the site took place in Sromowce Niżne. A road connecting two separate settlements in the 19th century still remains undeveloped. The site located in the western part of the village was known at that time as Sromowce Średnie. (NAK, Galician cadastre, ref. 2671, MGI, Tactical Map of Poland, A51 B31; Solecki, 1977). All the analysed double row forest villages have retained their irregular spatial layouts.

In the interwar period, the number of multi-road layouts increased from 7.5% (19th century) to 15% (Appendix 1 and 2). This is related to the transformation of the double row forest villages into multi-road villages, e.g. the village of Maniowy and Sromowce Wyżne. The observed changes were influenced by the development of holiday resorts in both settlement units (MGI, Tactical Map of Poland, A51 B31; Mikołajczak & Świątek, 2015). Multi-road layouts survived in Długopol, Ostrowsko and Waksmund (Fig. 7 and 8) (MGI, Tactical Map of Poland, A51 B31).



Fig. 5. The site of the village of Krauszw (mid-19th century)
Source: National Archives in Cracow, Galician cadastre, ref. 2379.



Fig. 6. The site of the village of Krauszw (interwar period)
Own elaboration based on Military Geographical Institute, Tactical Map of Poland, A51 B30.

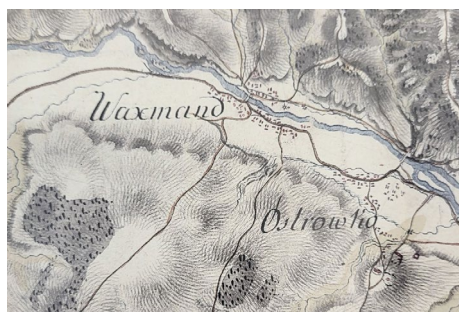


Fig. 7. Multi-road layouts in Waksmund and Ostrowsko (the end of the 18th century)
Source: Bukowski et al. (2012/2013). Volume 1, Part A, Section 28.



Fig. 8. Multi-road layout in Waksmund and Ostrowsko
Source: Military Geographical Institute, Tactical Map of Poland, A51 B30.

Let us now examine the changes that have occurred in the following spatial layouts: oval villages and small circular villages. The oval shape in the village Nowa Wieś (Fig. 9) has been preserved unchanged. In Kacwin the buildings begin to enter the central square, but the village is still characterised by an oval layout. In the village of Frydman the oval village with side roads retained its shape from the 19th century and in the village of Szlembark (Fig. 10) – a small circular village with a round square. The spatial layout being a combination of an oval village and a cross road village still characterised Krempachy (MGI, Tactical Map of Poland, A51 B31). In the period in question, oval villages accounted for 15% of all site forms (in the 19th century – 15.5%), and small circular villages 5% (in the 19th century – 7.5%) (Appendix 1).

Most of the villages in the studied communes have preserved the spatial layout from the 19th century. The change in the form of the site occurred only in the villages of Maniowy and Sromowce Wyżne. The dominant spatial type are double row forest villages. In the analysed communes, multi-road villages, small circular villages and oval villages still survive in the rural landscape in almost unchanged form (Table 1). The reasons for the spatial changes of the villages were, among others, political factors, such as the change of political affiliation of the region, the enfranchisement of peasants (related to land parcellation), and the development of nearby health resorts and tourism.



Fig. 9. The site of the village of Nowa Biała (interwar period)
Source: Military Geographical Institute, Tactical Map of Poland, A51 B30.



Fig. 10. The site of the village of Szlembark (interwar period)
Source: Military Geographical Institute, Tactical Map of Poland, A51 B30.

Table 1. Characteristics of spatial layouts in the 20th century

Name of the spatial layout	Characteristic features
Double row forest villages	1. Dominant layout 2. Dispersion of buildings along roads 3. Development of buildings within the sites caused by land parcellation 4. Transformation of some former dirt roads into functioning streets 5. Irregular form of the site 6. Loose or dense building development
Multi-road layouts	1. Increased number of multi-road layouts 2. Transformation of former double row forest villages and small circular villages into multi-road villages (linked to the emergence of new farms) 3. Presence of multi-road layouts in Długopole, Ostrowsko and Waksmund
Oval villages	1. Oval villages constituted 15% of all forms of sites (in the 19th century – 15.5%) 2. The form preserved in Nowa Wieś, Frydman and Kacwin (in Kacwin the buildings are starting to encroach on the central square; despite this the village is still characterised by an oval layout)
Small circular villages	1. The form preserved, among others, in Szlembark

Spatial changes after the creation of the Czorsztyn Reservoir

The idea to build a reservoir on the Dunajec River was born at the turn of the 19th and 20th centuries. The first ideas for building a reservoir for the production of electricity on the Dunajec River appeared as early as 1905, and in the following years this concept started to be related to the proximity of the castle in Niedzica. After the flood in 1934, a strong flood-prevention argument in favour of building a reservoir appeared. Plans to build the reservoir were thwarted by the outbreak of the Second World War. The plans were revived after 1945. Following numerous modifications, it was decided to locate the reservoir at the foot of the castle in Niedzica (Fig. 11). Ultimately, the decision was made to build a complex of two reservoirs: a main retention reservoir located between the villages of Dębno and Niedzica, and a smaller compensation reservoir located between the villages of Niedzica and Sromowce Wyżne, with the main dam in the vicinity of the castle

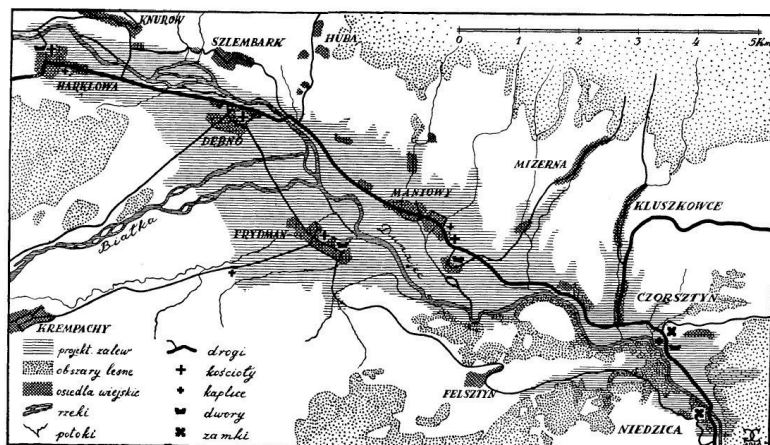


Fig. 11. The Czorsztyn Reservoir Project

Source: Ciołek (1948).

in Niedzica. A hydroelectric power plant was built next to the dam. The final decision to create it was taken in 1964. The construction took many years, encountering numerous technical and environmental problems. The Czorsztyn Reservoir was opened in 1997. The artificial Czorsztyn Lake is 9 km long and on average 1.3 km wide. The length of the coastline is 29.7 km (Ciołek, 1948; Wołek, 1997; Forczek-Brataniec, 2010; Jaguś & Rzętała, 2010; Niedziółka & Perchał, 2014).

The construction of the reservoir required the purchase and acquisition of over 1,500 hectares of private land, including the closure of approximately 500 farms. Due to the construction, some villages were placed under water and the inhabitants were moved to new places. As part of the action, the inhabitants of, among others, the villages of Maniów, Czorsztyn and Kluszkowce were resettled to newly erected substitute settlements, e.g. to the part of Czorsztyn Nadzamecz, Kluszkowce, Mizerna and the newly created village of Maniów Nowe (Ciołek, 1948; Jaguś & Rzętała, 2010).

The reservoir currently serves the following functions: flood control for the Dunajec Valley, generating hydropower, recreational and tourist purpose. After the lake was created, the area has become one of the most recognisable tourist destinations in the Małopolskie Province. Tourist and recreational infrastructure has been developed in the vicinity of the reservoir (Niedziółka & Perchał, 2014).

Due to the increasing number of tourists, most farmers abandoned agriculture and engaged in the service industry. This is particularly true in lakeside towns (Czorsztyn, Kluszkowce, Maniów, Dębno, Frydman, Niedzica and Sromowce Wyżne), where accommodation facilities are concentrated (Bielak, 2007). Some of the analysed villages changed their original spatial arrangements due to rapid expansion (Michałowicz-Kubal, Kubal, 2000; Bielak, 2007; Forczek-Brataniec, 2010).

Nowadays, the analysed rural settlements are dominated by multi-road layouts (accounting for 48.5% of all layouts) (Appendix 1), which were created through evolution. These forms are characterised by chaotic development with irregular roads. One of the most interesting and largest multi-road villages is Maniów Nowe, built between 1976

and 1980. During construction of the settlement, no natural or spatial factors were taken into account (Fig. 12) (Kiełczewska-Zaleska, 1972)³.

A similar spatial form – a multi-road village – characterizes the village of Frydman (formerly an oval village) (Fig. 13 and 14). A huge development of buildings was observed in Kluszkowce. The village was transformed from a double row forest village into a multi-road one. Rapid expansion of buildings also took place, among others: in Dębno (Fig. 15 and 16), Grywałd and Hub, which also changed their layout from double row forest villages into multi-road villages. The transformation from a double row forest village into a multi-road village took place in Ludźmierz³. A factor favouring the development of the settlement is undoubtedly Sanktuarium Matki Bożej Królowej Podhala (Sanctuary of Our Lady Queen of Podhale), which attracts pilgrims and tourists (Hodorowicz & Mróz, 2008; Hodorowicz & Mróz, 2009). The buildings in the villages of Knurów and Harkłowa are beginning to take on a multi-road character. The multi-road form survived in the settlement units: Długopole, Waksmund and Ostrowsko. Within these three settlements, development of buildings and the creation of new streets were observed³.

Currently, double row forest villages constitute 37% of the total (Appendix 1 and 2), and have been characterized by this spatial type since the 19th century. A number of spatial



Fig. 12. Spatial layout of the village of Maniowy Nowe
Source: National Geoportal (25 March 2026).



Fig. 13. Spatial layout of the village of Frydman (interwar period)
Source: Military Geographical Institute, Tactical Map of Poland, A51 B30.



Fig. 14. Contemporary site of the village of Frydman
Source: National Geoportal (11 April 2026).

³ National Geoportal (25 June 2025).

changes were noticed within them, i.e. development of buildings on the border of the original site and its immediate vicinity through parcellation processes, e.g. in Klikuszowa and Mizerna (Fig. 17 and 18), and the appearance of new houses within the borders of rural layouts, e.g. Lasek. In a lot of villages, former dirt roads are beginning to function as access streets to houses, e.g. Rogoźnik and Gronków. In Gronków, Klikuszowa and Rogoźnik new roads were laid through the middle of the settlement (Cepil, 2022). Two separate settlements connected by a road, resembling a twin structure, have survived in Sromowce Niżne⁴. In Sromowce Niżne and Sromowce Średnie, residential buildings are beginning to appear in the vicinity of the Dunajec River (in former floodplains) (Forczek-Brataniec, 2010); these changes have not changed the spatial layout.



Fig. 15. Spatial layout of the village of Dębno (inter-war period)
Source: Military Geographical Institute, Tactical Map of Poland, A51 B30.



Fig. 16. Contemporary site of the village of Dębno
Source: National Geoportal (11 April 2026).



Fig. 17. Spatial layout of the village of Mizerna (inter-war period)
Source: Military Geographical Institute, Tactical Map of Poland, A51 B30.



Fig. 18. Contemporary site of the village of Mizerna
Source: National Geoportal (11 April 2026).

⁴ National Geoportal (11 April 2026).

In the communes of Łapsze Niżne and Nowy Targ, five former oval villages (Nowa Biała – Fig. 19, Kacwin, Krempachy, Łapsze Niżne and Łapsze Wyżne) have been preserved (11.5% of all site layouts) (Mikołajczyk & Świątek, 2015; Appendix 1). In Nowa Biała the central square has been developed with detached houses. Currently, there has been an extension of development of the village settlement at the exit of roads to the east and west. Identical spatial changes within the site took place in Kacwin. In the settlement of Krempachy, the layout, which is a combination of an oval village and a cross road village, is still visible. In this village, the central square has been almost completely built up. In Krempachy, Łapsze Niżne and Łapsze Wyżne, the expansion took place at the exits of the village, thus expanding the sites. Due to the development of buildings, in the near future these villages may adopt a multi-road layout. These rural settlements have been classified as oval villages, due to the fact that the historical shape of the central square, in all three examples, is visible in the landscape (Mikołajczyk & Świątek, 2015).

One small circular layout (representing 3% of the total) (Appendix 1) survived in Szlembark. In the settlement, development of buildings along the roads leading to the centre of the village and the appearance of new houses in the northern part of the settlement was observed⁵.

The main factor influencing the changes in spatial layouts is, above all, the tourist development, including accommodation facilities and tourist infrastructure (Table 2; Bielak, 2007; Forczek-Brataniec, 2010), which undoubtedly contributes to population growth in the area under analysis (Table 3).

The greatest modifications of rural layouts take place in settlements located in the vicinity of the Czorsztyn Reservoir, especially to the north of it and on the road to Nowy Targ, where the greatest tourist traffic occurs (Bielak, 2007). The further from the man-made Lake Czorsztyn and the tourist attractions, the more historical spatial elements have been preserved (Fig. 20).

In conclusion, we can see that after the construction of the Czorsztyn Reservoir, the majority of rural settlement units changed their spatial layout. In many cases, the double



Fig. 19. Contemporary site of the village of Nowa Biała
Source: National Geoportal (25 June 2025).

⁵ National Geoportal (25 June 2025).

row forest village layouts were transformed into a multi-road village layouts due to the development of tourism. Due to the construction of the reservoir and the resettlement action, new rural settlements were created in a multi-road pattern. Nowadays, multi-road villages are predominant in the analysed communes, not double row forest ones as in previous time periods. In the rural landscape, few small circular and oval layouts have survived (Appendix 1 and 2).

Table 2. The number of accommodation facilities in the analysed communes in the years 1995-2024

Commune	The number of accommodation facilities						
	1995	2000	2005	2010	2015	2020	2024
Czorsztyn	17	9	10	10	24	25	24
Krościenko nad Dunajcem	16	10	9	7	16	10	13
Łąpsze Niżne	4	8	14	10	24	18	16
Nowy Targ	13	10	6	5	9	10	11

Own elaboration based on BDL (2026).

Table 3. Population in the analysed communes in the years 1995-2025

Commune	Population						
	1995	2000	2005	2010	2015	2020	2024
Czorsztyn	6,446	6,895	7,190	7,373	7,577	7,641	7,590
Krościenko nad Dunajcem	6,362	6,255	6,463	6,619	6,755	6,742	6,602
Łąpsze Niżne	8,203	8,613	8,764	9,043	9,237	9,229	9,265
Nowy Targ	20,382	21,275	22,017	23,298	23,717	24,080	24,054

Own elaboration based on BDL (2026).

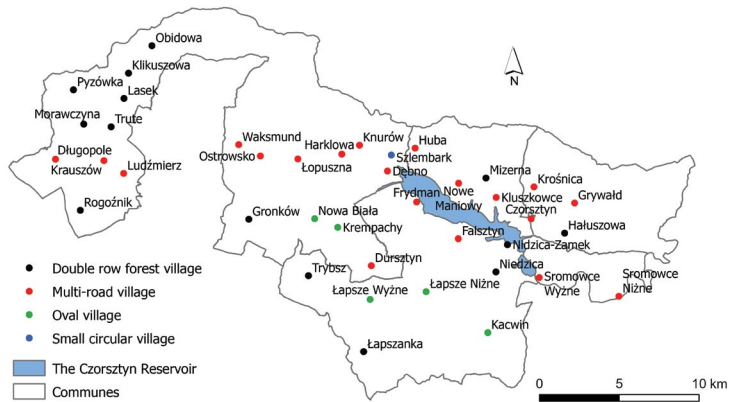


Fig. 20. Distribution of the villages from the 21st century, divided into current spatial layouts

Discussion

Presenting the scholarly contributions of geographers engaged in settlement studies is challenging, as this field was long regarded as a subdiscipline of economic geography. Nevertheless, the origins of settlement research are generally traced back to the nineteenth century (Schlüter, 1899). Over time, this area of study gained an established position in geographical research worldwide (e.g. Meitzen, 1895; Lienau, 1967; Cloke, 1979; Grossman & Siddle, 1998) as well as in Poland (e.g. Zaborski, 1926; Liszewski, 2008, 2016). Initial analyses typically covered a large research area, such as a country, continent, or the world, and focused on the examination of the settlement network of both cities and villages (Kiełczewska-Zaleska, 1972; Szymańska, 2013; Pouš, 2024). Early researchers most often linked settlement structures with natural conditions. Over time, a distinct research stream emerged that focused on the study of rural landscapes. These studies increasingly focused on the analysis of village layouts (Liszewski, 2008).

In Poland, the principal pioneers of research on the spatial layouts of rural settlements include Zaborski (1926), Kiełczewska-Zaleska (1972), Szulc (1976, 1995), Tkocz (1998), and Szymańska (2013). These scholars proposed various approaches to the classification of village spatial types and their characteristics, for example based on the shape of the rural layout (Zaborski, 1926) or on the development of settlement forms during particular historical periods, most commonly distinguishing between the medieval and early modern eras (Szulc 1995). The typology proposed by Kiełczewska-Zaleska (1972) is particularly challenging to interpret, as it approaches the issue from two perspectives: the analysis of village spatial layouts and the origin of villages. A different typological framework was adopted by Tkocz (1998), who divides spatial layouts into the site and land layout. The most recent and the most up-to-date discussion of spatial types of villages, as well as other forms of settlement, was provided by Szymańska (2013).

The majority of existing publications on rural layouts generally refer to larger spatial units and provide a valuable basis for more detailed regional and local investigations, which have increasingly become the focus of contemporary research. However, such studies are still insufficient in number (Guldon, 1982; Jackson, 2008).

Having reviewed numerous publications on regional studies of the morphogenesis and transformations of rural systems, two main groups of issues that have attracted the attention of researchers can be identified: studies on the spatial types of villages within a single region (several neighbouring rural settlements) and research on settlements sharing certain common features, e.g. a shared origin or an identical spatial layout. The first group includes, for example, studies on the transformation of rural settlements in Central Poland (Wójcik, 2008), Greater Poland (Szczepańska & Wilkaniec, 2016), Mazovia (Bierkat & Długozima, 2017), the Bošácka Valley in Slovakia (Najdený & Gurňák, 2024), the provinces of Jiangxi and the Tibetan prefecture of Huangnan in China (Pei et al., 2020; Feng et al., 2025), and the Spanish region of Galicia (Pardo, 2013). The second group of studies focusing on settlements characterized by shared morphogenetic features, includes research on dispersed villages in Slovakia (Petrovič & Petrikovičová, 2021), the development of Anglo-Saxon settlement forms (Hamerow, 2010), radial settlement layouts in Poland (Adamska & Figlus, 2023), and the Frederician colonization in Silesia (Adamska, 2016). These are only selected examples; other studies conducted worldwide can be assigned to both groups. It should be emphasised that the importance of local-level analyses of the

spatial patterns of rural settlements has been growing, which provided the impetus for the study on the transformation of the villages around Lake Czorsztyn. The body of work by researchers specialising in rural settlement issues includes a significant number of studies on landscape changes in Lesser Poland conducted, among others, by Dobrowolska (1958, 1959), Prochownik (1968), and Solecki (1977). These studies are of particular value for historical analyses and comparative research, as they were conducted many years ago under a different political system. Nowadays, due to political and social factors, the rural landscape of Lesser Poland has undergone significant transformations; it is therefore worthwhile to undertake new research in order to systematise and update existing knowledge, which has not escaped the attention of researchers. In this context, several recent studies may be mentioned, such as a series of articles describing selected double row forest villages in Lesser Poland (Cepil, 2022, 2023a, 2023b). However, these studies require further development to include additional areas of investigation. Interesting analyses have also been conducted on spatial transformations of villages in the vicinity of the Czorsztyn Reservoir, using modern GIS methods, with a particular focus on changes in selected oval villages (Mikołajczyk & Świątek, 2015). The development and transformation of settlement in the Podhale and Pieniny regions has also been discussed by, among others, Guzik (2004) and Alexandrowicz (2020).

Recently, there has been growing interest in the impact of the rural settlement landscape on tourism. Relict spatial patterns are increasingly perceived as one of the factors influencing the use of rural areas in the development of local tourism. This trend is driven by the growing interest of tourists in rural cultural heritage (Durydiwka, 2017). A review of the literature reveals an increasing number of studies aimed at combining settlement research with rural tourism in various regions of the world (Dmochowska-Dudek et al., 2015). In both international and Polish research, scholars have conducted analyses of tourism development in rural settlements in southern Anhui (Shao et al., 2026), developed a settlement typology of tourist villages in Indonesia (Salouw & Pramono, 2022), and identified tourism functions of villages located around selected lakes in the Masurian Lakeland (Jankun-Woźnicka & Furgała-Selezniow, 2025). After reviewing the extensive literature, this paper undertakes an attempt to closely examine the transformations of rural settlement spatial structures, using the Czorsztyn Reservoir as an example. This article fills an existing research gap in the analysis of local transformations of spatial layouts in rural areas.

Conclusions

The main objective of the study was to present the transformation of rural layouts of villages in the vicinity of the Czorsztyn Reservoir from the 19th century to the present day. The analyses covered villages located in the communes of Czorsztyn, Krościenko nad Dunajcem, Łąpsze Niżne and Nowy Targ. The problem was discussed using examples of selected villages in order to best reflect their spatial structure. The considerations undertaken in the text systematise the morphological characteristics of selected villages, determining their original spatial layout and subsequent transformations on the basis of previous achievements in the morphological typology of rural settlements and available source and cartographic materials.

After the research, the hypothesis was positively verified: historical spatial layouts of villages remain visible in the rural landscape today, although the degree of their preservation is low.

Following the research, it was concluded that in the 19th century, double row forest villages dominated. In addition to double row forest villages, there were oval villages, small circular and multi-road villages. In the following years, almost all villages retained their 19th-century form. Rapid processes of transformation of spatial layouts took place after the construction of the Czorsztyn Reservoir. Many of the former double row forest villages and oval villages took on a new multi-road layout. Some double row forest villages and a few small circular and oval village layouts have been preserved in the rural landscape (Fig. 21).

The factors influencing changes in spatial arrangements in the analysed villages after the construction of the Czorsztyn Reservoir are: the development of tourism, the departure of the local population from agriculture to tourism, the introduction of a new communication network and the resettlement of inhabitants of the areas intended for the reservoir to new places, thus creating new villages (without planned spatial layout). The greatest modifications of rural layouts take place in settlements located in the vicinity of the Czorsztyn Reservoir.

The creation of the Czorsztyn Reservoir increased the already existing interest in tourism in the region. Until its creation, villages located away from tourist areas (including the villages of the commune Łapsze Niżne) did not develop as intensively as those located on tourist trails near, among others, Krościenko nad Dunajcem and Szczawnica.

In addition to the main objective, the above-mentioned investigations can provide a basis for similar analyses for other regions in the world. The considerations are also intended to show the general public what spatial changes in rural areas are caused by the

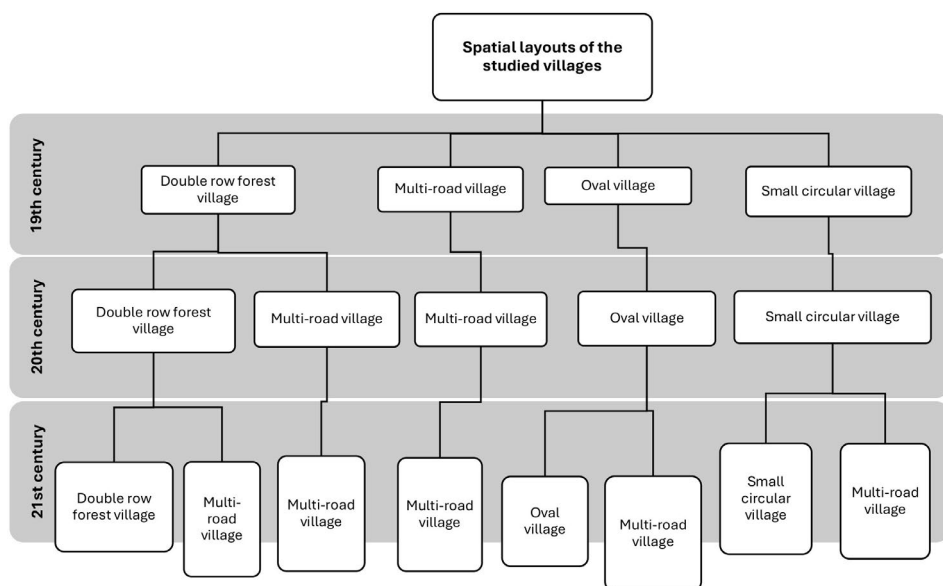


Fig. 21. Diagram of transformations of rural settlement patterns in the study area

development of tourism. The results of the research may contribute to the preservation of historical spatial layouts, i.e. oval and small circular villages. The information included in the text may be useful for institutions working for the development of rural areas, local governments and regional researchers.

Unless otherwise stated, the sources of tables and figures are the author's, on the basis of her own research.

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Appendix 1

Table 1. Percentage of individual spatial arrangements occurring in the 19th, 20th and 21st centuries

Name of spatial layout	19th century	20th century	21st century
Double row forest village (Waldhufendorf)	69.5%	65.0%	37.0%
Oval village	15.5%	15.0%	11.5%
Small circular village	7.5%	5.0%	3.0%
Multi-road village	7.5%	15.0%	48.5%

Own elaboration.

Appendix 2

Table 1. Spatial layouts of the villages studied in the 19th century, 20th century, and 21st century

Village name	19th century	20th century	21st century
Czorsztyn	Double row forest village	Double row forest village	Multi-road village
Dębno	Double row forest village	Double row forest village	Multi-road village
Długopole	Multi-road village	Multi-road village	Multi-road village
Dursztyn	Double row forest village	Double row forest village	Multi-road village
Falsztyn	Double row forest village	Double row forest village	Multi-road village
Frydman	Oval village	Oval village	Multi-road village
Grywałd	Double row forest village	Double row forest village	Multi-road village
Gronków	Double row forest village	Double row forest village	Double row forest village
Hafuszowa	Double row forest village	Double row forest village	Double row forest village
Harkowa	Small circular village	Small circular village	Multi-road village
Huba	Double row forest village	Double row forest village	Multi-road village
Kacwin	Oval village	Oval village	Oval village
Klikuszowa	Double row forest village	Double row forest village	Double row forest village
Kluskowce	Double row forest village	Double row forest village	Multi-road village
Knurów	Double row forest village	Double row forest village	Multi-road village
Krauszów	Double row forest village	Multi-road village	Multi-road village
Krempachy	Oval village	Oval village	Oval village
Krośnica	Double row forest village	Double row forest village	Multi-road village
Lasek	Double row forest village	Double row forest village	Double row forest village
Ludźmierz	Double row forest village	Double row forest village	Multi-road village
Łapszanka	Double row forest village	Double row forest village	Double row forest village
Łapsze Niżne	Oval village	Oval village	Oval village
Łapsze Wyżne	Oval village	Oval village	Oval village
Łopuszna	Double row forest village	Double row forest village	Multi-road village
Mizerna	Double row forest village	Double row forest village	Double row forest village
Maniowy	Small circular village	Small circular village	-
Morawczyn	Double row forest village	Double row forest village	Double row forest village
Niedzica	Double row forest village	Double row forest village	Double row forest village
Niedzica-Zamek	Double row forest village	Double row forest village	Double row forest village
Nowa Biała	Oval village	Oval village	Oval village
Nowe Maniowy	-	-	Multi-road village
Obidowa	Double row forest village	Double row forest village	Double row forest village
Ostrowsko	Multi-road village	Multi-road village	Multi-road village
Pyzówka	Double row forest village	Double row forest village	Double row forest village
Sromowce Niżne	Double row forest village	Double row forest village	Double row forest village
Sromowce Średnie	Double row forest village	Double row forest village	-
Sromowce Wyżne	Double row forest village	Multi-road village	Multi-road village
Rogoźnik	Double row forest village	Double row forest village	Double row forest village
Szlembark	Small circular village	Small circular village	Small circular village
Trute	Double row forest village	Double row forest village	Double row forest village
Trybsz	Double row forest village	Double row forest village	Double row forest village
Waksmund	Multi-road village	Multi-road village	Multi-road village

Own elaboration.