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Visual Capacity Assessment of the Open Landscape in Terms of Protection and Shaping: Case Study of a Village in Poland

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Abstract: This article describes the methodology and results of research on landscape visual capacity. The aim of the project was to develop a tool that would support planning and design decisions at the level of communal management in rural areas in Poland through systematic application of visual criteria. Their importance in the protection, management and shaping of space is underlined by the document produced at the European Landscape Convention of 2000 (ELC). To date, ELC recommendations have not been fully implemented in Poland. The author of the study used the methods of the Krakow School of Landscape Architecture in assessing cultural landscapes and referred to the assumptions of the British Landscape Character Assessment (LCA). The analysis was based on the results of a landscape identification conducted in a part of the Cekcyn commune. The assessment of visual capacity was conducted for the village of Nowy Sumin, located in that commune. The effect of the study is the classification of open landscapes with respect to the assessment of visual changes resulting from potential residential development. The results obtained prompt the conclusion that the applied method can effectively support local spatial planning as it takes national conditions into account.

Keywords: open landscape; landscape visual capacity; spatial management and planning; landscape protection

1. Introduction

Awareness of the need to manage the visual resources of the landscape emerged in the US in the first half of the 20th century with the concept of green corridors developed by Frank Albert Waugh [1]. The concept was used to assess the visual qualities of roads, wilderness areas and rivers. At the turn of the 1960s, an increase in public interest in outdoor recreation resulted in a new public policy aimed at preserving the beauty of nature. In the 1960s, first attempts were made at conducting a survey on visual resources while planning recreational areas. These attempts, in turn, gave rise to the Visual Resource Management (VRM) system, which is still applied today [2–4]. At the end of the 1970s, the Visual Impact Assessment procedure was introduced as part of VRM, which consisted of a survey of visual resources designed to determine their social value (*visual sensitivity*), setting requirements for the protection of visual qualities in future planning and design studies, and the assessment of the potential visual and environmental impact of the planned investment [5,6]. The concept of *visual absorption capability* was first used in 1969 by Peter Jacobs and Douglas Way in the meaning of: *the varying ability of different landscapes to screen or mask development activities based on vegetative density, topographic closure and visual complexity* [7]. At present, the term is still generally defined as the ability of a landscape to embrace changes without affecting its character.

The importance of landscape instruments in space management was stressed by the European Landscape Convention of 2000 (ELC) document. Changes to the visual landscape are a clear indicator of social transformation processes. They are a direct, simple and widely available marker of many complex cultural and natural phenomena. Identifying, shaping and monitoring those changes supports space management in line with sustainable development concepts, as well as promoting spatial order. Procedures for assessing the visual impact of potential development create an efficient information flow channel within the space management systems of many countries as well as counteracting possible conflicts, aiding the decision-making processes in terms of spatial issues (for example, VRM, Visual Resource Inventory, Visual Recourse Contrast Rating used in the US and LCA in GB) [2–4,8].

In Poland, a similarly comprehensive assessment of the visual qualities of the landscape is applied only to cultural landscapes of the highest value. The physiognomy of common, rural and agricultural landscapes is completely excluded from the planning process. This topic remains outside of mainstream social and scientific interests. The limited scope and sporadic character of studies on the physiognomy of the landscape result from a lack of public interest, which is reflected in legal status. The official process of landscape identification and assessment began in Poland as late as January 2019, which is a significant delay compared with the ratification of the ELC in 2004 and the procedures implemented in most European countries well before 2000 [9]. However, the significance of landscape identification and assessment for the optimization of spatial decisions may prove insufficient as the applied assessment method fails to include visual assessment [10].

The methods of assessing the landscape's visual capacity are not applied in spatial management in Poland despite the urgent need to implement procedures that would ensure control of the excessive dispersion of development observable in open areas. Construction traffic in rural areas of Poland has been rather chaotic for years. The causes of this situation are complex. Unlike other countries formerly known as the so-called Eastern Bloc, in Poland, private land ownership was retained after World War II. As a result of the mass sub-division of landed estates, the number of private owners of agricultural and forest land increased significantly. After the political transformation in 1989, the prevalence of agricultural land private ownership increased and trade within it was allowed. In this situation, the low profitability of fragmented farms and the ongoing housing shortage resulted in an increase in the number of built-up rural areas. Their growth has remained immethodical to this day due to the insufficient coverage of communal areas by local land development plans and their inadequate quality [11,12].These circumstances threaten the economic security of local authorities, who are forced to manage the over-expanded infrastructure. Moreover, an obvious consequence of the excessive dispersion of buildings is a decrease in the amount of biologically active areas, including agricultural land, from 18.87 million ha in 2011 to 16.4 million ha in 2018 [13].

This article responds to the problems outlined above. The aim of the research is to develop and test the methodology of the landscape visual capacity assessment of open landscapes in rural Poland to support planning at the level of communal management.

2. Materials and Methods

Identification of local landscapes is needed to create a framework for visual studies in the planning system. However, the results of nationwide description and classification of landscapes have not yet been fully obtained. Therefore, research on an individual landscape was undertaken in the selected commune before visual capacity assessment could be conducted. The methodology of Landscape Physiognomy Assessment (LPA) used and the relationship between the LPA and Landscape Visual Capacity Assessment (LVCA) described in the article are briefly presented in Figure 1.

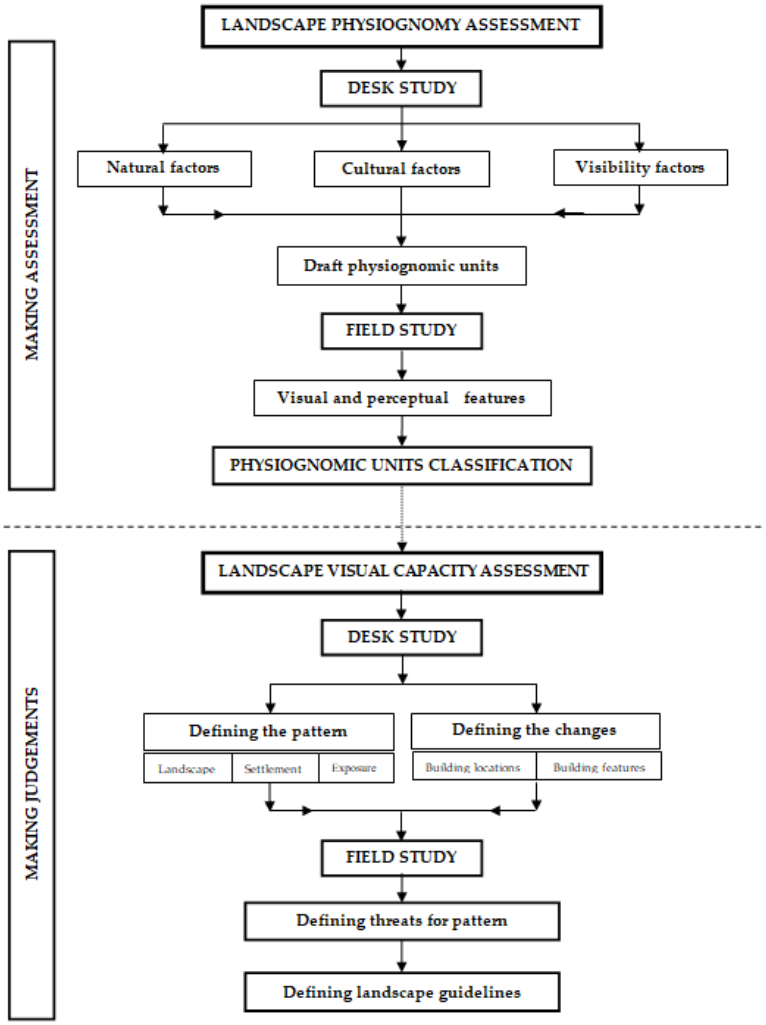


Figure 1. Methodology of landscape visual capacity assessment as a part of landscape physiognomy studies.

Natural, cultural and visual landscape characteristics recognized in GIS-based and field studies of the LPA phase are materials for landscape visual capacity assessment. Planning documents valid in a study area support the currently conducted analysis as well.

The model for the adopted research methodology was LCA analysis conducted on the districts surrounding the city of Perth [14]. The method is characterized by clear criteria, simplicity of ranking and graphic notation with which to explain the conditions of landscape exposure.

For the LVCA, landscape visual capacity is defined as the ability of the landscape's visual resources to absorb anticipated interference without fundamentally altering the landscape pattern. The landscape's visual resources may be defined as its visible, physical elements and their characteristics, to which society attributes importance due to their use and age. These include layouts of landforms and land cover as well as forms of development that constitute a recognizable spatial pattern. A distinctive pattern is an attribute of a distinguishable landscape unit. A well-developed, relatively durable spatial pattern is an indicator of sustainability and the coherence of natural and cultural features. Such a pattern should, therefore, be protected or continued. A new development, going beyond the existing boundary of the estate, may change the properties of the pattern with respect to:

- Landscape (L)—the visual resources of the open landscape; examples include breaking the ribbon-shaped pattern of fields or removing landscape-specific elements such as a tree lane or a single tree.

- Settlement (S)—the visual resources of the settlement or housing estate; for example, the linear or dispersed development layout of the village may be distorted, or objects which are landscape markers, such as traditional wooden houses, may be destroyed.
- Exposure (E)—the conditions of open landscape visibility and housing estate development; this happens, for example, in the case of a change in the scope or range of views to or from the estate towards the extensive landscape.

The most important viewpoints from routs are indicated in effect of desk and field studies within the scope of LPA and LVCA procedures [15]. L, S and E constraints for building locations in set directions are systematically established on the basis of visual resources defined. The assessment is of qualitative, synthetic and expert nature. The findings of LVCA are presented in a tabular report. The report includes:

- indication of areas where capacity assessment is not relevant due to legal prohibition or a physical barrier to development;
- estimation of threats resulting from the probability of disturbing the open landscape structures (L) and the development of the estate (S), as well as from the conditions of their visibility (E);
- indication of ways to mitigate the negative effects of changes within the three examined areas of threat to the spatial pattern (L, S, E);
- determination of the possibility of improving landscape aesthetics as a result of modifications within all three areas of threat to the spatial pattern (L, S, E).

A three-basic-point scale represented by colors facilitates understanding of the assessment and report. However, extension of the three-stage scale by intermediate degrees was deemed useful in order to underline the importance of planning quality. Scale points were added to indicate the chances of mitigating potentially negative effects of a new development or improving landscape aesthetics (possibly neutral and possibly beneficial impact). The proposed rating is illustrated in Figure 2. The point scale in respect to LVCA criteria is explained in Table 1.

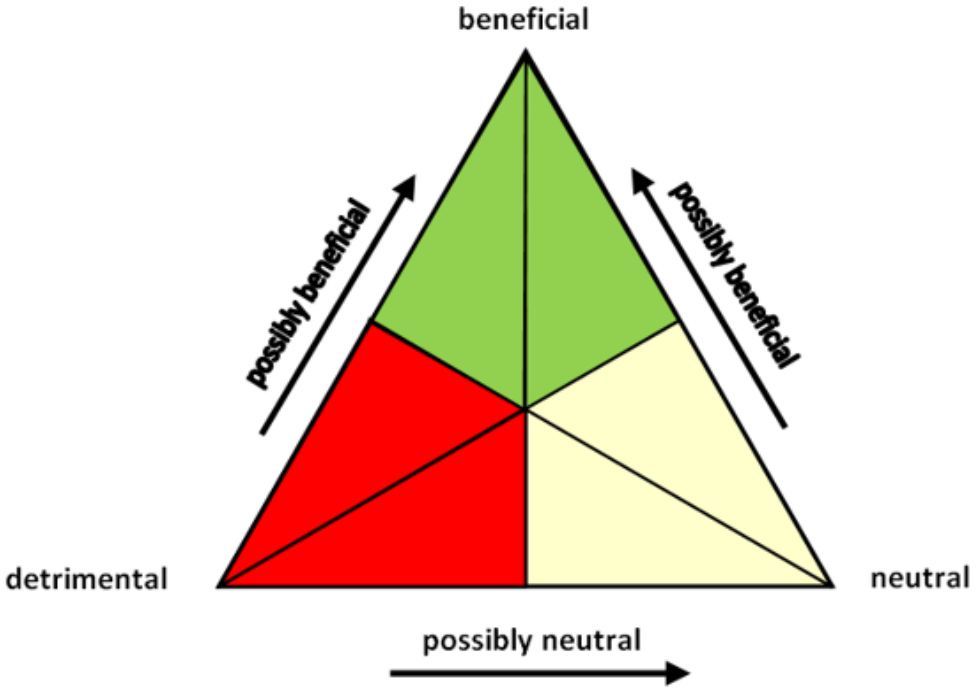


Figure 2. Landscape visual capacity assessment ranking. Impact of potential development on visual resources of the landscape.

Table 1. Explanation of Landscape Visual Capacity Assessment (LVCA) point scale.

LVCA Criteria		Landscape (L)	Settlement (S)	Exposure (E)
1-5 Beneficial effect		Built development could enhance landscape pattern through reinforcement of visual resources.	Development could complete the form, layout or edge of historical building.	Development could improve view connections or aesthetics.
1-5 Neutral effect		Development would exert a neutral effect on the landscape pattern.	Development would not change the form, layout or edge of an existing village.	No visual impact on development.
1-5 Detrimental effect		Development would exert a negative effect on the landscape pattern.	Development would exert a negative effect on the settlement form and pattern.	Visual amenity would be detracted by development.
1-5 Possibly beneficial or possibly neutral effect		Mitigating negative effects or improving effects of development on the landscape pattern could be used to various degrees.	Neutral or negative effects of development on settlement form or pattern could be improved or mitigated by planning.	Visual impact could be renewed or improved if mitigation was applied.

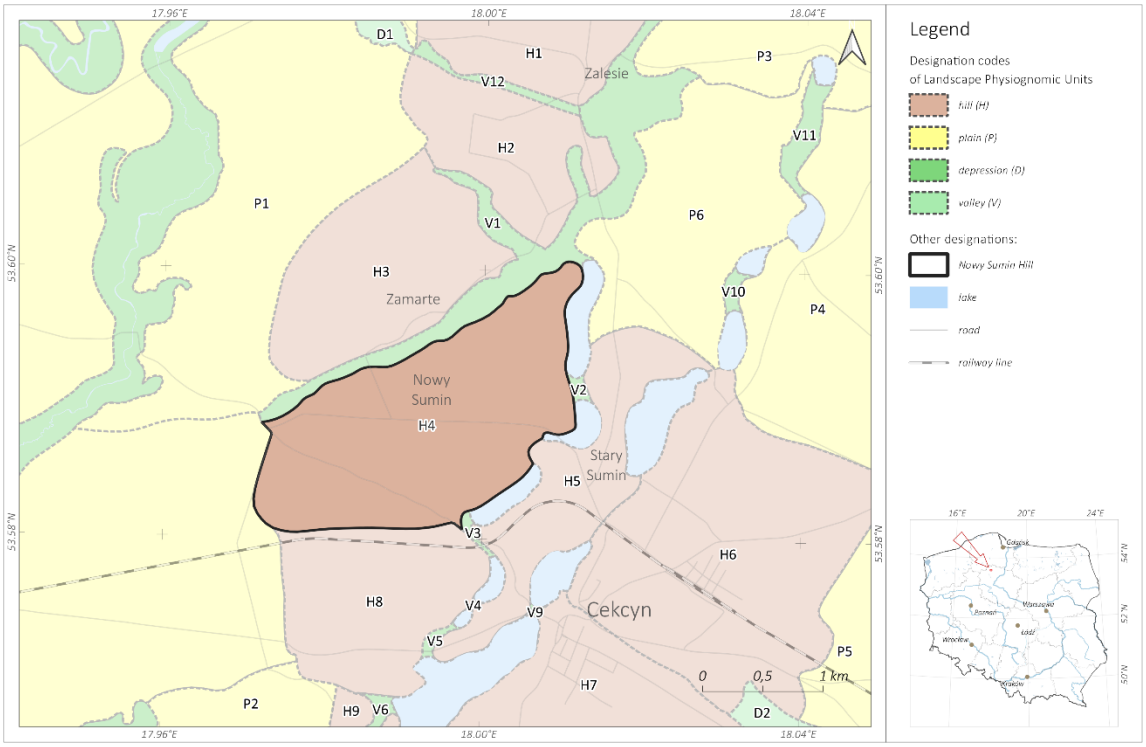
The L, S and E criteria are described and illustrated in photos or sketches. Results of the assessment are presented in a sketch plan.

3. Results

3.1. General Characteristics of the Landscape Physiognomic Unit

The assessment of landscape capacity was conducted on the village of Nowy Sumin in the Cekcyn commune, Kuyavian-Pomeranian Voivodeship. The results of the first stage of the study, i.e., the identification of landscape physiognomic units, made it possible to establish that the village and its visually-related surroundings lie entirely within the area of landscape unit H4 Nowy Sumin Hill (NSH). The results of the LPA related to the study area are briefly presented in Figure 3. The NSH landscape unit is defined by the following key features:

- Early glacial origin.
- Visually distinct elevation and gentle slopes.
- Open landscape with a clear, ribbon-like pattern of fields, visible from the country road and from the dirt road.
- A very well-visible range of linear village buildings, stretched along the crest of the hill.
- Mostly small, brick or wooden buildings with preserved regional features.
- Plant cover and use of soil corresponding to its quality.
- Use and coverage of the area consistent with its topography.



(**a**)

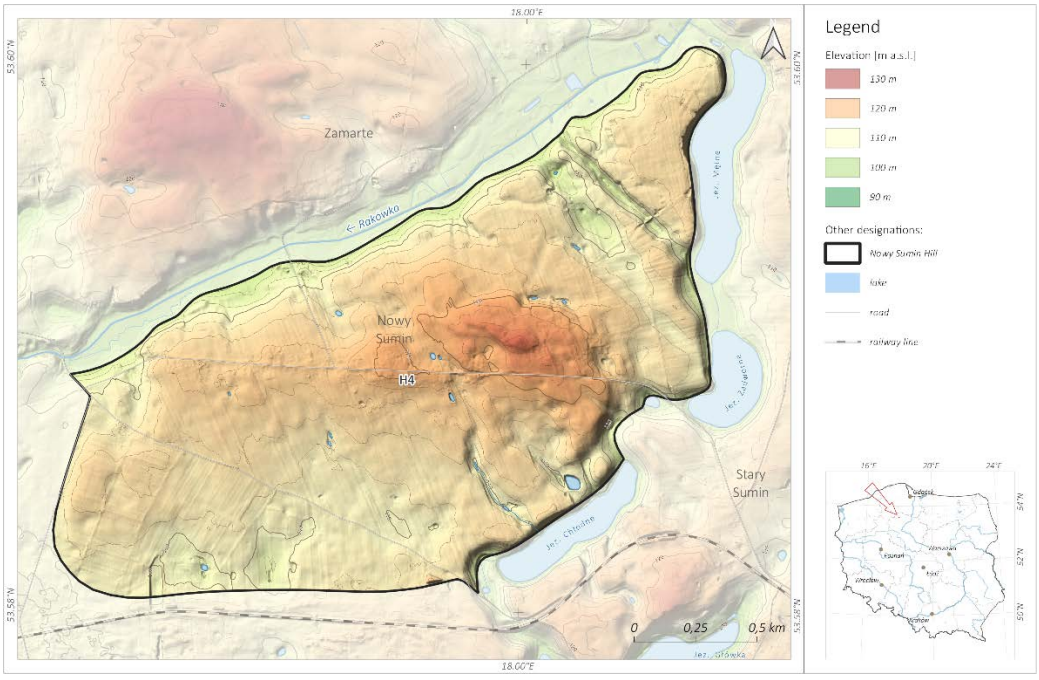


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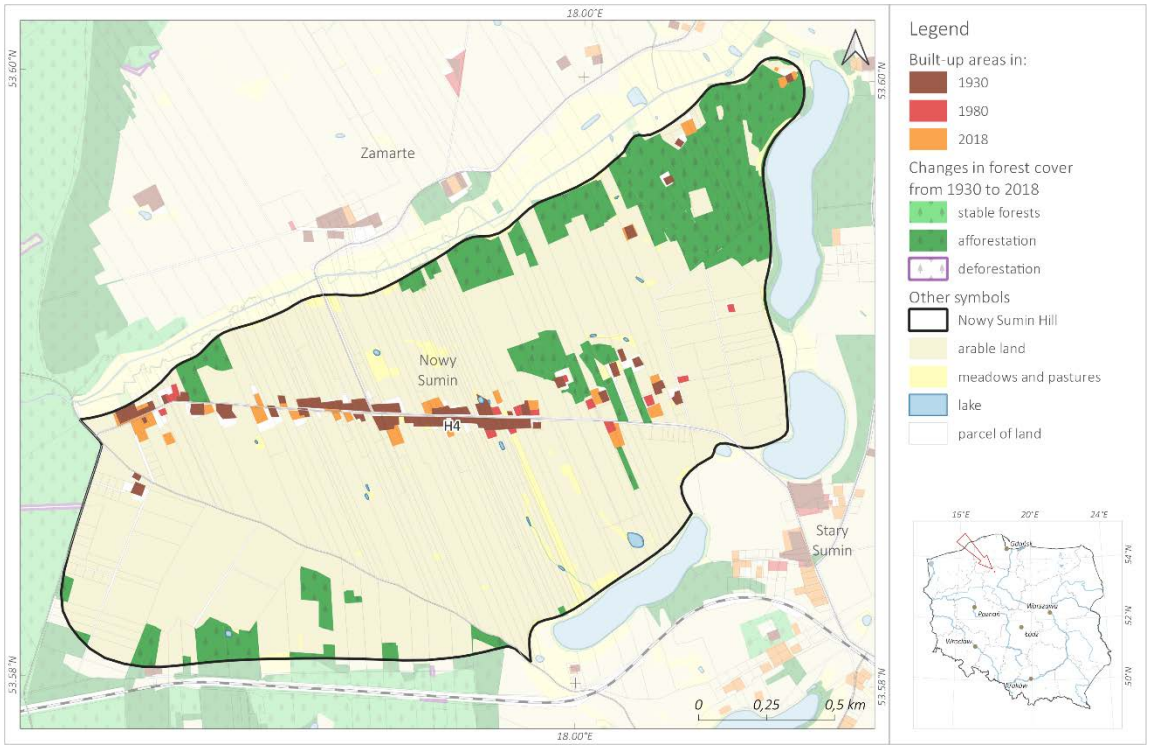
Figure 3. *Cont.*



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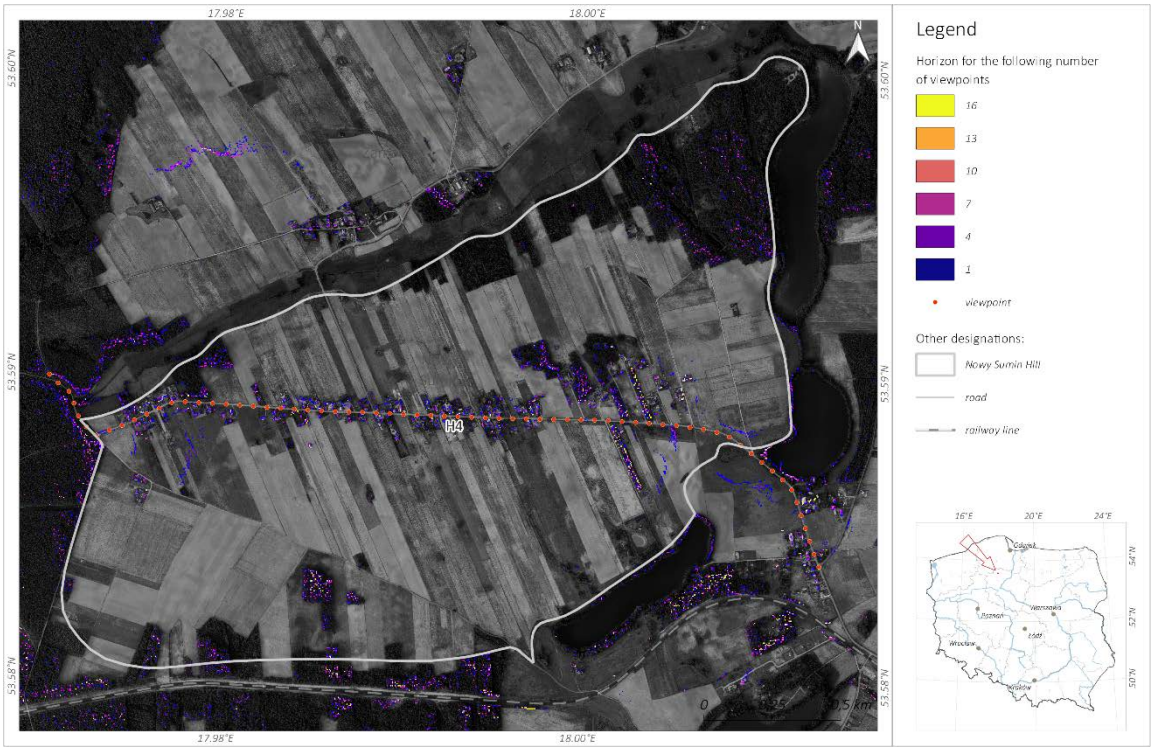
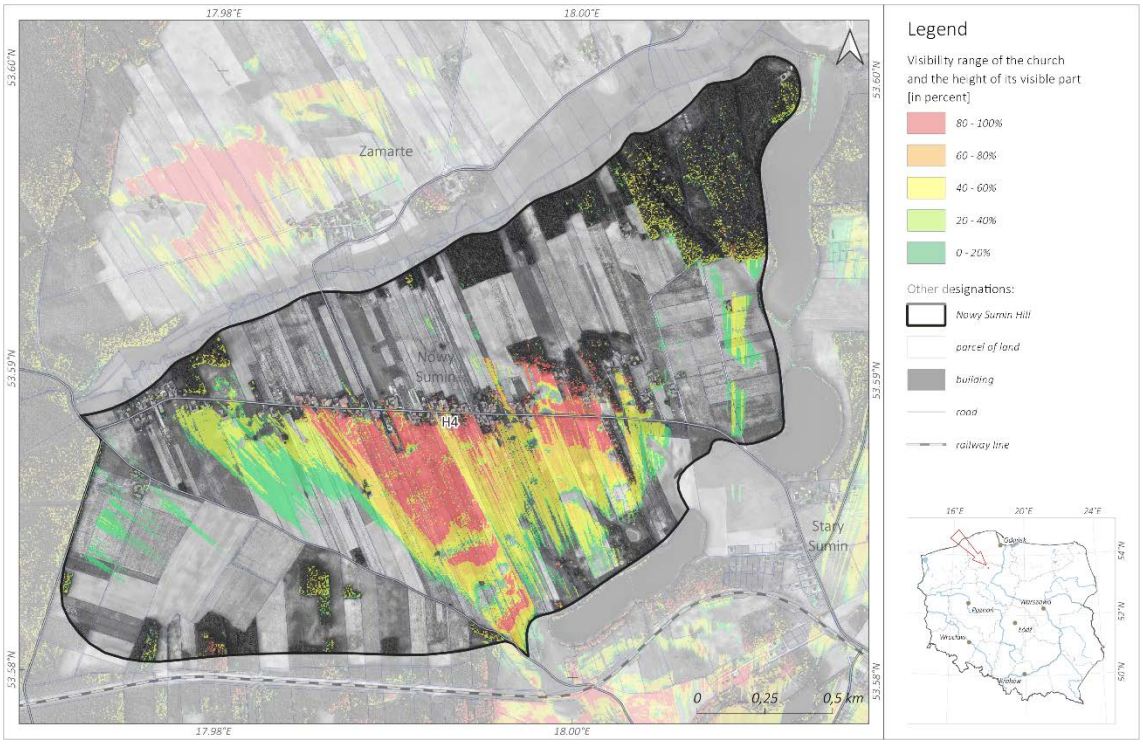
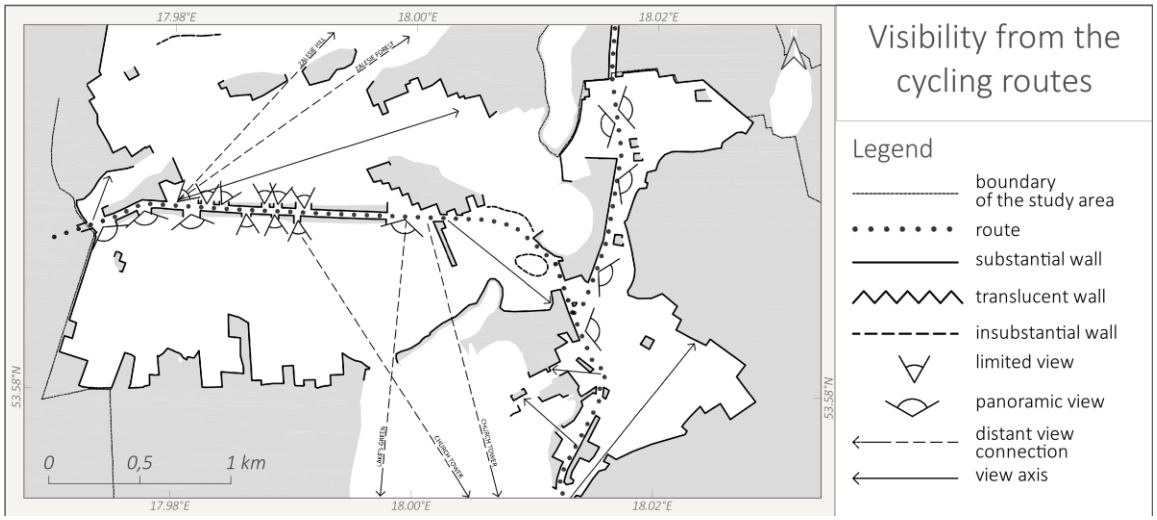


(**e**)



(**f**)

Figure 3. *Cont*.



(**g**)

Figure 3. Selected effects of the Landscape Physiognomy Assessment (LPA) desk and field studies related to the study area.: (**a**) area of the NSH landscape unit and neighbouring units, (**b**) land form in the NSH area, (**c**) land cover alterations in NSH area, (**d**) visibility measurement from the roads in the NSH area, (**e**) horizon measurement from the village road, (**f**) visibility range of the church tower in the NSH area, (**g**) visibility from the cycling route- field study.f

General characteristics of the NSH landscape unit are presented in Table 2.

Table 2. General characteristics of the Nowy Sumin Hill (NSH) landscape unit in which the research area is located.

Land Forms	Land Cover	
Top of the hill	Mosaic of the forest and buildings	
Hill ridge	Linear, roadside village	East part of settlement
		West part of settlement
Hill slopes	Ribbon-shaped, regular fields inlaid with trees	
Base of the hill	Irregular fields inlaid with trees	
Cut hills	Forest perforated by buildings	
	Small, rectangular fields with mixed arrangement	

3.2. Determining the Location and Parameters of Planned Investment

Nowy Sumin is among the villages in the commune with the largest expected increase in population by 2045. According to the Key Diagram (SUiKZP), the commune [16] has exhausted the possibilities of siting new development based on the local spatial development plans in force. Five local spatial development plans (MPZP) with a residential function are currently applicable to the area in question. As a result of a simulation conducted with reference to an increase in housing needs and to assessing the possibility of siting new development in areas with a developed structure and areas covered by local development plans, the decision was made to designate new investment areas with a dominant residential, service or resort function. The locations of new development areas assigned with various planning status are presented in Figure 4.

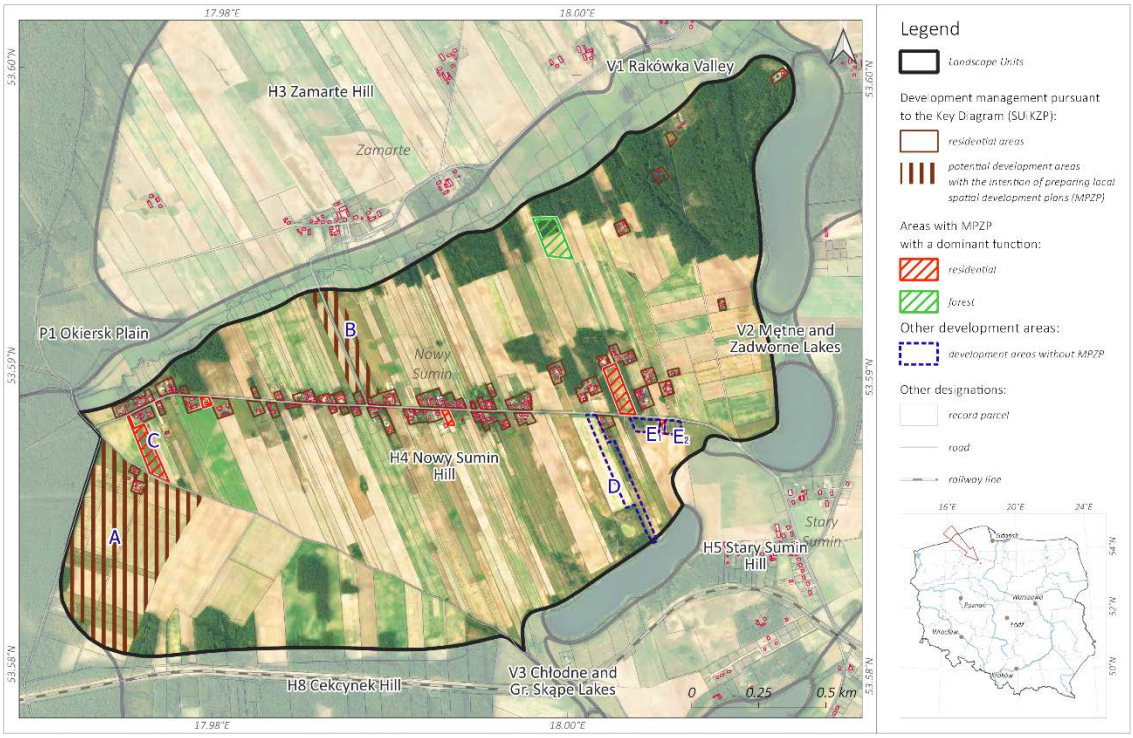


Figure 4. Development of the village of Nowy Sumin with its landscape surroundings in the area of H4 Nowy Sumin Hill landscape unit. The figure shows areas of the current village development and areas of anticipated development with the largest A, B, C, D, E_1–E_2 areas.

The division into plots of areas D, E_1 and E_2 has been legalized on the basis of zoning decisions, which constitutes local law in the absence of a development plan currently in force. At present, none of the development areas have been built up. The implementation of the planned investments will significantly increase the development area of villages, as shown in Table 3.

Table 3. Residential development areas of Nowy Sumin village.

Development Areas	Area [ha]
The area of current village development	12.2
Investment area A as per SUiKZP	22.7
Investment area B as per SUiKZP	4.2
Investment area C fully covered by MPZP	1.1
Investment area D not covered by MPZP	2.2
Investment area E partially covered by MPZP	0.8
Other investment areas covered by MPZP	2.4

The Key Diagram does not specify the layout and architectural features of the new buildings in detail. Plots of 1500–2000 m^2 with a single building were adopted purely for the purpose of simulating housing needs. No legal or physical restrictions exist for development in the research area. No conservation zones or objects have been entered in the communal register of monuments for the village area. Therefore, there is no legal obligation to adjust the new development to the spatial layout of the estate or the characteristics of historical development. Consequently, forms for the present research approach must take into account the commonly accepted procedure, which involves the distribution of land properties spread over time with a regular network of new plots of land (i.e., without earlier consolidation of adjacent land properties and the development of a single development plan) and in the siting of buildings with heterogeneous shapes, dimensions and ornaments. In the vast majority of cases, such uncontrolled shaping of new development determines its negative impact on the landscape.

However, the buildings currently erected in the village of Nowy Sumin do not differ significantly in scale and form from traditional ones. Consequently, an assumption was made that the facilities to be built in the future would also retain this character. The buildings will be relatively small, with a simple shape and modest ornaments: one-story, on a rectangular plan (approx. 6.5 m: 8.5 m × 10 m: 12.5 m) with sloping roofs—about 45 degrees.

3.3. Landscape–Environment of the Village

The research area is located in the central part of the landscape unit called Nowy Sumin Hill. It is made up of a wavy moraine upland, diversified by dunes, located at an altitude of 110–120 m above sea level. It consists of sands, gravels and clay. The village is located at the western foot of the hill, at the top of it and along the longitudinally oriented flattened ridge of the hill, which rises to the east. The gentle slopes descend to the north towards the valley of the Rakówka River and to the south towards the larger foot of the hill. The northern and southern slopes of the hill are covered by regular, ribbon-shaped fields, stretching across the ridge from north-west to south-east. The eastern slope of the hill is steeper. In the downward direction, the slope is covered by smaller, rectangular fields. Situated on a hill, the development, together with the surrounding fields, forms a distinct whole, clearly limited by patches and narrow bands of younger trees, mainly pine trees and mixed types of trees, and a compact forest complex in the Tuchola Landscape Park in the west. The fields take up fertile areas, while young forests grow on poorer soils. The whole village is situated in the zone of Natura 2000 PLB220009 Bory Tucholskie and in the Tuchola Landscape Park buffer zone.

Compared to 1930, the area of afforestation in the vicinity of the village has significantly increased. Small patches of pine forest in the south have complemented the old forest existing before 1930. Dense woods have overtaken the hilly and deforested area to the north-east of the village. Scattered copses also appeared near the buildings, on strips of former fields. Currently, the meadows in the Rakówka Valley are being afforested.

3.4. Settlement–Village Buildings

The village consists of two building arrangements in different layouts: a street settlement, founded in 1828 (formerly Nowe Suminy, German: *Neu Summin*) and a dispersed building arrangement, which emerged as a result of the parceling of the Stare Suminy land estate at the end of the 19th century. The primary area of the village occupies the central part of the hill. It consists of buildings situated along a straight 1 km long section of a road, the direction of which almost overlaps the east-west axis. Further west, the village street goes down the hill, changes direction to the south-west and runs parallel to the valley of the Rakówka River. A shorter, approximately 200-metre long part of the village development is located in that area. Both parts of the village, separated by a young pine forest and an undeveloped section of the road, constitute visually unrelated wholes. A distinctly separate part of the village consists of dispersed buildings surrounded by young pine trees at the top of the hill.

The range of roadside village buildings has seen no significant changes since the first half of the 20th century. The few new buildings were built in the 1980s at the extension of the historical building range. The current spatial growth dynamics of the linear village are also low. However, there has been systematic development of this part of the village, including the complementation and lengthening of the frontage and the formation of successive rows of buildings deeper in the plots. The dispersed parcel estate shows varied dynamics. The part of the village located closer to the street is characterized by a tendency to expand, while its forest, peripheral, and northern parts do not change much.

The historical substance of the Nowy Sumin development has been preserved to a large extent. It is known that there used to be a Catholic school and an Evangelical cemetery in the village back in 1885. The brick school building and the remains of the cemetery still exist today, as does a large part of the wooden and brick buildings, including the former K. Wietzke Inn (No. 22). An unpreserved windmill is marked on the map, dating from the 1930s, located behind the southern frontage (at the school building). A brick chapel built in 1938 is located in the center of the village, adjacent to the

street. Another object that attracts attention is the monument of the 18°E meridian, unveiled in 2011, which is a new tourist attraction and geographical curiosity.

Houses in the roadside village are located close to the edge of the village street, most often at the ridge side, although there are also some with peak and oblique alignment. These are small, one-story structures on a stone plinth, covered with a roof inclined at about 45° with a non-habitable attic, with a brick or wooden post-and-plank construction (Figure 5). Some of them were expanded by adding a single-story extension with a lean-to roof on the courtyard side. The introduced modernizations erased the traditional character of many houses. Their reconstruction most often consisted of replacing the roofing (from tile or asbestos cement sheet to sheet or tile) with a change in slope angle and color, as well as the removal of wooden combination windows, which were replaced with PVC, single-frame equivalents. Many buildings have been insulated and painted in different colors, which makes them stand out in the neighborhood. Up to three small farm buildings are located deep within the homesteads. Some homesteads have a trapezoidal layout, whereas livestock and storage buildings are often merged. They are prevalently wooden or mixed, consisting of a brick or stone basement and a wooden or brick superstructure. The barns are wooden and built using the slab-column method. Homesteads are accompanied by fruit trees in old orchards and flower gardens in front of the houses. The road connecting Nowy Sumin and Zamarte was partially planted with a row of Swedish whitebeam trees, a plant species non-native to this area.

(**a**) (**b**) (**c**)

Figure 5. Respectively: (**a**) traditional wooden house and (**b**) traditional brick house buildings along the road; (**c**) western entrance to the village.

3.5. Exposure–VisibilityFeatures

Long panoramas of the village on the hill are best exposed from the north, such as the neighboring Zamarte hill, and well exposed from the south-oriented and north-oriented foot of the hill. The exposure foregrounds of these panoramas form totally uncovered slopes, cut in a downward direction by regular ribbons of fields. The panoramas from the broad base of the hill are single-plane (Figure 6); the view of the village from Zamarte hill has a foreground marked by rare, irregular forestation within the range of Rakówka's riverside meadows (Figure 7). The substance of both panoramas is encircled by the forest and woods in the background. The view from the access road in the east provides a short panorama of the street with adjacent buildings standing out in the open area. The gateway to the village is marked by a solitary poplar. The opposite view of the village from the side of the forest complex is not evenly homogeneous or expressive due to more varied buildings and trees (Figure 5c).

Figure 6. Southern village panorama.

Figure 7. Northern panorama of the village from the neighboring hill.

The village street constitutes an interesting scenic route. Gaps in the northern frontage provide intimate or panoramic views of the slope of the neighboring hill with the buildings of the Zamarte village and the Rakówka stream valley. The area between buildings located in the southern frontage offers a view of the church tower in Cekcyn that looms over the forest. From the road connecting the villages of Nowy Sumin and Zamarte, the windmill in the distant Kiełpin is also slightly visible.

Characteristic features of the spatial patterns and their described exposure are synthetically illustrated in Figure 8.

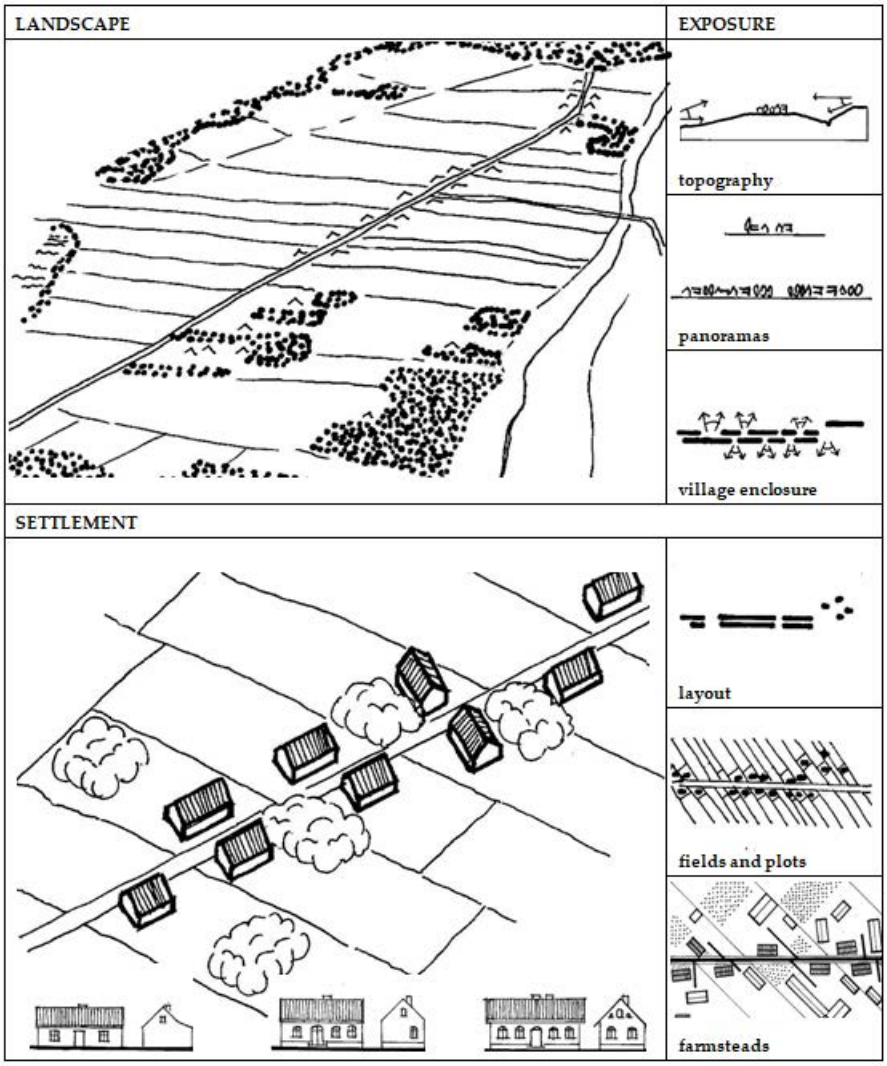


Figure 8. Synthesis of the landscape pattern and visibility features of Nowy Sumin. Outlines of the landscape pattern, the settlement forms and patterns and characteristics of their exposure.

3.6. Identification of Visual Hazards and Ways of Minimize Them

The assessment of the impact potential development may exert on the durability of the visual attributes of the surrounding landscape (L) and on development of the estate (S) as well as on the preservation of exposure features (E) is described in Table 4. The results of the LVCA are illustrated in the sketch in Figure 9.

Table 4. The LVCA Report. Classification of the areas according to visual hazards and ways to minimize their effects.

Direction of Village Expansion	Visual Hazards and Mitigation Options		
	(L) Landscape	(S) Settlement	(E) Exposure
Village expansion to the north (including in area B as per SUiKZP)	The buildings would cause fragmentation of the open slope with a historical pattern of ribbon-likefields.	The village buildings would lose their historical, linear layout.	The buildings would be very much exposed from the north and would obscure the old village. From avillage interior perspective, it would obscure the panorama of the hill with the Zamarte village.
Expansion of the village dispersed to the east (excluding area E)	The buildings could have a positive impact on the landscape by making the ruderal area more orderly.	The buildings could be a harmonious complement to the dispersed village development.	The buildings would be strongly exposed and could form a pronounced gateway to this part of the village.
Village development to the east and the extension of the roadside village layout (between roadside and dispersed village layouts)		The buildings would erase the trace of historical development and the division of the system into a roadside and dispersed village.	The buildings along the village street would obscure view openings on the surroundings of the village and on the church tower, which is a local highlight.
Expansion of the village towards the south (including in area D)	The buildings would adversely affect the composition of the extensive landscape interior, taking the place of the current farmland.	The village buildings would lose their historical, linear layout.	The buildings would obscure the visual openings from the interior of the village to the church tower in Cekcyn.
Expansion of the village in the south-western direction (in area A and C as per SUiKZP)	The development would adversely affect the composition of the extensive landscape interior, and it would overtake a large area of open spaces.The impact of area A can be moderated.	Estate A would not be connected with the old village buildings; complexes A and C would not follow the historical layout of the village. The impact of area A can be moderated.	The buildings would obscure the visual opening from the south-western direction to the village entrance, and it would degrade the short western panorama. The impact of area A can be moderated.
Expansion of the village towards the west (including in area C)	The development would connect the range of buildings to the border of the forest and the Tuchola Landscape Park.	The buildings would erase the historical development layout of the roadside village.	The buildings would occupy the visual foreground area of the old village, which would not be exposed from the forest exit road.

This study of the visual capacity of the landscape of Nowy Sumin village demonstrated that the siting of settlements B, C and D is extremely detrimental and will negatively affect the sustainability of the spatial pattern in terms of the extensive landscape, the development and the landscape exposure of the unit. The negative visual impact of settlement A can be neutralized if surrounded by greenery. On the other hand, the development of the dispersed village to the east, excluding area E, could positively influence the perception of village development, provided that the dispersed village character is preserved.

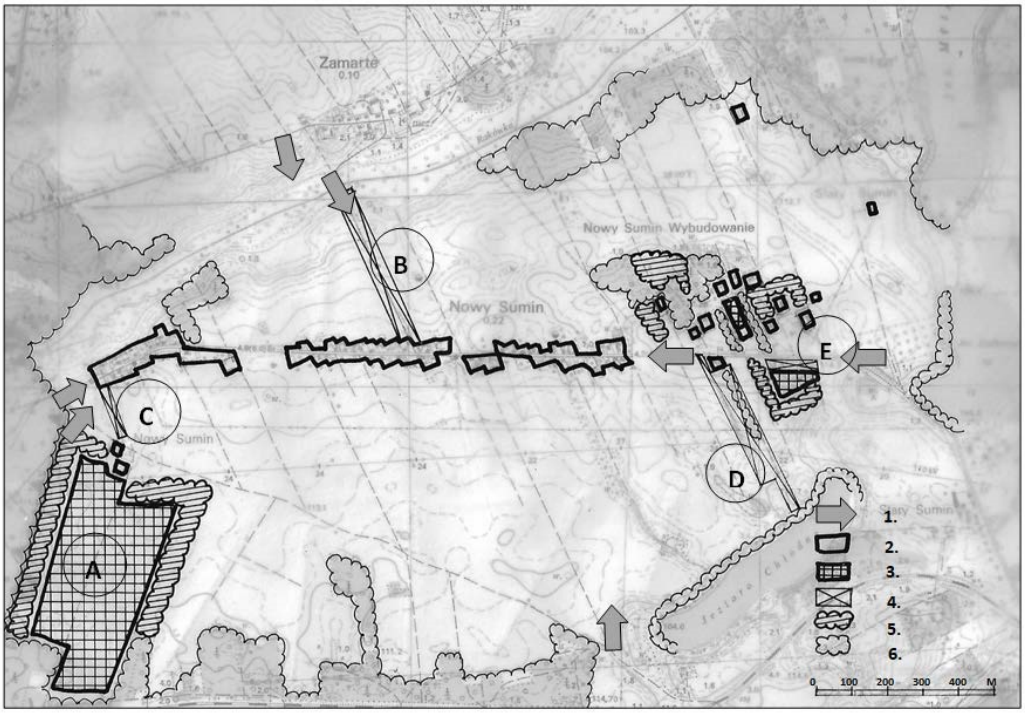


Figure 9. Landscape visual capacity assessment in the plan of Nowy Sumin village. 1. Important views; 2. development areas; 3. potential development areas accepted when visual mitigation is taken into account; 4. potential development areas excluded from development; 5. tree stands proposed for the improvement of the visual perception of existing buildings or to mitigate the negative impact of potential buildings; 6. forestation and tree planting.

4. Discussion

LVCA was applied to determine the probable impact of potential development on the visual perception of a village and its landscape environment. A new methodological framework was developed for Polish conditions. The project is based on the results of the identification of physiognomic units of the landscape. In combination with the procedure, it forms a coherent system of visual surveys to be used in space management on a local level. These two merged techniques can help to control the process of development dispersion: to monitor, to preserve or to shape harmoniously the settling-agricultural border. In Poland, a similar visual assessment system has never been tested before.

LVCA is modeled on methods of landscape capacity assessment, which constitute part of the Landscape Character Assessment (LCA) methodology developed by the Countryside Agency and Scottish Natural Heritage and are applied in the UK in order to support the planning decision-making process [8,17]. Although different, detailed ways of describing landscape capacity are applied, as evidenced by the comparison of the Aylesbury [18] and Perth [14] landscape capacity assessment methods, the procedure in each case is preceded by the identification of the landscape's perceptual resources and by a general definition of planned development forms. It is assumed that design solutions will meet the spatial order criterion. The research involves determining the degree of restrictions for potential development that result from the following hazards:

- The social value of visual landscape, also referred to as landscape sensitivity. The indicator of the above may be the extent of legal protection (international, national or local) or the level of public interest measured by the number of users, the length of observation routes or the number of viewpoints. High sensitivity can be ascribed to, for example, the foreground of an attractive panorama that attracts tourists or investors.
- Established visual relationships between land forms, land cover and forms of development.

- Chances of mitigating the negative impact exerted by potential development or by improving the physiognomy of the landscape in the future.

The flexible LCA model has been developed as a result of many years of practice, which makes it well suited to social needs and expectations. A similarly holistic approach was applied in LVCA. It allowed the natural, cultural and visual landscape features of the study area to be described in an integral manner based on the results of local landscape classification.

However, LVCA was adapted to the organizational and social conditions of the national spatial planning system, as well as to Polish studies on cultural landscapes. Rather than the best planning solutions available, the ones that are standardly used were assumed. The need to mitigate the effects of the existing development was highlighted. The methodology excluded the stakeholders' participation in the assessment, a factor that could be added in future. LVCA used Bogdanowski's expert method for defining of spatial arrangements and their exposition, as well as extending the method by assessing the impact new buildings exert on the visual landscape. This method remains a common tool for expert analysis of the cultural landscape in selected areas of Poland. It consists of identifying homogeneous architectural and landscape units on a planning scale, enclosure complexes on an urban scale and architectural and landscape enclosures on a local scale. The classification is based on differences in topography and land cover, the history of transformation and visual connections. Assessment criteria include historical value and the composition's legibility of the distinct areas. Among other issues, the analysis includes the visual connections within and between landscape enclosures and the composition of views and panoramas. The study results in project guidelines [19–21].

LVCA is a new contribution to landscape visual capacity assessment in Poland. Polish researchers rarely tackle the assessment of landscape visual capacity in an integrated manner by combining natural, cultural and visual factors. The notion of landscape visual capacity in research by Polish scientists is very narrow and most often reduced to the visibility of objects in the field described by means of visibility diagrams and maps [22]. Similarly, Polish researchers have failed to address the issue of assessing public interest in possible modification to visual qualities. Krajewski [23,24], Rygiel [25], and Rozenau-Rybowicz & Szlenk-Dziubek [26] define the susceptibility of the landscape to changes as a result of relations between the physical attributes of the landscape and its exposure characteristics. In addition, Krajewski takes into account the historical value of the landscape. Works conducted by Krajewski and Rozenau-Rybowicz & Szlenk-Dziubek consisted of recognizing the capacity inherent in a given landscape (also referred to as resistance or sensitivity by the authors). Ozimek and Ozimek analyze the visual capacity, understanding it as the potential visibility of objects depending on topography and land cover [27]. The study of visible space is also related to the field of interest of Forczek-Brataniec [28]. The school of research, which focused on the impact of a single object on the visual perception of the landscape, contributes pre-planning studies in Poland much more often, for example in assessments of the environmental impact of large investments [29]. Unlike other studies on landscape visual capacity conducted in Poland, LVCA includes determination of the impact of potential development on physical, cultural, aesthetic and perceptual features of landscape based on local landscape units classification, which is characteristic in countries that have been following the ELC recommendations for much longer [30,31].

A particularly weak point of the landscape audit, which has been underway in Poland, lies in the marginalization of the visual features' assessment in the case of most landscapes (Figure 10). LPA and LVCA supplement the effects of landscape audit by recognizing the visual resources of the local landscape.

The LVCA results can guide communal spatial strategies for protecting landscape openness in rural areas. However, it should be noted that the visual resources of the study area are characterized by exceptional cohesion and low complexity, which makes assessment much easier. It is therefore necessary to review the methodology in areas that are characterized by varied and more complex physiognomy.

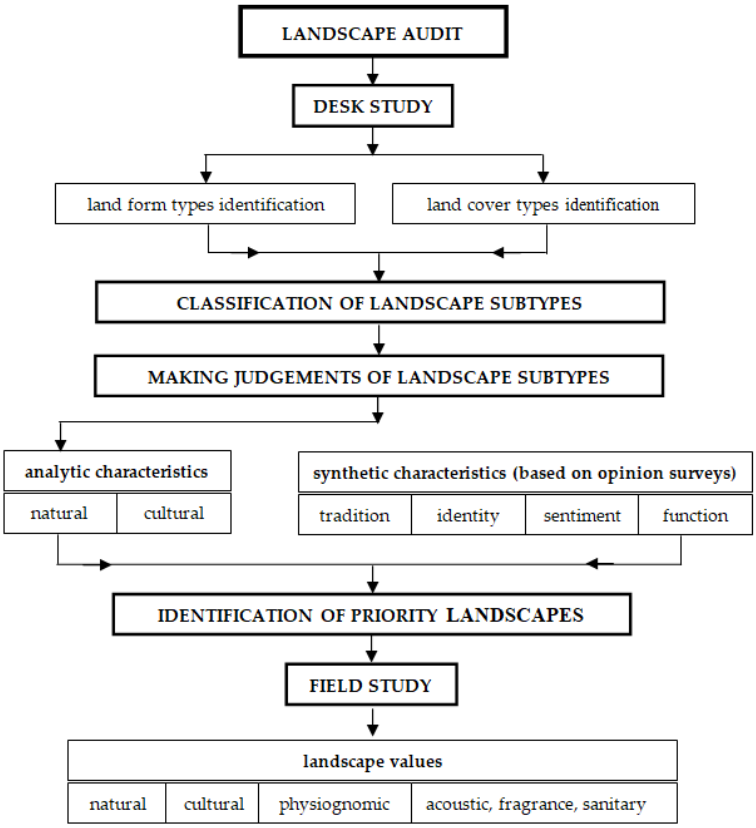


Figure 10. Methodology of landscape audit carried out in Poland on a regional level. Physiognomy study conducted only for priority landscapes.

5. Conclusions

This article concerns the sustainable development of Polish rural areas. It discusses a local case, which is part of a complex insight into implementing ELC recommendations throughout Europe. The results of the landscape visual capacity assessment (LVCA) conducted for a selected village have been presented. LVCA determines the probable impacts potential buildings will exert on the visual perception of a village and its landscape environment. The significance of such an assessment consists of aiding the protection of landscape openness. The methodological framework applied in this case is easily understood and open to stakeholders' input. For these reasons, LVCA stands the chance of providing an effective tool for the national spatial management system on a municipal level. The application of this method would result in increased control over building sprawl in agricultural areas, which poses the main visual threat to rural landscape in Poland.

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