Nauka

Urszula Forczek-Brataniec\*

Paulina Koppel\*\*

orcid.org/0000-0003-1600-4332

# Visual Analysis as an Element of the Cultural Park Protection Plan: Evolution and Development of the Method on the Example of Several Districts in Cracow

Analiza widokowa jako element planu ochrony parku kulturowego. Ewolucja i rozwój metody na przykładzie dzielnic Krakowa

**Keywords:** city landscape, visual values, protection of the urban layout

**Słowa kluczowe:** krajobraz miasta, walory widokowe, ochrona układu urbanistycznego

#### Introduction

The Cracow School of Landscape Architecture (KSAK) has developed its original methods for studying the landscape of urban layouts. They are based on the foundations of the analysis of architectural form and its exposition. They are developed and improved both by scientists of the Cracow University of Technology and representatives of other centers.1 They stem from a comprehensive method by Professor Bogdanowski which is formed on a holistic approach to landscape issues. This approach has become a starting point for works related to protection of cultural city landscape and open landscape. One of the effects of actions in this respect is a form of protection of cultural landscape in the form of a cultural park.2 It presents an integrated approach to the protection of urban space. The cultural park has become the basis for planning in the spirit of sustainable development while taking into account cultural, natural, and visual resources.3

The source of this approach can be found in the European Landscape Convention. In its definition, the perceptive aspect is emphasized because it has become equivalent to natural and cultural resources. In this way the issue of perception has been confirmed and gained its rightful place in the process of landscape resource management. The vista as a common good requires adequate methods of studying, identification, characterization, assessment and, as a result, creating guidelines for preservation, protection and creation without any losses. The issues of studying city views and vistas have a very rich history. Their specific development can be observed in the post-war years when new methods in planning developed and were implemented in cities in the rebuilding process. This trend continued in planning over the subsequent decades.

It was at that time that Professor Bogdanowski worked on the concept entitled JARK-WAK that emphasized the landscape values of the city. The concept is still being developed and continued. Moreover, it is applied in planning and expert analyses regarding landscapes undergoing transformation. Studies and projects concerning fortress landscapes, calvary landscapes, complex engineering projects,<sup>8</sup> or historic city centers are also worth mentioning. Another important trend comprises the methods developed within the

Cytowanie / Citation: Forczek-Brataniec U., Koppel P. Visual Analysis as an Element of the Cultural Park Protection Plan: Evolution and Development of the Method on the Example of Several Districts in Cracow. Wiadomości Konserwatorskie – Journal of Heritage Conservation 2021, 68S:149–157

Otrzymano / Received: 13.03.2021 • Zaakceptowano / Accepted: 30.08.2021

doi: 10.48234/WK68SCRACOW

Praca dopuszczona do druku po recenzjach

Article accepted for publishing after reviews

<sup>\*</sup> Ph.D. D.Sc. Eng. Arch., University Professor, Faculty of Architecture, Cracow University of Technology

<sup>\*\*</sup> M.Sc. Eng. Landsc. Arch.

<sup>\*</sup> dr hab. inż. arch., prof. PK, Wydział Architektury Politechniki Krakowskiej

<sup>\*\*</sup> mgr inż. arch. krajobr.

framework of visual analyses prepared for the evaluation of visual and landscape impact. They stem from studies of impact of new projects on existing landscape conditions. This method finds confirmation in numerous visual studies of landscape.<sup>9</sup>

J. Palmer presented an extensive overview of implemented methods while stressing versatility and a wide range of applications. At the same time, the authors of the GLVIA (Guidelines for Landscape and Visual Impact Assessment) guidelines for defining the visual impact on landscape stress its valuable contribution to the study of urban space while articulating the need for developing its application and new studies to integrate existing achievements in this field.<sup>10</sup> The presented method used in the analysis of visual values of cultural parks integrates both trends. It combines the issues related to assessment of cultural landscape specific to the Cracow School of Landscape Architecture and the studies of spatial dependencies conducted with the use of contemporary methods in the field of visual impact assessment. Integrating methods is especially valuable in historic urban spaces where the issue of protection and development constitutes a major problem in planning central spaces. This paper presents the process of the evolution of the research method which took place while studying three urban structures. The analysis of these three different city districts led to an adjustment of the methods' tools and structures to the properties of the analyzed areas. Additionally, over the decade that passed between the first and last protection plan, additional scientific tools have been developed. This was also reflected in the method's evolution. This presents its versatility and flexibility. On the one hand, it is qualified as a proper scientific tool for diversified urban spaces, while on the other, it allows for making use of emerging scientific techniques and applying them already at the analysis stage. This leads to a situation in which the presented method demonstrates the possibility of wide application in the study of historic urban structures which remains particularly important when faced with urban densification and increasing threats to visual integrity of historic urban structures.<sup>11</sup>

## Materials and method

In Cracow, there are three areas with the status of a Cultural Park. These include the Old Town, Nowa Huta as well as Kazimierz with Stradom. Two of them encompass spatial arrangements dating back to medieval times with a differently preserved urban layout. The third plan concerned a city built from scratch on farm land in the mid-twentieth century. The areas in question are urban structures of recognized value placed under forms of statutory conservation, such as: an entry on the UNESCO list (the Old Town), strict conservation zone (the Old Town, Nowa Huta, Stradom and Kazimierz), historical monument status (the Old Town, Kazimierz and Stradom) (Fig. 1). All the analyzed areas are mostly located on almost flat ter-

rain with insignificant differences in landform. Wawel Hill with the Wawel Castle showed distinctive features within the Old Town, while in Nowa Huta it was the Vistula River embankment with a number of buildings on its side. As a result, the city blocks constituting a homogeneous structure in height formed a compact system with tight walls limiting any external access. Objects distinguished by height proved a decisive factor for the visible shape of these structures, which created independent visual connections and determined the appearance of the composition features in the form of depth, borrowed or multi-plane views. Thus, they would determine the picturesque and attractive land-scape of the city. 12

For the purposes of the Cultural Park Protection Plan for all three areas, an analysis of the visual values was made as an element of the Cultural Park Protection Plan. It was one of the components of the protection plan developed in a multidisciplinary team. Work on the area of the Old Town was the first visual analysis during which frameworks of the method were formed.<sup>13</sup> The structure of the protection plan was based on a division into architectural and landscape interiors in accordance with the JARK-WAK method. The visual analysis was based on the division into interiors done on the basis of historical and contemporary determinants. Historical studies of landscape transformations conducted on the basis of historical iconography were an important element of the analysis. Then, in accordance with the method of architecture and landscape interiors, an analysis of resources was conducted together with interior characteristics in terms of active and passive exposition. The key issue here is both that of views within the studied area and the outside views of the Old Town panorama with identification of major points of outside views of Cracow panorama. Afterwards, a valorization of active and passive exposition was performed, which led to formulating guidelines referring to particular interior groups.

The area of Nowa Huta presented a different challenge. This space was built in the mid-twentieth century based on the idea of a "neighborhood unit." It was deprived of planned landmarks and formal buildings and demonstrated completely different compositional features. Because of neglect and a lack of care in the last quarter-century, it required the method to be expanded to account for analyzing view clutter, and the limitation and deformation resulting from uncontrolled development of greenery and accumulation of elements that degrade space. The area of Kazimierz and Stradom, as a layered and extremely varied form, has somehow combined the characteristic features of the Old Town and Nowa Huta. In this case, the method evolved in terms of the analysis of visual impact of the landmarks as well as temporary form layers and structures that influence the visual shape of the area. In the case of Stradom and Kazimierz, the latest tools in the form of the method of a multipoint analysis included in the method of analyzing the visibility degree were applied.

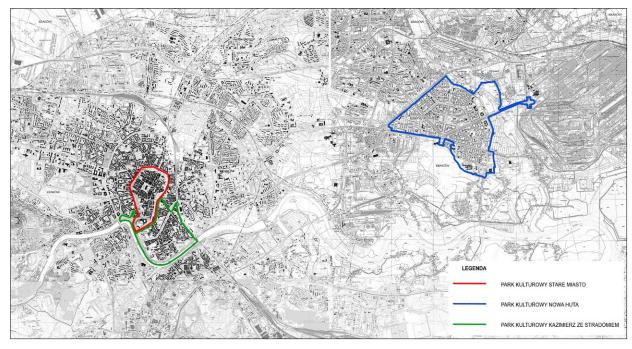


Fig. 1. Location of three cultural park areas in Cracow: the Old Town cultural park, Nowa Huta cultural park, Kazimierz and Stradom cultural park; by P. Koppel.

Ryc. 1. Lokalizacja trzech obszarów parków kulturowych w Krakowie: Park Kulturowy Stare Miasto, Park Kulturowy Nowa Huta, Park Kulturowy Kazimierz ze Stradomiem; oprac. P. Koppel.

#### Results

Work on visual analyses of three selected examples was stretched in time and concerned different spatial structures. This led to the development of the analysis method and constituted its validation. The results of the method's development were presented for two fundamental parts of the analysis, i.e., studying visual resources as well as the stage of landscape characteristics in the form of active and passive exposition.

Preparatory work involved desk and field research in accordance with the adopted method. The desk research included an analysis of historical materials, a preliminary division into architectural and landscape interiors as well as digital analyses of spatial models (Fig. 2).

Because of the development of digital research tools, the visibility analysis underwent significant evolution. In each case, both digital terrain model (DTM) as well as digital terrain surface model (DTSM) were used. In the case of the Old Town, digital data in the form of a spatial model was used to obtain elevation and surface data and to prepare comparative visualizations. In case of Nowa Huta, both DTM and DTSM were prepared on the basis of laser scanning. For the purpose of detailed analyses selected sections of areas were refined and detailed. On the basis of the model a simulation was made of spatial impact of non-existent yet planned Nowa Huta landmarks in the form of a visual range of a planned town hall and an obelisk at Centralny Square in various height variants (Fig. 3). The detailed model

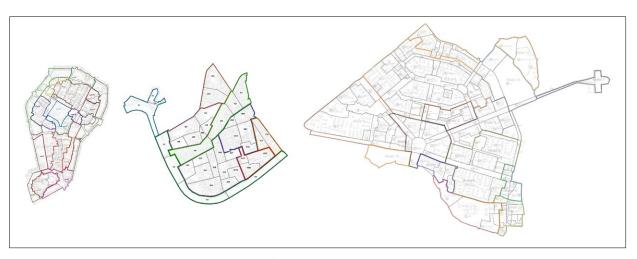


Fig. 2. Division into architecture and landscape interiors of three cultural parks; by P. Koppel. Ryc. 2. Podział na wnętrza architektoniczne i krajobrazowe w trzech parkach kulturowych; oprac. P. Koppel.

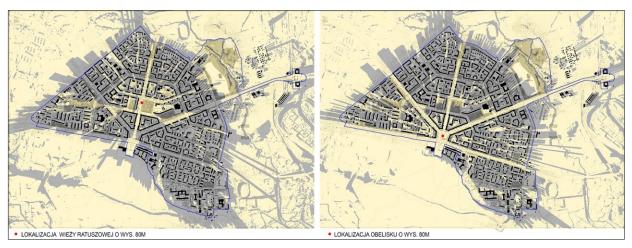


Fig. 3. Visibility ranges of the planned town hall tower and the obelisk in Nowa Huta, visual analyses conducted on the basis of digital terrain model; by the authors.

Ryc. 3. Zakresy widoczności projektowanej wieży ratuszowej i obelisku w Nowej Hucie, analizy widokowe przeprowadzone na podstawie cyfrowego modelu terenu; oprac. autorki.

proved to be extremely useful for defining the range of deformed interiors of developed quarters. On the basis of the model, a potential for correcting tree density was presented. It was aimed at preserving the character of the place while making the urban structure more legible. Furthermore, the model was also used for demonstrating the scope of visibility corrections in order to display crucial compositional elements as it was in case of the only visually closed axis of Solidarności Avenue. What is more, the model was used to simulate future preservation activity with regards to Centralny Square.

In the case of Stradom and Kazimierz, terrain models have additionally become the basis for the analysis of active exposition. As a result of the development of the method's visibility analysis capabilities, it was equipped with a crucial tool for the precise examination of visibility degrees based on multipoint analysis. At the desk research stage, the method of analyzing visibility degree from 2018 was used.14 On its basis the manner of evaluating the elements of active exposition was improved. It allowed, among others, to precisely identify the areas with the highest number of visible lanmdarks, which, in turn, became an important and measurable indication for locating key points of active exposition. Moreover, the landmark visibility degree map constituted the basis of numerous decisions at the stage of valuating active and passive exposition.

In each analyzed case, field work included data verification and landscape survey. Identification of historical photography took place and contemporary documentation to compare then with the current state. The development of the methods at the analytical stage proved to be extremely useful for field work. On the basis of a digital analysis of visibility ranges, a photographic survey of views was performed in areas where visibility ranges overlapped. This allowed for documenting and verifying the results. It also facilitated the hierarchization of the views in the field. In all of these cases this stage of research represented a similar

approach yet a slightly different scope. The method's evolution in initial data preparation made it possible to better predict which areas would require a deeper analysis. It constituted the answer to the different spatial character of particular structures. Their preliminary characterization in virtual space and preparing auxiliary materials facilitated and made work in the field more effective. Therefore, in case of the Old Town visual relationships between Planty Park and the buildings were enhanced while in case of Nowa Huta it was necessary to analyze visual relations for potential landmarks and detailed greenery analyses in developed quarters. At the same time, in the case of Stradom, they were studies of visual ranges of landmarks within the studied area as well as in the neighboring areas.

## **Active exposition**

Based on the division into interiors as well as desk and field research, a characteristic of visual resources of individual interiors was prepared. It was based on a division into active and passive exposition as applied by the KSAK. 15 Active exposition is defined by the act of landscape observation while passive exposition is defined by landscape views in the form of views and panoramas. This distinction allows for separating functional dependencies of exposition from seen landscapes. Elements of active exposition consist of points, series, visual surfaces and visual axes (Fig. 4). Elements of passive exposition consist view components, such as: dominant elements (landmarks), subdominant elements, accents, the foreground and the background. The specifics of active exposition stemmed from the location of the point, series and visual surface. It was connected to the way of its management. Passive exposition is a view, a panorama is in image whose disclosure depends on spatial structure and the substance it is built from. Both exposition categories were closely interrelated and interdependent; yet, their specifics de-

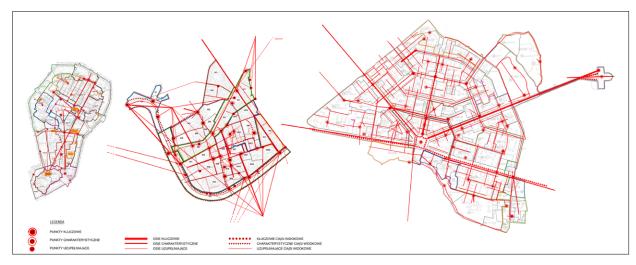


Fig. 4. Comparison of the map of active exposition of the analyzed cultural parks; by the authors. Ryc. 4. Porównanie map ekspozycji aktywnej analizowanych parków kulturowych; oprac. autorki.

termined a different approach and a different impact on design decisions.

In case of the Old Town cultural park identification of elements of active exposition was conducted on the basis of studies on historical iconography and work in the field supported by a digital model. Distinctness of the structure and its visual isolation from the surroundings allowed for locating and characterizing elements of active exposition. The Old Town protection plan by CUT includes a matrix for categorizing elements of active exposition. It distinguishes key, characteristic and supplementary elements. The selection of key points in urban space identifies the main critical points to become the basis for monitoring at a later stage.

In case of Nowa Huta there are no dominants but a clear predominance of views on a micro-landscape scale. The above created the character of particular visibility studies in individual quarters as well as a detailed analysis of Solidarności Avenue. In this case an analysis of visibility degree was used. It is conducted on the basis of the digital terrain surface model (DTSM). These analyses helped to define current visual relations on a micro and macro landscape scale. Moreover, possible visual ranges were studied and they concerned potential yet never realized spatial forms which then were compared to the existing situation. Digital analyses were also used for developing conduct models for correcting excessive greenery in order to uncover elements of the urban layout. Those were conducted for selected quarters as well as Centralny Square.

In case of the diversified structure of Stradom and Kazimierz the studies of active exposition were supported with detailed visibility analyses of numerous dominants. In order to indicate their actual role in the district space we applied the exposition degree index which has become an important element supporting the location of viewpoints. A view analysis from the highest and most attractive objects of the urban layout

helped to locate the sites from which they were viewed either individually or collectively. This constituted auxiliary material verified in the field, to define elements of active exposition. The original method to determine visibility degree from 2018 was applied in this case. <sup>16</sup> It supports the location of key points by indicating places of concentration of exposition of dominants and subdominants.

The case studies have led to substantive and methodological conclusions. In terms of substance, the comparison of spaces of different nature and origin indicated that it is vertical differentiation of elements as well as presence of surfaces as visual foregrounds that create distinctiveness and a range of active exposition. Both in the Old Town and Kazimierz and Stradom the main elements that enriched the space and determined its multi-planned nature and wealth in borrowed views were landmarks and subdominant elements. Nowa Huta, while deprived of planned yet unbuilt landmarks, has become a labyrinth of corridors with almost no multi-planning, borrowed views or vertical views. The dominant expositions in the micro and meso scales are narrowed down to single-plane views limited by developed quarters. The main visual axes indicated street frontages and avenue canyons. Solidarności Avenue has taken on a special significance against this background. It was terminated by the Administrative Centre and the issue of greenery maintenance in order to recreate visual connections in the interior scale. Due to the vicinity of an extensive viewing area in Nowa Huta in the form of the Nowa Huta Meadows, and in the case of Stradom and Kazimierz, the vicinity of the Vistula riverbed, the border areas adjacent to these areas gained scenic views of high compositional value.

The presented features of comparative areas clearly demonstrated graphical combinations in the form of maps, in particular diagrams of visual axes. In this respect, the applied method of hierarchization of ele-

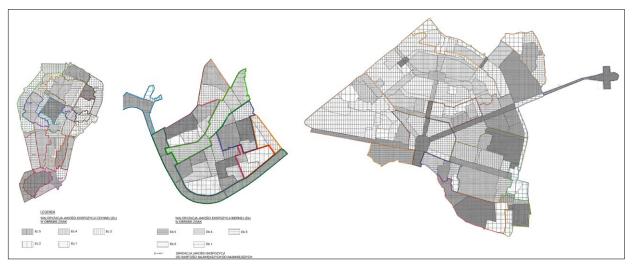


Fig. 5. Comparison of the exposition evaluation maps of the analyzed cultural parks; by the authors. Ryc. 5. Porównanie map oceny ekspozycji analizowanych parków kulturowych; oprac. autorki.

ments of active exposition while expanded with additional analyses resulting from the place specifics, has become an appropriate tool for studying the spatial character of this urban structure.

## Passive exposition

The character of passive exposition was shaped by two factors, namely: the quality of substance that created the space as well as the composition created by the mutual arrangement of individual elements. The quality of substance was defined on the basis of work conducted by a team of historians. Each interior gained historical value. Historical substance evaluation was based on the following criteria: conservation status, layout clarity and system homogeneity. The second factor that determined the perception of spatial structure are its compositional features. This issue was most clearly visible in case of the Kazimierz and Stradom Cultural Park. The compositional features of the view were characterized and their occurrence was determined. The following features were distinguished: depth of view, distance, width, multi-layeredness, borrowed views. It took the form of an expressive formula with specific criteria for assessing the compositional structure of the system.<sup>17</sup> In this particular case, the evolution of the method here has led to defining the main criteria and their clear separation.

Supplementary materials took on the form of panoramas where the presence of characteristic features for the composition was demonstrated. The issue of view clutter evolved in the analyzed cases. Comparing the cases showed a different approach resulting from differences in maintenance and care for each space. In the case of a space that is neat and regularly cleaned, as in that of the Old Town, this criterion was included in the general analysis of passive exposition. In the case of Nowa Huta, this phenomenon was given a different form: that of the degree of visual clutter, assessed in

accordance with two criteria: clutter caused by natural, and cultural elements. In the case of Stradom and Kazimierz, the space that included areas of considerable neglect and showed an accumulation of intense use this issue developed even further. The degree of visual clutter was singled out from the issues of passive exposition. It took the form of the degree of visual clutter.

Project overlay, a lack of renovation and ongoing cleanup activity in relation to transport, advertising and the information space introduced a superficial disorder into the urban space, separate from the quality of the urban substance. Determining the degree of clutter and its identification constituted a source of significant data for defining further action aimed at improving the visual values of the analyzed area. Among the elements that determine visual clutter degree, the following were distinguished: chaotic street furniture, neglected greenery, the presence of advertisements, an excess of road signs and the haphazard siting of parking places. The degree of clutter was divided into three values: high, medium and low.

The analysis of the criteria adopted for active and passive exposition formed the basis for formulating assessments for the studied areas. In case of the Old Town and Nowa Huta, they took a tabular and graphic form (Fig. 5). Maps of valorization of active and passive exposition and maps of collective assessment were prepared. On their basis, exposition protection zones have been distinguished. In case of Stradom and Kazimierz, these maps were additionally overlaid with data related to the visual clutter. This summary allowed for zoning of the analyzed area. The areas with the highest visual values were indicated, as well as areas requiring intervention due to the degree of visual clutter, which has a degrading effect on the valuable historical substance. The combination of the zone of special exposition value and the zone of particular visual clutter made it possible, in turn, to identify areas for immediate cleaning interventions.

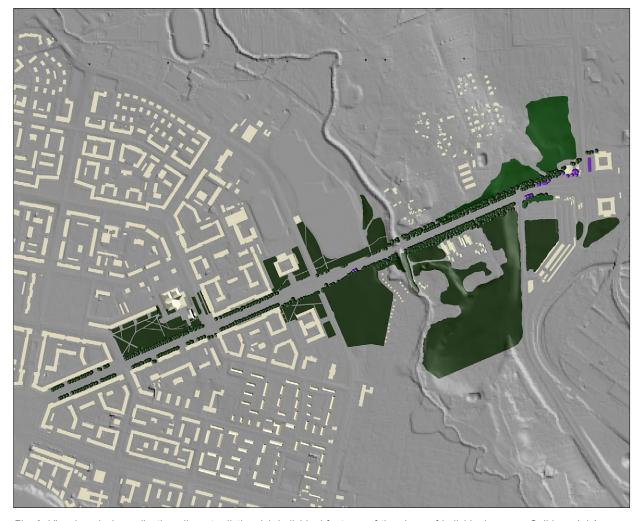


Fig. 6. Visual analysis application allows to distinguish individual features of the views of individual spaces. Solidarności Avenue, the trees indicated by color have been selected for correction in order to restore the axial view of the Administrative Centre; by P. Koppel.

Ryc. 6. Zastosowanie analizy widokowej pozwala zidentyfikować indywidualne cechy widoków poszczególnych przestrzeni: al. Solidarności – oznaczone kolorem drzewa zostały wybrane do korekty, aby przywrócić osiowy widok Centrum Administracyjnego; oprac. P. Koppel.

#### Conclusions

The examples of the visual analysis presented above were prepared for the purposes of drafting the cultural park protection plan. They indicate the evolution of the method of analysis stemming from the features of the analyzed areas as well as the development of scientific tools. The developed method takes into account the essential elements of the procedure and makes it possible to adapt detailed studies to the specificity of the analyzed area. Its application allows to distinguish individual features of the views of individual spaces: features that are essential to its further shaping and management in the spirit of sustainable development aimed at preserving the most valuable visual resources for protection of the diversity of cultural heritage and landscape (Fig. 6). The visual analysis in this approach, based on the achievements of the Cracow School of Landscape Architecture and contemporary methods developed

as a part of visual impact assessment, allowed for the gradual adaptation of tools to the needs of the analysis. Basing it on a common methodological core allowed for some flexibility necessary to study spaces with differing specificities in order to emphasize their distinctive features which constitute the formal identity of the urban landscape and its originality. The cases mentioned above confirmed the effectiveness of the application of the study sequence according to the adopted order: resource identification and characterization, and assessment, which made it possible to formulate local guidelines. At the same time, they indicated the significance and merit of conducting visual analyses as a tool supporting design decisions in protection plans (Fig. 7). The evolution of the method indicates its universality and usefulness in the field of analyzing various urban spaces. The adopted formula allows for further verification and development of the method as a result of using spaces with distinctive features for research.

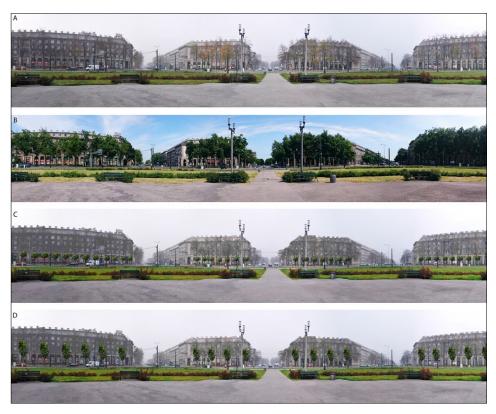


Fig. 7. Visual analyses as a tool supporting design decisions, four views of Centralny Square; in descending order: a—leafless state, b—full foliage state, c—introducing small spherical trees – visualization, d—introducing smaller oval trees – visualization; by the authors. Ryc. 7. Analizy widokowe jako narzędzie wspomagające decyzje projektowe: cztery widoki Placu Centralnego, od góry do dołu: a – stan bez liści, b – stan z pełną roślinnością, c – wprowadzenie małych drzew sferycznych – wizualizacja, d – wprowadzenie mniejszych drzew owalnych – wizualizacja; oprac. autorki.

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# **Abstract**

This article presents the evolution of the visual analysis method used in the design of cultural park protection plans. Using three cases as examples, the specifics of visual studies of urban layouts, which is one of the elements of a multidisciplinary protection plan, were presented. This method is based on the experience of the Cracow School of Landscape Architecture and on global advancements in the field of landscape analysis. While it was developed during research and verified on the basis of implementation works, it was used in an integrated approach to assist in the conservation of valuable urban layouts. On the basis of studies prepared for three cultural parks, selected elements of the analysis and their usefulness for further stages in the form of valorization and guidelines prepared for the protection plan were analyzed. The method of visual analysis developed as a result of the evolution presented can be used in planning works concerning valuable spatial systems.

# Streszczenie

Artykuł przedstawia ewolucję metody analizy widokowej stosowanej w projektach planów ochrony parków kulturowych. Na podstawie trzech przykładów zaprezentowano specyfikę badań widokowych układów urbanistycznych, stanowiącą jeden z elementów multidyscyplinarnego planu ochrony. Metoda ta opiera się na doświadczeniach Krakowskiej Szkoły Architektury Krajobrazu oraz na światowych dokonaniach w zakresie analiz widokowych. Wypracowana i rozwijana w trakcie badań oraz weryfikowana na podstawie prac wdrożeniowych znalazła zastosowanie w zintegrowanym podejściu do ochrony cennych układów urbanistycznych. Opierając się na opracowaniach wykonanych dla trzech parków kulturowych, przeanalizowano wybrane elementy analizy i ich przydatność dla dalszych etapów w postaci waloryzacji i wytycznych sporządzonych do planu ochrony. Wypracowana metoda analizy może znaleźć zastosowanie w pracach planistycznych dotyczących cennych układów przestrzennych.