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The European Landscape Convention as a Tool for the Protection, Management and Planning of Landscapes

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Abstract

Landscape protection and planning have attracted the attention of experts in many branches of science and industry. The growing interest in landscape management reflects concerns over environmental degradation that deteriorates the quality of life. Undesirable landscape changes result mostly from civilizational development, inappropriate land use and spatial planning. Further adverse landscape transformations should be prevented at local, regional and national levels. On 24 June 2004, Poland ratified the European Landscape Convention (ELC)*, which was opened for signature in 2000 in Florence (Italy). The ratifying countries have committed themselves to enhance the quality of local landscapes which are the basic components of Europe's natural and cultural heritage. Despite several attempts that resulted in the development of preliminary analytical reports, the Convention has not been implemented in Poland to date. For the Convention to be implemented, landscapes on Polish territory have to be identified and assessed. A systemized approach to landscape evaluation can provide a basis for creating landscape maps. This paper discusses selected methodological assumptions underlying landscape classification (typology) and quality assessment, which could be used in the implementation process. The proposed method for assessing the esthetic value of landscape may become an integral part of landscape auditing, which is an important legal aspect of implementing the Convention. A landscape audit involves the identification of priority landscapes of particularly high scenic value.*

Keywords: landscape, landscape protection, landscape development, landscape auditing, European Landscape Convention

Introduction

The progressive deterioration of the surrounding space calls for intensified measures aimed at landscape protection and planning. Environmental degradation lowers the quality of life. Economic development together with inappropriate planning and land management lead to adverse and irreversible changes in landscape. Further undesirable changes in landscape should be prevented at the local, regional and national level. On 24 June 2004, Poland ratified the European Landscape Convention (ELC), which was opened for signature in 2000 in Florence. The ratifying countries have committed themselves to enhancing the quality of local landscapes which are the basic components of Europe's natural and cultural heritage.[1] The primary goal of the ELC is to promote landscape protection, management and planning and to organize European cooperation on landscape issues.

1. See: The European Landscape Convention (Florence, 2000). [@:] http://www.coe.int/en/web/landscape/the-european-landscape-convention and Europejska Konwencja Krajobrazowa, sporządzona we Florencji dnia 20 października 2000 r. DzU z 2006 r. nr 14 poz. 98.

This paper analyzes legal provisions applicable to landscape protection and management, and it discusses the principles for landscape quality assessment in view of their applicability for the implementation of the European Landscape Convention. The proposed method of landscape assessment could be used in landscape auditing, which is an important legal aspect of implementing the ELC. The esthetic value of landscape was evaluated based on data covering three periods. Changes in the esthetic value of rural areas induced by human activity were monitored. The presented empirical study discusses the results of field surveys that could contribute to the development of principles and methods of landscape management and protection.

1 Landscape

In the European Landscape Convention, landscape is defined as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."[2] Landscape is perceived as a visual phenomenon, "a spectacle presented by the countryside" (Land Use Consultants (Great Britain) and Countryside Commission for Scotland 1971). A landscape can be perceived from a near-view perspective when all senses are employed or from a distant-view perspective when we rely only on the sense of sight to observe the view stretching to the horizon (Natori and Chenoweth 2008; Qiu, Lindberg, and Nielsen 2013). The word "landscape" is often regarded as synonymous of the environment and geography, but according to many authors, this interpretation is incorrect because both concepts have much broader meanings. As a visual phenomenon, landscape incorporates numerous layers (land relief, water bodies, vegetation, etc.) that form a whole in terms of composition. Individual layers do not create separate landscapes (Brown and Brabyn 2012). Landscapes are also perceived as spatially heterogeneous areas characterized by a mosaic of patches that differ in size, shape, contents and history (Wu 2013).

Simple definitions of landscape that are comprehensible for all readers are strongly accentuated in the literature. Landscape is a place where we live, work, eat and sleep. It is a phenomenon that gives meaning to our existence. As an integral component of the natural environment, landscape is a historical record of human activity. It is a symbolic representation of a country, region, city or village that embodies local traditions, history of governance and land use, esthetic and economic value of the surrounding space. It is the "heritage of life" (Antrop 2005; Brace 2003; Lowenthal 2003; Nassauer 2012; Sevenant and Antrop 2009; Valk 2009).

2 European Landscape Convention

The signatories of the European Landscape Convention undertook to recognize landscapes in law as a foundation of their identity, to establish and implement landscape protection policies, and to integrate landscape protection and management into spatial planning and development strategies. The Parties identify and describe landscapes throughout their territory. European countries develop national and regional landscape classification systems based on various criteria and procedures. The definition of landscape formulated by the ELC sets out a methodological framework for landscape studies. Landscapes have to be identified, characterized, classified and audited based on numerous features that combine natural and anthropogenic factors with information about the historical, cultural, usable and esthetic value of land (Solon 2013).

The ELC defines landscape protection as "actions to conserve and maintain the significant and characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity."[3] The signatories are under obligation to identify and characterize landscapes throughout their territory and to analyze the landscape forming factors. They have to describe and evaluate the observed changes in view of the special features attributed to a landscape by members of the local community. The ELC does not contain detailed theoretical or methodological guidelines for dividing national territory into landscape units.

2. European Landscape Convention…
3. Ibidem.

Despite several attempts that resulted in the development of preliminary analytical reports, the Convention has not been implemented in Poland to date. A draft regulation proposing legislative amendments in connection with new landscape protection tools has been developed. Some of its provisions transpose the recommendations of the ELC, including the implementation of landscape audits involving:

- identification of landscape categories in every region of the country
- description of characteristic landscape features
- landscape evaluation
- identification of priority landscapes of particularly high natural, cultural, historical and esthetic value
- identification of threats to priority landscapes
- protection of priority landscape by identifying areas that should be governed by landscape protection principles and areas entitled to legal protection

Under the provisions of the ELC, the competent public authorities should preserve or formulate landscape quality objectives. The signatories should develop a set of recommended landscape quality features that condition the achievement of desirable landscape quality. The ELC aims to identify and preserve landscape quality parameters or objectives that are socially desirable (Chmielewski 2012).

3 Landscape assessment

Landscape classification is a process that stirs controversy, debate and reveals differences in the scientific community. Following the ratification of the ELC, many European countries modified the existing landscape typologies and created new classification standards. Landscape Character Assessment (LCA) is one of the key methods of landscape identification and characterization inspired by the provisions of the ELC. LCA originated in the United Kingdom, and various versions of this tool have been used in Ireland, Northern Ireland and Scotland. LCA supports the identification and description of landscape features that make a given locality different from neighboring areas. The LCA process aims to describe the perceptual qualities of an area, and it relies heavily on field surveys. The character of a landscape is defined as a specific, distinctive and cohesive arrangement of various features that distinguish one area from another. The analyzed features include geological structure, soil type, land relief, vegetation, land use, settlement pattern and agricultural system. The natural and cultural elements of a landscape and its physical attributes are characterized with different level of detail, and the result are typological and regional units at national to local level at 1 : 250 000 to 1 : 25 000 or even 1 : 10 000 scales (Swanwick and Land Use Consultants 2002). Assessment reports are valuable sources of landscape data that can be used in various documents, in particular development strategies and planning outlines that issue recommendations for the protection of valuable and unique landscapes and introduce landscape management principles in line with the provisions of the ELC.

Lithuania has implemented a national landscape policy. The national landscape typology comprises maps illustrating landscape typologies, land relief, landscape naturalness as well as botanical, geochemical and visual diversity (Veteikis and Jankauskaite 2009). Landscape typologies are part of Lithuania's national atlas, and they are used in the planning process to evaluate the environmental impacts of development projects. Spatial typologies also contribute to the protection and rational management of landscapes.

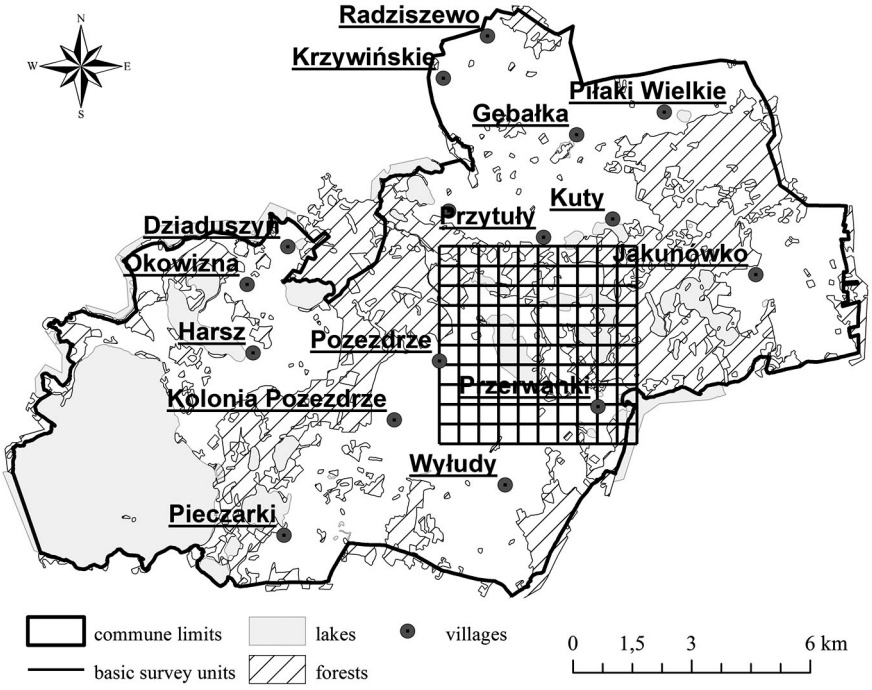
The Polish regional classification system was developed by Kondracki who identified 318 mesoregions representing 59 macroregions and 5 provinces (Kondracki 2002). This is the only comprehensive classification system to be recognized by most Polish geographers. Kondracki's system is used only in Poland, and it differs from the classifications applied across Europe. Physical geographic regions are identified based on land fragmentation, morphological features and macroclimate diversity. Provinces are distinguished in view of their geological structure, the effects of neotectonic movements and general differences in land relief and climate. Macroregions represent the combined effects of all environmental components. They are identified based on location, character, origin of relief parameters and lithological differences (Kondracki 2002; Richling and Solon 2011).

4 Materials and methods

Landscape is classified based on various criteria, including the percentage of areas characterized by intensive land use, field systems, settlement patterns, visual quality, sustainable land use and major geological and climate zones. In this article, landscape is classified based on its esthetic value. The esthetic qualities of landscape are discussed based on regional examples. Changes in the esthetic qualities of a rural landscape induced by human activity were evaluated based on data covering three periods. Landscape assessments were performed in 2002, 2008 and 2014 to monitor changes in esthetic qualities. Every evaluation was performed in May, under similar weather conditions and by the same expert. This approach ensured the highest comparability of landscape attractiveness. The research process was divided into the following stages:

- Identification of the analyzed area. The research site was the central part of the commune of Pozezdrze in the Region of Warmia and Mazury (fig. 1). This rural area features numerous lakes and forests. It is highly suitable for recreational purposes due to the high quality of the natural environment. The research site is also characterized by high levels of development (seat of community authorities, recreational facilities surrounding lakes) in comparison with neighboring areas. The remaining parts of the municipality are typical agricultural areas.
- Determination of a geometric network of basic survey units. A network of basic survey units contains 100 squares measuring 500 x 500 m (fig. 1). The evaluation scores noted during a field survey were assigned to the center of mass of basic units. If an evaluation could not be performed at the center of a basic unit, the nearest locality offering a good view of the assessed landscape was selected. The size of survey units was determined by the scale of the map and land configuration. The adopted unit size ensured satisfactory visibility and, in sites characterized by significant slope, it supported the assessment of fragments of space that were not visible from other locations.
- In selected measurement points, landscape was assessed with the use of Wejchert's impression curve. In this method, four parameters of the observed landscape are evaluated: diversity, degradation, infrastructure and balance. Each parameter is assessed on a scale of 0 to 3 points, producing a total of 0 to 12 points. The most highly evaluated parameter scores 3 points, and the least satisfactory parameter scores 0 points. Parameters of intermediate value are assigned 1 or 2 points (Cymerman et al. 1988). The impression curve is developed by registering an

Map 1. Map of the Pozezdrze Commune. Basic survey units



observer's impressions of the esthetic qualities of landscape during spatio-temporal movement. Evaluation sites are distributed at equal distance or time intervals. A landscape is composed of various views which are selected by a moving observer who subconsciously classifies and organizes the perceived sights. The applied method does not propose any units of measure, and it is merely a tool for comparing different fragments of space. The impression curve is highly suitable for monitoring changes in landscape. Evaluations have to be performed at specific time intervals in order for the changes to be registered and analyzed.

- Landscape attractiveness maps were developed with the use of isolines. Landscape qualities were divided into five attractiveness categories which were used to compare the results from three analyzed years. The geostatistical method of ordinary kriging was applied in the study. Measurement data were processed and the results were presented with the use of ESRI ArcGIS 10 software which features a variety of interpolation tools, including geostatistical methods for analyzing spatial data. Kriging, a geostatistical estimation method, supports the determination of the most unbiased linear estimator of the analyzed regionalized variable. The value estimated by kriging constitutes a weighted, linear combination of regionalized random variables. The kriging estimate is random function $Z(s_i)$ represented by:

$$Z^*(s_0) = \sum_{i=1}^{n} w_i Z(s_i), \tag{1}$$

where w_i are kriging weights calculated based on minimized error variance. In ordinary kriging, the sum of weights has to equal 1. Kriging is strongly rooted in geostatistical theory, and it accounts for both the distance between and the direction of measurement points. If the interpolated point x and the points in its vicinity x_i are spatially autocorrelated, then the value of $z(x)$ does not differ significantly from the value of $z(x_i)$. The squared difference in value removes the negative sign $[z(x) - z(x_i)]^2$. Calculations can be performed for any pair of points. In evaluations of natural phenomena, as the distance between point x and points x_i increases, the difference in variable value will increase until it reaches a stable level (Bohling 2005; Eldeiry and Garcia 2010; Longley et al. 2005; Sarma 2009; Urbański 2012).
- The results of landscape quality assessment are compared with the rate and direction of changes in land use in the analyzed commune based on data supplied by the Head Office of Geodesy and Cartography (as at 1 January of a given calendar year).
- The proposed method's applicability for a landscape audit was evaluated.

5 Results

The isolines of the analyzed phenomenon in the proposed system of basic survey units were interpolated to visualize measurement data in the evaluated area. The esthetic qualities of landscape were assessed. In the three evaluated years, the lowest score was 2 points and the highest score was 12 points. The resulting scale was proportionally divided into 5 categories of attractiveness (fig. 2). An analysis of interpolation results revealed that in 2002, the most attractive landscapes (category I) spanned a larger area than in successive years. Their area was gradually reduced from 18% in 2002 to 10% in 2014. In 2008 and 2014, the area of the least attractive landscapes (category V) increased relative to 2002. The above parameter increased by 4% throughout the entire period of the study. Only minor fluctuations were reported in the area of category II, III and IV landscapes. The noted results point to progressive deterioration of landscape quality in the analyzed site. The average score for all basic survey units decreased from 7,84 points in 2002 to 7,62 points in 2008 (by approximately 2,8%).[4] In 2014, the average score was 7,31 points (decrease by 4% from 2008). The observed drop in landscape quality resulted from human activity in areas of high scenic value. The percentage area (rounded off to 1%) of every landscape category in the evaluated site is presented in table 1.

4. [In the journal European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

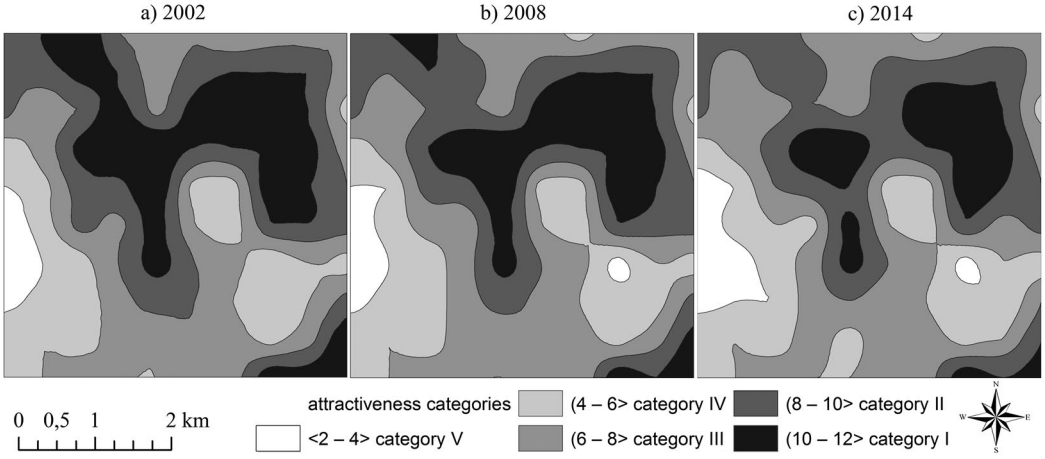


Fig. 1. Interpolation results for 2002, 2008 and 2014

Tab. 1. Percentage of each landscape category

Year of survey	Area of landscapes in different attractiveness categories (%)				
	category I	category II	category III	category IV	category V
2002	18	23	26	26	7
2008	14	24	27	27	8
2014	10	24	28	27	11

Field observations and survey measurements presented in cartographic form indicate that the most dramatic changes in the esthetic qualities of landscape took place in areas of greatest scenic value. The highest drop in value was noted in the vicinity of lakes and forests that attract developers of recreational and residential estates. Those projects require utility networks, which further contributes to landscape transformations. The observed change trends are listed in table 2, and they constitute the background for landscape transformations in the entire municipality. The changes in the area of land used for various purposes were analyzed in 2008–2014 (as at 1 January of a given year)—i.e., in the second period of the survey. The regularities observed during landscape assessment point to the most significant increase in the area of developed and urbanized land (5,02%). Anthropogenic transformations affect the perceived quality of space, which is one of the assumptions of Wejchert's impression curve used in the analysis (infrastructure, degradation, balance). The area of forests and land covered by trees and shrubs also increased, which contributes to scenic attractiveness. The area of all land types increased at the expense of farmland, which is consistent with national change trends.

Tab. 2. Area of different land categories (2008–2014) in Pozezdrze Commune (in ha)

Year	PE	UR	GLZiZ	GZiZ	GW	UE	N	TR
2008	17 614	8 387	5 167	398	3 048	0	612	2
2009	17 618	8 388	5 156	403	3 048	0	621	2
2010	17 619	8 360	5 179	405	3 052	0	621	2
2011	17 617	8 338	5 186	421	3 052	0	618	2
2012	17 618	8 336	5 191	418	3 052	0	619	2
2013	17 618	8 332	5 194	418	3 052	0	620	2
2014	17 622	8 331	5 199	419	3 053	0	620	2
Increase/decrease (%)		−0,67	+0,62	+5,28	+0,16	0	+1,31	0

Source: Own elaboration based on the data supplied by the Head Office of Geodesy and Cartography
Note: PE—registered land, UR—agricultural land, GLZiZ—forests, land covered by trees and shrubs, GZiZ—developed and urbanized land, GW—water bodies, UE—conservation areas, N—wasteland, TR—miscellaneous land uses

Conclusions

The European Landscape Convention placed all signatories under the obligation to implement landscape audits, which necessitates the development of methods for identifying landscape typologies and evaluating landscape quality. Landscape audits involve the assessment of the esthetic quality of local scenery, which coincides with the main objectives of the ELC.

Progressive deterioration of landscape quality leads to undesirable and irreversible changes in the environment and quality of life for humans and all living organisms. Rapid economic development should be accompanied by sustainable principles of land management that rely on the protection, quality conservation and conscious planning of landscape.

Landscape protection and management activities should involve regular evaluations of the esthetic qualities of landscape. The continuity and repeatability of surveys will contribute to effective monitoring of changes and the identification of threats posed by social and economic growth. The proposed method for assessing the esthetic value of landscape could become an integral part of landscape auditing. Rapid landscape transformations of recent years call for new methods that cater to contemporary needs.

GIS software features analytical tools that can be used to process the results of field surveys, analyze spatial data and visualize the examined phenomena. Statistical and geostatistical tools are deployed in landscape analysis to present the rate, direction and range of spatial transformations. They supply valuable information about the types of environmental threats, which contributes to the implementation of the most appropriate conservation and remedy measures. Analyses of developmental trends in the surrounding space, including changes in land use, and a comparison of the results with the values of landscape quality parameters, complements the observations of landscape transformations.

The applied method is consistent with the main objectives of the European Landscape Convention. It can be used to develop landscape maps for analyzing transformation processes based on numerous criteria. Landscape maps can play an important role in landscape protection, planning and management. The results of this study indicate that the proposed method is suitable for transposing the provisions of the ELC. The discussed method can be incorporated in the landscape auditing process recommended by the ELC. Evaluations of the esthetic qualities of landscape have to be repeated regularly to guarantee that the results of the audit are reliable.

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