

PL1 (Chłapowski Landscape Park, Poland):

What are the characteristics of two different landscapes

(components, structure): within and outside the Landscape Park?

Objective

The main objective of the study performed in the Polish case study region (CSA) in Chłapowski Landscape Park was to contribute to a development of knowledge base on the relations between landscape structure and composition, functions and benefits, and the contribution to the regional competitiveness and creation of socio economic effects of typical agricultural landscape. The focus of the Ad-hoc study 1 was on the comparison of the two different landscapes: in the Park and outside in the adjacent region.

Methodology

Research was conducted in two agricultural areas of distinctly different landscape features, but located in the neighbourhood, adjacent to each other. (a) A selected area of Koscianski Plains, within the boarder of the Chłapowski Landscape Park that have the highest share of: woodlots (shelterbelts), field-forest boundaries and roadside plantings. It was assumed that the landscape surrounding Turew, the central village of the Park, is the most typical agricultural landscape for this region. (b) Two selected areas of Łowicko – Błonska Palains, with a small share of shelterbelts, the boundaries of agro-forestry and roadside plantings, and where the landscape has low natural and cultural values. The Łowicko-Błonska Plain is similar to Koscianski Plains in terms of a high share of agricultural land (over 80%). However this is the area of much smaller share of forests and hedgerows. It was assumed that the landscape surrounding Czempin, and Kobylniki are the most typical agricultural landscapes for this region.

In the extracted three areas: Turew – in the Park, and two adjacent areas – Czempin and Kobylniki the detailed analysis of the structure of the landscape was made. Landscape structure of the sites has been compared. The fundamental analysis was made on the area divided into 1 km² (100 hectares) fields in each defined region. Analysis of the landscape structure was performed with the use of topographic maps at the scale of 1:25,000, aerial photographs and on the basis of field research. The structure of the landscape was distinguished according to four thematic layers, containing the following information (GIS):

- Layer 1: kilometre grid, hydrographical network, the network of roads, settlement units;
- Layer 2: shelterbelts (including windbreaks and other woodlots in the vicinity of fields and internal roads that are not classified in any of the categories of public roads);
- Layer 3: field-forest borders;
- Layer 4: roadside plantings (tree-rows).

With use of GIS, soil maps and other material we prepared detailed maps of the selected three regions. On the basis of prepared maps, the composition and structure of the landscape has been

calculated. The complexity of landscape is expressed by two indicators – Shannon Index (H) and Herfindahl-Hirschman Index (HHI). The Shannon diversity index (H) (Shannon, 1948) has the following formula. P_i represents the share of the element in the landscape structure. High H values indicate greater landscape diversity:

$$H = -\sum_{i=1}^n (p_i \times \ln p_i)$$

The second indicator which we used was the Herfindahl-Hirschman Index (HHI), which in economics is a measure of industry concentration and an indicator of the strength of competition among them. We adjusted the index for measuring complexity of the landscape, by replacing the shares in the market by the share of each landscape element in the landscape structure. S_i represents the share of the element in the landscape structure, i the number of elements:

$$HHI = \sum_{i=1}^n S_i^2$$

The Herfindahl Index (H) ranges from $1/N$ to one, where N is the number of elements in the structure of landscape. Prepared maps and regional characteristics contributed to the general description of the landscape in the CSA and created a background for the empirical study.

Results

The following pictures (Figure 3) present the structure of landscape typical for the Chlapowski Landscape Park (Turew) and for two communities adjacent to the Park – Kobylniki and Czempin.

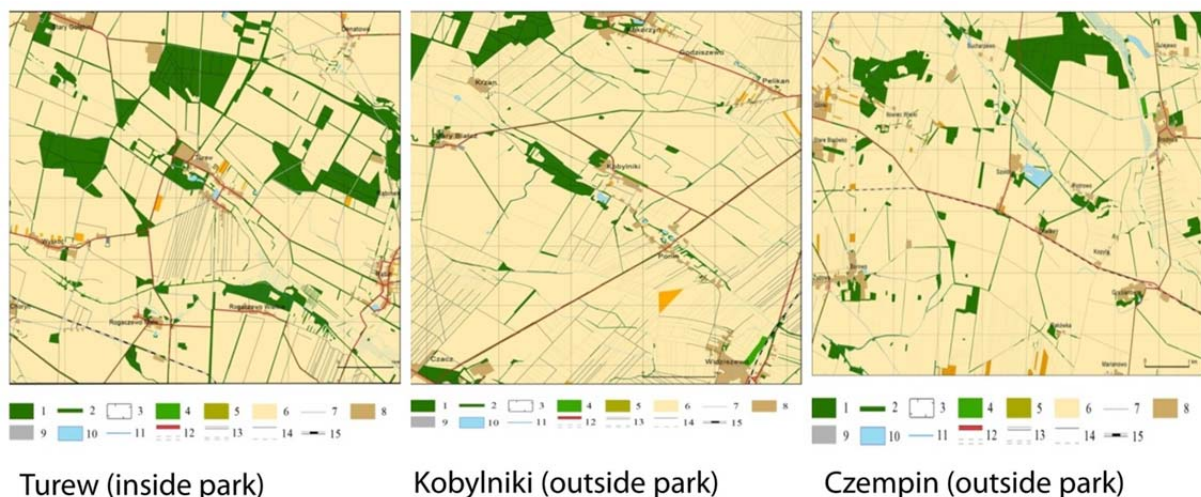


Figure 3: Landscape structure and elements in Chlapowski Landscape Park and adjacent regions (Source: own study. P. Wolski).

More details the characteristics of landscapes in the Chlapowski Park and two adjacent areas selected for comparisons is presented in table 1. The agricultural landscape in the park is mainly shaped by the shelterbelts in-between the fields and rows of trees (linear elements) along the roads. Concentration of this element in the case study region is almost two times greater than in the neighbouring regions (53 meters/ha vs. 27 and 39 m/ha). The landscape composition is more diversified in the Park than in the two other studied regions. It can be expressed by a higher Shannon index and lower Herfindhal-Hirshman concentration index. The selected regions have a similar built-

up area (about 2.6-2.8%), but differ in terms of the share of agricultural land, green-linear elements, forests and water reservoirs. The share of manor parks is also double in case of the Chlapowski park, comparing to neighbouring regions.

Table 1. Structure of landscape elements in the case study region - Chlapowski Landscape Park and adjacent regions.

Community (NUTS5)	TUREW (within the park)	KOBYLNIKI (outside the park)	CZEMPIN (outside the park)
Field-tree/forest borders (km)	225 km (53m/ha)	131 (39m/ha)	140 (27m/ha)
Shannon index H			
Landscape concentration	0,70	0,56	0,46
Index (Herfindhal-Hirschman Index)	0,68	0,81	0,79
Share of specific landscape elements in the total area of the selected region [%]			
Agricultural land	81.35	86.84	90.08
Forests and woodlands	10.88	7.26	3.58
Linear elements - trees	3.72	1.93	2.85
Lakes and ponds	0.14	0.33	0.01
Manor parks	0.91	0.37	0.53
Built-up areas	2.64	2.61	2.85
Other (orchards etc.)	0.35	0.65	0.33

Source: own calculations. HH index – the sum of the squares of the shares of distinguished elements in the landscape structure: the lowest index the greater diversification of landscape elements. Shannon index - a greater H value implies greater landscape diversity

Lesson learned & Policy Recommendations

The agricultural landscape in the Chlapowski Landscape Park is mainly shaped by the shelterbelts in-between the fields and rows of trees (linear elements) along the roads. Concentration of this element in the case study region is almost two times greater than in the neighbouring regions. The landscape composition is more diversified in the Park than in the two other studied regions.

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