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LANDSCAPE VALUES AND FUNCTIONAL CHANGES OF SUBURBAN AREAS: A CASE STUDY OF GÖTTINGEN (GERMANY)

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Abstract. Every suburban area is individually formed by cultural, natural and historical aspects, as well as by its proximity to urbanised areas and the social, economic, and industrial development that such proximity incurs [Jaszczak et al. 2012]. The analyses of landscape function changes are essential to understand the development of the given area in order to make proposals for a sustainable land use management. On the other hand unique landscape values of today and the visitors' preferences for specific landscapes have to be involved in the process of landscape evaluation too [Jaszczak et al. 2012]. This article concentrates on the functional changes as well as on the actual analysis of the landscape and its' preferences by the visitors in the suburban area of Göttingen (Lower Saxony, Germany) called Kerstlingeröder Feld.

Land use and landscape function changes were examined by historical and actual analyses based on historical maps, monographs as well as old pictures and paintings. Expert-based methods were used to choose characteristic landscape elements of the area today. The perception of cultural, visual and natural items of the landscape was tested by empirical methods using quantitative and qualitative interviews. The interviews showed that the most preferred areas were panorama views and dominant elements like deadwood and solitary trees.

The study has several important implications: First, empirical methods have to be included in landscape evaluation systems to fully understand the preferences, social relationships, and the "rural identity" of what visitors perceive. Second, the development of Kerstlingeröder Feld in the urban forest of Göttingen should advance to multifunctional utilization, as it sets a positive example for sustainable land use.

Key words: landscape functions, function changes, suburban areas, landscape preferences, landscape values, historical maps, empirical methods, historical guidelines

INTRODUCTION

In many European countries, suburban zones are subject to strong and tedious developments which are accompanied by severe functional changes of its land use. Often, continuing urbanization of specific areas result in vast urban investments and increasing human migration. At the same time, however, the preservation of pristine natural values is crucial to ensure a harmonic and aesthetic living in the area for its citizens. Typically, the character of suburban areas is vastly formed by the development of predominant landscape functions and uses. According to Szűcs et al. [2012], we focus on the following functions to characterize suburban areas: residential (so-called dormitory towns), industrial, retail (shopping centres, services) and recreational (diverse forms of tourism and recreation). These functions present different bundles that, when combined and harmonized, determine the landscape scene and its character.

The topic of aesthetic values of landscapes and their functions becomes especially relevant in the discussion of cultural ecosystem services. Cultural ecosystem services, somewhat vaguely defined as „non-material benefits obtained from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences” [MA 2005], create strong ties between humans and their natural surroundings and play a crucial role in “feeling at home” in a landscape. Understanding how people perceive and experience the beauty of a landscape is central to achieve compliance and public support for ecologically motivated landscape change [Schaich et al. 2010]. According to Bollinger and Kienast [2010] increasing attention should be given to the anthropogenic dimension of landscape-change assessments by addressing and developing the yet limited availability of cultural functions.

Within the context of landscape and landscape function changes, we analyse the perception by the local people of the recreation and protection area in the suburban zone of Göttingen (Germany), known as Kerstlingeröder Feld.

To analyse functional changes, one question of the study was to what extent, and how, the local recreation area under analysis has been under transformation over the last 200 years.

Combining both historical and present data materials to determine changes of landscape functions with an empirical assessment of landscape preferences, we are able to formulate trends and recommendations for future utilization of the Kerstlingeröder Feld. Furthermore, the implications that can be derived from this study provide a starting ground for improved landscape management of comparable suburban areas.

RELEVANCE OF EMPIRICAL STUDIES AND HISTORICAL GUIDELINES (IN GERMAN “LEITBILDER”) IN LANDSCAPE PLANNING PROCESSES

In Germany, more than 150 visual landscape assessment methods have been developed and described [Kenneweg and Gruehn 2001], most of them based on single expert ratings. According to Gruehn, Roth [2010] more empirical surveys are needed to better understand, assess and model landscape sceneries of specific landscape types reflect-

ting the perception of different social groups. That is why we used empirical methods to analyse landscape preferences of the visitors of Kerstlingeröder Feld.

Another matter related to the functional changes is the role of historical guide principles (in German “Leitbilder”) in landscape planning processes. The initiative of nature conservation in Germany is strongly connected to the protection and preservation of natural and cultural elements of historical landscapes that are often compared to the pre-industrial status, largely comprised by natural elements. These landscapes are often used as guide principles in planning processes [Szűcs 2013]. Since the appearance of large scale landscape conservation in the 1970s, nature protection is dominated in the praxis by these historical guide principles, which are mostly orientated towards the landscapes of the 19th century, were characterized by more diverse habitats. However, these landscape scenes are strongly idealized [Raffelsiefer 2000]. Penker [1986] calls them “high-performance ecological landscapes” with an unprecedented “ecological efficiency” [Jaszczak et al. 2012]. [Raffelsiefer 2000]. Related to this issue, the question was, whether landscape scenes of that time could serve as a paradigm in landscape planning processes.

MATERIAL AND METHODS

We employ a two-step procedure to pursue our aims. In a first step, we assess landscape function changes using a compound of different sources including photographs, contemporary literature [Deppe and Troe 1956, Lücke 1927, Meineke et al. 1993, Prietzel 1990], and historical maps [City of Göttingen, 1999]. Aerial photographs (Fig. 1) from the years 1999, 2005 and 2011 were helpful to localize changes of the vegetation as well as the degradation of military constructions. To analyse the perception of the historical landscape and the land use changes of the Kerstlingeröder Feld, contemporary literature, such as old guidebooks or newspapers from the 19th and 20th century as well as historical maps (including structural agricultural maps of deposits) of the city of Göttingen were studied from the following years: 1784, 1878, 1910, 1965, and 2002. Old photographs, paintings and copper engravings, collected from the Central State Archive in Hannover and the City Archive of Göttingen were essential sources of the research. Using visual materials like photographs and sketches [Jaszczak et al. 2012], it is possible to show how specific values influence landscape perception in each period. Information on land use and its intensity have been captured in a wide range of sources containing archives, primary and secondary literature. In a second step, we identified distinctive landscape elements of both visual and aesthetic importance used in an empirical survey conducted to understand individual landscape preferences of the area. The questionnaire was conducted using both qualitative and quantitative questions.

To define the unique landscape values of Kerstlingeröder Feld, 10 characteristic landscape elements were chosen and separated into 2 groups (Group 1: Deciduous forest, single shrubbery, roads, orchard, ruin, and Group 2: conifer forest, solitaire trees and deadwood, avenue, flock of sheep, meadow). The chosen landscape elements needed to be representative for the area and had to involve important cultural, natural and



Fig. 1. Digital Orthophoto of the Kerstlingeröder Feld. The research area – as part of the flora-fauna habitat area of the Göttingen Forest – is marked with a rectangle.

Source: City of Göttingen 2011

historical elements of the Kerstlingeröder Feld. In both groups a question on the panorama view was included to find out aesthetical preferences that are not restricted to single elements but refer to a larger part of the landscape.

The division of the questions in 2 groups was necessary because of the high number of the items. In this context every interviewee had to evaluate only 6 typical landscape elements.

THE RESEARCH AREA

The research area Kerstlingeröder Feld (202 ha) is located in the pristine area of the Weser-Leine Bergland near Göttingen, a city of approx. 135,000 inhabitants situated in Lower Saxony, Germany. The research area has been subject in a study conducted by Szűcs et al. [2012] in which the author determined the recreational values of the area. As a part of the Urban Forest of Göttingen, it has been subject to recent efforts to preserve the area's natural values as a unique habitat of endemic flora and fauna (EU Nr. DE 4325-301).

The village called "Kersthelingerode" has been founded in 1346. The lack of water and wood resources caused the first desertifications in 1387, however the area has been continuously used for agricultural issues. In the beginning of the 16th century the village was founded a second time, with a new Manor building. Since then until the 20th century the agricultural use as field and pasture shaped the face of the landscape [Meineke et al. 1993, Jaszczak et al. 2013].

In the 18th and 19th century students, professors and other visitors of Göttingen has been written about aesthetic values of Kerstlingeröder Feld. Even G.C. Lichtenberg mentioned it as his favourite place to visit in Göttingen. Furthermore the poet association called "Hainbund" has been founded in this place [Levin 2006]. In 1928 some parts of the area were transferred into a military zone, and from 1937 the whole field was used as a military training ground. From 1945–1957 it was used by the British troops and after that until 1993 by the Federal Armed Forces.

In the year 2001, the Kerstlingeröder Feld fell under the management of Göttingen's Forestry District and has since been guided by the city administration. According to Szűcs [2012], the area can be characterized as combining "conservational, recreational, silvicultural and educational functions [...] partly used as an extensive grazing land" (p.123). Because of the long agricultural use without fertilisation, rare habitat complexes could develop that are now under protection. The prior flora fauna habitat types of the area are semi natural dry grasslands with unique orchid and gentian sites (Fig. 2.) and scrubland facies (*Festuco-Brometalia*) on calcareous substrates, surrounded by Medio-European limestone beech forest (*Cephalanthero-Fagion*, *Asperulo-Fagetum*), and *Tilio-Acerion* forest of slopes, screens and ravines [Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz 2009]. Due to its high natural value it is one of the recreational and leisure areas most frequently visited by the inhabitants of the District of Göttingen.



Fig. 2. Protected fauna and flora species in the conservation area of Kerstlingeröder Feld: *Polyommatus icarus*, *Gentianella germanica*, *Gentianella ciliata*

Source: Fotos made by Szűcs [2011]

TRANSFORMATIONS OF THE *KERSTLINGERÖDER FELD* ASSOCIATED WITH CHANGES OF ITS FUNCTIONS

Various forms of space usage induce, in some measure, the nature of changes. To paraphrase Alain de Botton [2000]: “the old field outside the town, in the beginning ice-bound, then ploughed and sown with cereals, providing a place for a rest and idyll, still abound then with innocent events, ‘came to an end’ with the onset of residential developments which were less beautiful than the landscape they had taken over”. Constant changes take place in the landscape of suburban areas; particularly, this could be observed over the last several dozen years. Often, these changes are driven by transformations of farming zones into recreational areas. An example of the “Pfannenstil” area

which is located in close proximity to Zurich, quoted by Wiskemann [2011], is a precise indication of the transition from the former agricultural function to a recreational one. Wiskemann also stresses that the residents most preferably spend their free time outside the buildings and, which is of key importance, they identify, to a large extent, with the traditional landscape.

Therefore, the example of the suburban area of Göttingen should be analysed with a similar assumption. The area under research changed its functions over the centuries from typically sylvan, through agricultural and military, to fragmentarily agricultural and recreational, as well as protective one (Fig. 3). The most significant transformations of the landscape are related to the construction of military facilities from 1928 to 1993. There exist both the necessity and first efforts to identify sustainable land uses for the *Kerstlingeröder Feld* in order to implement a natural sense of recreational usage under the premise of protecting the area from extensive and galling usage.

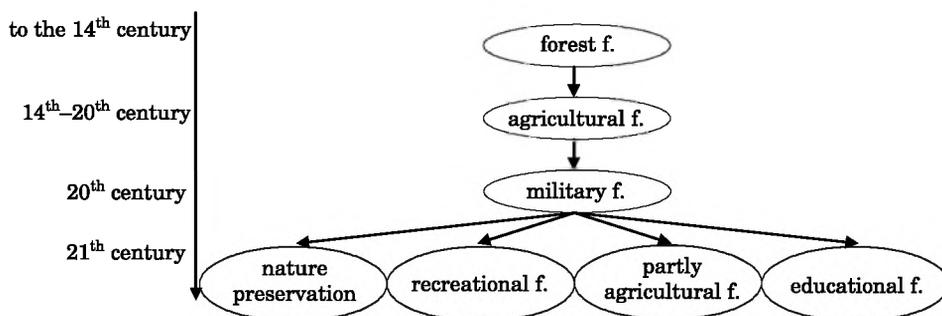


Fig. 3. Functional change over the centuries in the area under research

Introducing a sustainable form of recreation, while accounting for the principles of protecting the biodiversity of the area in question, seems the most appropriate way of determining the further use of the *Kerstlingeröder Feld*. Therefore, the preferred option is to introduce the following forms of recreation: leisure walking, cycling and horse-riding, as well as to consider educational forms that are likely to be successfully performed (educational activities for children, schools, students and the elderly [Szűcs et. al. 2012]).



Fig. 4. Past military and actual landscape protectional (partly agricultural) and recreational functions
Source: Foto made by Szűcs [2011]

INTERVIEW RESULTS

Based on the above-mentioned cartographic and visual data sources and illustrations, an interview with qualitative and quantitative question-groups was improved for randomly chosen visitors ($n = 113$) practicing recreational activities like jogging, cycling, hiking, horse-riding etc. In our previous study we listed the preferred recreation forms on Kerstlingeröder Feld [Szűcs et al. 2012]. Around 70% of the interviewees came from the city area of Göttingen and 19,5 % of all interviewees were visiting the Kerstlingeröder Feld for the first time [Szűcs et al. 2012].

Landscape preferences were evaluated in a context of preferences for specific parts of the Kerstlingeröder Feld (open area, forest, forest edge, small-scale confined area) [Szűcs et al. 2012]. The preferences of landscape areas were as follow – Figure 5.

- open space (panorama) – 44%;
- forest outskirts, roads – 28%;
- small scale areas (particularly the ruin) – 14%;
- forest – 14%.

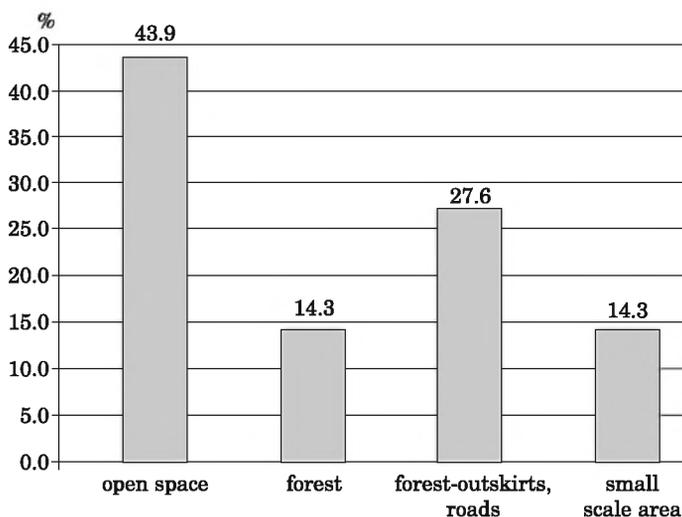


Fig. 5. Preferences of landscape areas on Kerstlingeröder Feld

The answers related to preference reasons in the qualitative question group revealed that people visiting the Kerstlingeröder Feld enjoy most the panorama, which was associated with “freedom”, “harmony”, and “peace” and which brought back “memories of the landscape” they grew up in. “Nature and diversity of the landscape” and the “flora”, the “voice of the birds” and the “wind”, as well as the “wideness and the horizon” were named as positive features of the place. Overall, the respondents cherished the Kerstlingeröder Feld as an important counterpart to the coadunate forest scene and an unique “open space in the suburban area of Göttingen” [Szűcs et al. 2012, p.127].

The preference analysis about the characteristic landscape elements of the *Kerstlingeröder Feld* showed, that the most promoted elements in group 1 were the panorama (38%) the deciduous forest (20%) and the orchard (16%), whereas the mostly chosen elements in group 2 were solitary trees and deadwood (44%) panorama (29%) and meadow (12%) – Figure 6 and Figure 7).

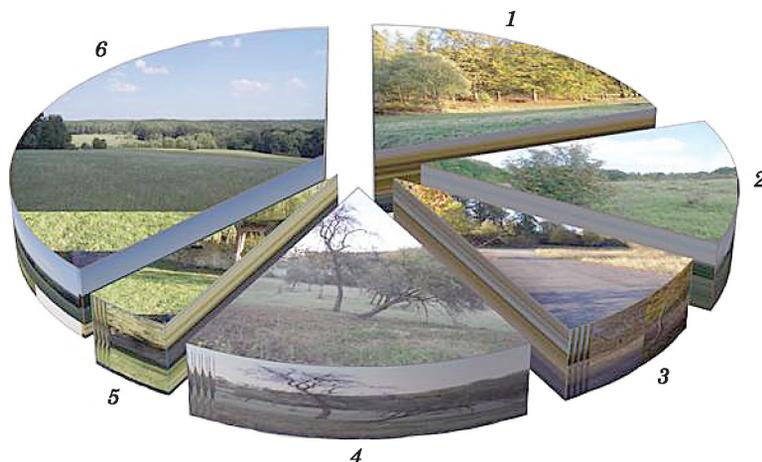


Fig. 6. Preferences of landscape elements detailed in group 1: 1 – deciduous forest (20%); 2 – single shrubbery (13%); 3 – roads (9%); 4 – orchard (16%); 5 – ruin (4%); 6 – panorama (38%)

As the results of our previous study about recreational use of Kerstlingeröder Feld [Szűcs et al. 2012] showed that landscape conservation as well as continuation of the "soft" form of recreational use by protecting the natural values of the landscape were crucial aspect for the visitors of Kertlingeröder Feld.

According to our research results it is important to formulate possibilities of the further use of the *Kerstlingeröder Feld*. We determine the following functions as crucial for future development: active protection with frequent grazing utilization on some parts of the area as well as and recreational usage. According to the analysis of recreational activities located in the *Kerstlingeröder Feld*, it is suggested to continue with the „soft forms” of recreational use. Future management plans should account for the landscape values specific to that area [Szűcs et. al. 2012].

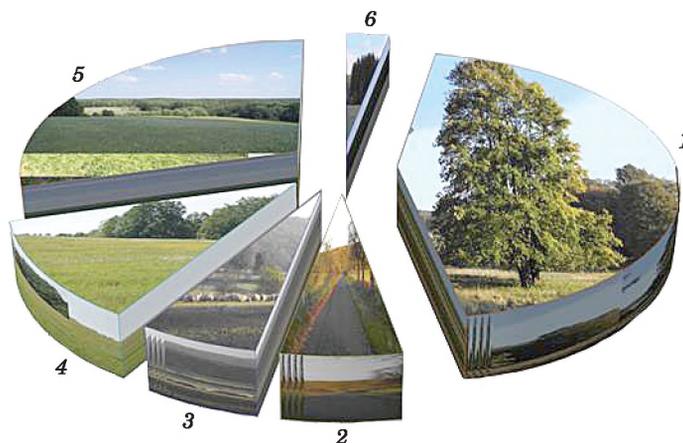


Fig. 7. Preferences of landscape elements detailed in group 2: 1 – solitaire trees and deadwood (44%); 2– avenue (6%); 3 – flock of sheep (6%); 4 – meadow (12%); 5 – panorama (29%); 6 – conifer forest (3%)

CONCLUSIONS

Suburban zones have many functions which are influenced by the characteristics of the given landscape [Borcz and Czechowicz 2007]. The interdisciplinary analyses of landscape function changes are essential to understand the development of the given area and to make proposals for a sustainable land use management. As well, unique landscape values of today and the visitors' landscape preferences need to be involved in the process of landscape evaluation. The interviews with qualitative and quantitative question-groups indicates that most important for Göttingen inhabitants was to maintain and continue the recreational function of the *Kerstlingeröder Feld* in a sustainable way by protecting the natural values of the landscape, which is an important issue for a sustainable landscape management in the future.

Related to the question if historical landscapes can serve as guidelines for conservation issues, it is important to clearly define the retrospective status as well as the conditions of the past landscape we want to recultivate.

The development of Kerstlingeröder Feld in the Urban Forest of Göttingen indicates a positive trend against expectations of pre-industrial landscapes. We therefore suggest continuing the multifunctional utilization of the area and to further develop the sustainable practices that are currently implemented. This could add to a recent stream of literature [Szücs et al. 2012] in which nature-orientated recreational services are recommended to preserve the historical, cultural and natural value of landscapes.

Overall, the analysis provides evidence that empirical methods should be included in landscape assessment to determine the preferences and rural identity of citizens.

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WARTOŚCI KRAJOBRAZU ORAZ PRZEKSZTAŁCENIA FUNKCJONALNE OBSZARÓW PODMIEJSKICH: GETYNGA (NIEMCY) – STUDIUM PRZYPADKU

Streszczenie. Każdy obszar podmiejski ma indywidualny charakter wynikający przede wszystkim z lokalizacji, wielkości miasta, procesów industrialnych oraz znaczenia ekonomicznego i socjalnego, jak również czynników historycznych, kulturowych i przyrodniczych. Analizy zmian funkcji krajobrazu są ważne do zrozumienia rozwoju danego obszaru w kontekście wyznaczenia propozycji zrównoważonego kształtowania terenu. Z drugiej strony wyjątkowe walory krajobrazowe oraz preferencje odbiorców w stosunku do szczególnych krajobrazów powinny być także włączone w proces ich oceny. Artykuł dotyczy zmian funkcjonalnych oraz aktualnej analizy krajobrazu obszaru podmiejskiego Getyngi, nazwanego Kerstlingeröder Feld, (Dolna Saksonia, Niemcy) w kontekście preferencji odbiorców.

Badaniu podlegały użytkowanie terenu oraz zmiany funkcji. Analizowano mapy archiwalne, monografie oraz stare ryciny i obrazy. Metody eksperckie posłużyły przy wyborze współczesnych elementów krajobrazu. Percepcję kulturowych, wizualnych oraz przyrodniczych elementów krajobrazu przeanalizowano za pomocą metod empirycznych, ilościowych i jakościowych wywiadów. Pokazały one, że najbardziej preferowane były ujęcia (widoki) panoramiczne oraz dominanty krajobrazowe w postaci soliterów i pozostałości drzew. W badaniach wykazano, że metody empiryczne powinny być włączone w system oceny krajobrazu, choćby ze względu na możliwość poznania preferencji odbiorców oraz ich związku z obszarami wiejskimi. Autorzy określili ponadto propozycję zrównoważonych form rekreacji na obszarze Kerstlingeröder Feld w odniesieniu do ochrony jego unikalnych historycznych, przyrodniczych i kulturowych walorów krajobrazowych. Znaczenie takiego postępowania badawczego podkreśla fakt wykorzystania metod historycznych, kartograficznych oraz fotograficznych, jak również empirycznych podczas analiz zmian i analiz wartości krajobrazowych obszarów podmiejskich, co z kolei jest pomocne w przyszłym kształtowaniu krajobrazu danego obszaru.

Słowa kluczowe: funkcje krajobrazu, zmiany funkcji, obszary podmiejskie, preferencje krajobrazu, wartości krajobrazu, mapy historyczne, metody empiryczne, wytyczne krajobrazowe

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