

The relationship between landscape design style and the conservation value of parks: A case study of a historical park in Weimar, Germany

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HIGHLIGHTS

- ▶ We studied a historical park in Weimar, Germany which is part of UNESCO world heritage.
- ▶ We linked the historical design principles and techniques used to today's plant biodiversity.
- ▶ Results were compared with similar German and European landscape parks.
- ▶ Suggestions for future sustainable park design, restoration and management were made.

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ABSTRACT

Urban parks can be invasion sources through planting of introduced taxa. On the other hand, parks may act as hot spots of biodiversity in urban areas and can support the preservation of endangered and rare taxa. Even if historic urban parks are evaluated first of all as heritage sites, they are also credited for their ecosystem services and positive aesthetical and social values.

Although there are numerous studies in Europe on the design, philosophies and historical background of parks as well as their biological diversity, little research has posed the question of how landscape design principles have influenced the biological conservation value of parks. Because the landscape park style was one of the most influential historical landscape design fashions in Europe we focused our study on the 'Park an der Ilm' in Weimar, Germany which was created in the late 18th century and is since 1998 part of the UNESCO World heritage.

Our research questions were:

1. Which design principles, plant material and technical implementation were used during the creation and management of the park?
2. What is the current value of the park for biological conservation especially for the conservation of endangered plant species and habitats?
3. What is the relationship between design principles and the present-day value of the park?

We compared our results with similar landscape parks and made suggestions for future sustainable park design, restoration and management.

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1. Introduction

Horticulture is a major source of plant species invasions (Dehnen-Schmutz, Touza, Perrings, & Williamson, 2007; Mack & Erneberg, 2002; Reichard & White, 2001). Urban parks can be invasion sources through planting of introduced taxa (Säumel, Kowarik,

& Butenschön, 2010). On the other hand, parks may act as hot spots of biodiversity in urban areas (Cornelis & Hermy, 2004) and can support the preservation of endangered and rare taxa (Kowarik, 1998; Kunick, 1978; Li, Ouyang, Meng, & Wang, 2006; Reidl, 1989). Even if historic urban parks are valued foremost as heritage sites, they are also credited for their ecosystem services and positive aesthetical and social values (e.g. Bolund & Hunhammar, 1999; Chiesura, 2004).

Although there are numerous studies in Europe on the design, philosophies and historical background of parks (e.g. Gothein, 1928; Turner, 2005) as well as their biological diversity (e.g. Cornelis & Hermy, 2004; Ignatieva & Konechnaya, 2004; Nath,

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1990) little research has posed the question of how landscape design principles have influenced the biological conservation value of parks. Because the landscape park style was one of the most influential historical landscape design fashions in Europe by the end of the 18th and the first part of the 19th century we focused our study on a park from that period. The 'Park an der Ilm' in Weimar, Germany was created in the late 18th century and has been since 1998 part of the UNESCO World heritage site 'Classic Weimar'. We selected it for study because:

1. it is a 'typical' park of that period
2. there were no changes to design style for several centuries
3. there was rich historical material on park design and plant use suspected. Initial searches in the Thuringian Public Record Office (situated close to the park, since 1567) confirmed this suspicion.

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3. What is the relationship between design principles and the present-day value of the park?

We compared our results with similar German landscape parks and make suggestions for future sustainable park design, restoration and management.

2. Study site

The 'Park an der Ilm' is situated in Weimar (215 m a.s.l.) in central Germany. The origin of the park dates back to 1778. As for many historical parks in Europe 'Park an der Ilm' appeared on the site of a previous formal (geometrical) garden which was designed next to the Duke Carl August's palace. At that time the park was located in the outskirts of Weimar. From 1860 the city of Weimar spread and the Park became enclosed in the urban boundaries.

The park forms part of the floodplain of the river Ilm between the Ducal city palace of Weimar and the city centre in the north and the now suburbanised village of Oberweimar and exclusive residential areas in the south (Fig. 1 for a general overview). It is c. 1.5 km long and covers about 0.48 km². The soil of the floodplain is alluvial clay; the valley sides comprise calcareous material like Keuper and shell bearing limestone deposits.

Climatically Weimar belongs to the dry environment of the Thuringian basin leeward of Thuringia Mountains with beech forests. The annual precipitation is about 557 mm; the prevailing wind directions are southwest, west and northwest. The average annual temperature is 8.3 °C, with an average of −0.7 °C in January and 17.2 °C in July (Salzmann, 1999).

3. Methods

3.1. History of design, plant introduction and management of the park

Historic documents were studied to gain important information about the design principles, plant material (including origin and time of introduction of non-native ornamental species) and management techniques used during the creation and development of the 'Park an der Ilm'. These unpublished documents included filed reports, management notes and plans of the former gardeners and

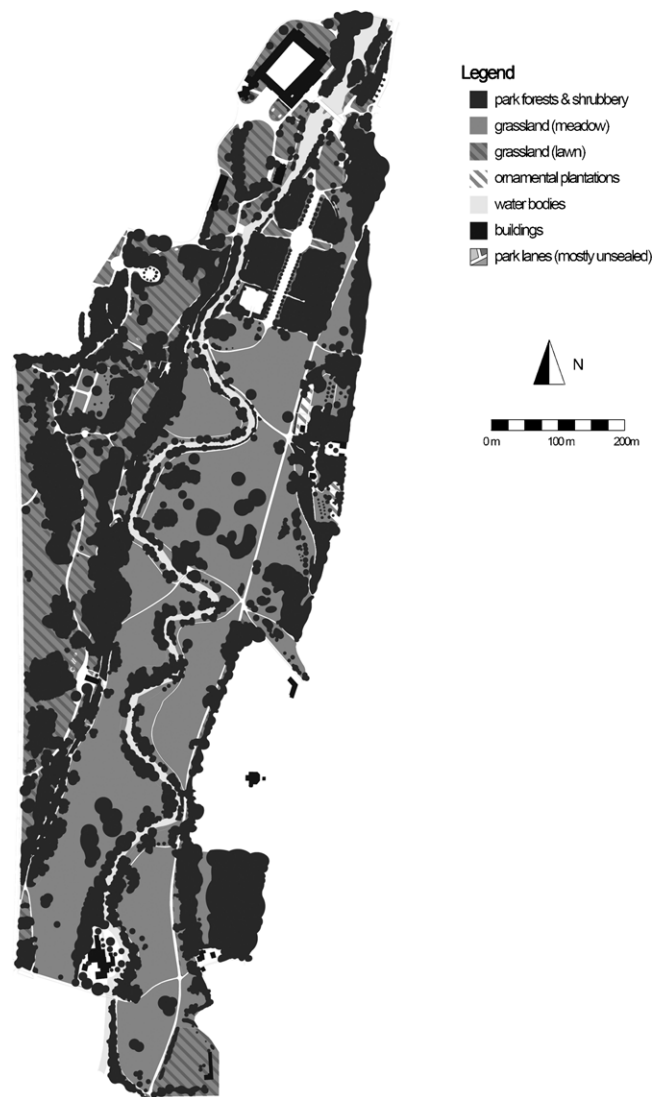


Fig. 1. Habitat map of the "Park an der Ilm".

designers found in the Thuringian Public Record Office and associated archives, as well as reprints of historic etchings and drawings collected by the Weimar Classics Foundation.

In addition local literature from the Weimar Classics Foundation (especially Beyer & Seifert, 1995) was used to relate the findings of the historic documents to their appropriate era. Also informal interviews with the current and former gardeners about management techniques and plant usage were carried out.

3.2. Evaluation for biological conservation

3.2.1. Field mapping of flora and vegetation

The present vegetation and flora were investigated by field mapping in May–October 2006 to evaluate the park's plant diversity. The park was divided into different habitat types: lawns, meadows and pastures, shrubberies, woodlands, ecotones (herbaceous margins), walls/rocks, plant communities on paths & lanes, riverbanks and water bodies. Each habitat type was then sampled randomly. The number of samples was based on the size of each habitat type (Fig. 3). The size of sample plots was determined using the minimal area method (Dierschke, 1994). For each sample plot the frequency of plant species were recorded following the "Braun–Blanquet" method (Dierschke, 1994). In total 436 sample plots were

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