



# Investigating perception of green structure configuration for afforestation in urban brownfield development by visual methods—A case study in Leipzig, Germany



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## ABSTRACT

The afforestation of urban brownfields represents a new urban redevelopment strategy that is currently being used by various shrinking or shrunken cities like Detroit (U.S.), Halle, Leipzig, Schwedt or Weißwasser (Germany). This paper deals with the perception of both, successional brownfields and their afforestation, they were compared to one another with respect to their acceptance, possibilities for use and potential dangers. The study used visual methods: photo montages were produced that presented several stages of afforestation and succession. Both sets of photo montages were linked to questions about perception, acceptance, and usability. The household-based questionnaire survey was embedded in a real urban redevelopment project in the city of Leipzig, Germany, and had the goal of delivering concrete recommendations for the planning and design of urban forest sites in the inner-city. In a direct comparison, afforestation on brownfields is accepted more than natural succession. However, residents really wanted park-related green structures and traditionally designed urban nature areas.

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## Introduction

Urban forests are normally highly appreciated by the urban population because of their manifold services, uses and contributions to the quality of life (Bernasconi et al., 2009; Weber et al., 2014). Mostly the valuation of the population and most of the research is related to old urban forests on traditional sites, whether forests in inner-city parks or at sub-urban locations. The creation and design of new urban forests – like other forms of new urban nature – in the inner-city of existing cities is very seldom because of lacking land (Unt and Bell, 2014). The afforestation of brownfields in the inner-city is a relatively new strategy, which is approached by some shrinking or shrunken cities in Europe and the U.S. (Mathey and Rink, 2012; Rößler, 2010). But these afforestations are controversial debated, because there are different expectations and interests related to the re-use of inner-city brownfields. So planning and governance are challenged to find appropriate design solutions and settings for the new urban forests.

This paper deals with an under-researched topic: afforestation at inner-city brownfields. To assess the perception and evaluation we have dealt with both post-industrial nature, in the form of natural succession and in the form of newly designed nature,

afforestation, both in an inner-city context. Our investigation, which was carried out in the summer of 2010, was embedded in a practical context, i.e. in the parallel accompanying scientific research of the testing and development project “Urban forests: ecological urban renewal through applying of urban forest areas to urban areas in land use change—a contribution to urban development in Leipzig”. The project is an initiative of the Planning Department of the City of Leipzig and the German Federal Agency for Nature Conservation (BfN). It is funded by the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety. The parallel scientific research investigates the effects of urban forests in their various stages of development on environmental, social and economic aspects. The aim of the project is to develop interdisciplinary grounded and communicable recommendations for the use of afforestation in urban redevelopment (Dietrich et al., 2013). Additional, the project supports the demands of the superordinate German Biodiversity Strategy especially for urban areas. To that effect, the greening of cities should be increased significantly by 2020. The ambitious aim of this strategy is to improve the living conditions, to enable more people to nature contacts and to push an overall increase of biodiversity in cities.

The background of the social science research consisted of experiments with new design concepts for brownfields, which have become controversial and contested by civil societal actors. Because old built-up stock in the inner city was replaced by forest, it was seen as threat to the model of the compact and dense city, as

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is pursued in Europe. To meet the interests of the broader public, planners and landscape designers, a questionnaire survey was conducted to provide knowledge for communication, participation, and implementation. To deliver more realistic pictures of prospective appearance of newly designed inner-city afforestation, photos were used with (a) different stages of natural succession, and (b) different forms of afforestation within an urban context, typical for a shrunken city. The survey was not only interested in perception and acceptance but, in particular, in ideas for use, design, and maintenance of these newly designed types of urban nature.

In the following, a brief survey of the specific context of urban shrinkage and its influence in the investigated city of Leipzig will be given. In this context, we will first consider brownfields as an impact of shrinkage and deindustrialisation, as well as new design options for “urban forests”. In the second part, the methodological approach will be outlined, the results presented, and then discussed.

### The challenge of brownfields: The case of Leipzig

As Unt and Bell have stated, “urban dereliction is one of the key issues in contemporary architectural, urbanism and planning discussions” (Unt and Bell, 2014, 134). Although urban brownfields are a global phenomenon (Frantál and Martinát, 2013; De Sousa, 2007), they are portrayed very differently, according to world region and city. In shrinking or shrunken cities the brownfield problem, caused by processes of deindustrialisation and abandonment, is usually more obvious. Examples include Detroit with its Donut-effect, or old-industrialised regions in Europe, such as the northwest of England, the Ruhr area in Germany or the Upper Silesian industrial area in Poland. In East Germany the brownfield problem has achieved a particular distinction as a result of the combined effect of, massive deindustrialisation, suburbanisation, demilitarisation, structural changes in the transport sector, as well as a strong reduction in population (Rink, 2012; Großmann et al., 2015). This has led to the creation of a huge number of brownfields in a series of affected cities. Leipzig is a typical case of such a development, since the city has shrunken from the beginning of the 1930s until the end of the 1990s from more than 700,000 to around 440,000 inhabitants. Whereas the first brownfields have emerged as a consequence of the bombings during WW II, the phenomenon has reached a new quality in the transformation period in the 1990s as a consequence of all mentioned processes. A first monitoring of the brownfields in Leipzig in the early 2000s has counted the number of around 3000, covering a surface of around 900 ha—this equates to a share of 3% of the administrative space. The largest fraction consists from bigger industrial and commercial brownfields, in addition there is a big number of empty lots. There are estimated ca. 8000 small lots particularly in the inner-city (Muschak et al., 2009). Due to the low or non-existent demand for sites, it has been unclear whether, and, if yes, when the brownfields will be used again. Many has been in an unstable state and have succumbed to natural succession, which, in the eyes of the inhabitants, strengthens the perception of their quarters as shrinking, declining and decaying (Rink, 2005).

Together with other problems, this topic reached the agenda of urban redevelopment in East Germany in 2000 and became the subject of intensive research, development, and planning work. As a result, Leipzig – and some other cities in East Germany, like Halle, Schwedt and Weißwasser – have developed or introduced new strategies, instruments, and tools for dealing with brownfields, including various forms of interim use, or renaturation (see Rößler, 2010; Mathey and Rink, 2012). One form that has been developed is the so-called “urban forest”—the afforestation of urban brownfields. Normally this instrument was used alone and almost always

on the urban periphery, for instance, to complete greenways or to connect to the surrounding countryside. The city of Leipzig has gone a step further and has tried to establish urban forests in inner-city locations. The aims of afforestation are (1) to improve green space services, (2) to achieve positive effects with respect to the upgrading of the neighbourhoods, and (3) the creation of a new open space category for urban land-use planning in shrinking/shrunken cities. Whether the new urban forest can really achieve the expected positive effect is the topic of an inter-disciplinary research project in which the topic is investigated by several natural and social science disciplines (biology, soil science, climatology, landscape architecture, sociology) (see: Dietrich et al., 2013). The social science part of this research has dealt with the expectations of different social groups related to possible types of urban forests and their usability. A central methodological element of the investigation was the use of photo montages, which will be more precisely explained in the next section.

### Methods

#### State of research

The aim of the sociological research within the project was to explore perception, acceptance and possible use of urban forests. Studies on the perception of urban nature have a long tradition and point to a fundamentally positive attitude towards nature and vegetation in urban contexts (e.g. Ulrich, 1986; Kaplan and Kaplan, 1989; Kuo et al., 1998; Rink, 2005). Studies on the perception of urban forest, the subject of this contribution, do not yet exist. Urban forests, e.g. the afforestation of brownfields, are understood as a managed alternative for urban successional sites. Therefore, we approach the perception of urban forests from two directions. First, there are a number of studies dealing with the perception of urban brownfields (e.g. Breuste and Breuste, 2001; Keil, 2005; Laforteza et al., 2008). In these studies, brownfields are generally presented as places with unkempt, mostly successional vegetation. Further investigations about the perception of different brownfield types are not yet available. However, the findings indicate that the perception of brownfields is often negative, especially in contrast to other forms of urban nature (e.g. lawns, parks).

Second, there are a number of studies that deal with various forms of forest management (e.g. Tahvanainen et al., 2001) or the acceptance of forest in the urban context (see Kowarik, 2005; Franz et al., 2008). The findings show that wild and untouched forest landscapes are perceived very positively, as ecologically valuable and worthy of protection in the city. However, such sites are hardly conceivable in an urban context. Problematic are the low usability of near-natural forest forms and the high safety expectations of urban residents.

#### Methodological approach

The empirical study was designed as a household survey and was conducted as a combination of face-to-face and postal survey. Therefore the questionnaires were handed over personally by well-trained assistants and picked up again after about a week. The survey was realised in summer 2010. The questionnaires were completed by the respondents themselves. The chosen approach moderates the high priority of the subject and low fears regarding the anonymity of the survey (see Kabisch, 2005, 195f.).

To guarantee the success of the survey, respondents were informed in advance about the investigation through notices in residential buildings and the local press. The aim was to reach a specified number of households in the study areas previously selected, to pass out and collect the questionnaire. The

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