Full Paper

Increasing land value through open spaces – new options in brownfield redevelopment.

Track: Public goods, infrastructure and market relations.

Dipl.-Ing. Anne Budinger, Univ.-Prof. Dr. Dietwald Gruehn

1. Abstract

In many European countries an inconsistent discussion on the value of and the benefits from urban green spaces is going on. On the one hand they are highly regarded, on the other hand they are mostly seen as expense factors. The paper wants to point out the importance of green spaces in the urban structure, with a focus on their significance for the economic value of properties and wants to give an overview on the originating of urban waste land and the chance and opportunity to use them for green improvement of urban districts. Location is seen as the most important aspect in the valuation process of almost any property, but there are a lot of other factors which have an impact on the land value. The open spaces around such an estate are one of theses factors. Due to that fact, underused and misused sites can be transformed into a new "location" by making them a green space. In more detail the meaning and impact of green spaces for the land value will be shown, by presenting examples out of a German wide study of big and middle sized cities, the authors specify these aspects and point out the importance to include them in the urban planning process. Further on a closer look would be taken on brownfield redevelopment projects with a focus on a green reuse, which created a new "location".

2. Green spaces an their functions in cities

Urban green or open spaces have a lot of different important functions not only for the dwellers although for the plants an animals living in urban areas. The dedicated function to open spaces can be divided into different fields like ecological, social and economical functions. Figure 1 contains an overview on the different functions open spaces can have. The three groups of functions can be seen as the elements of sustainability like the Bruntland Conventions defined those (World Commission on Environment and Development 1987).

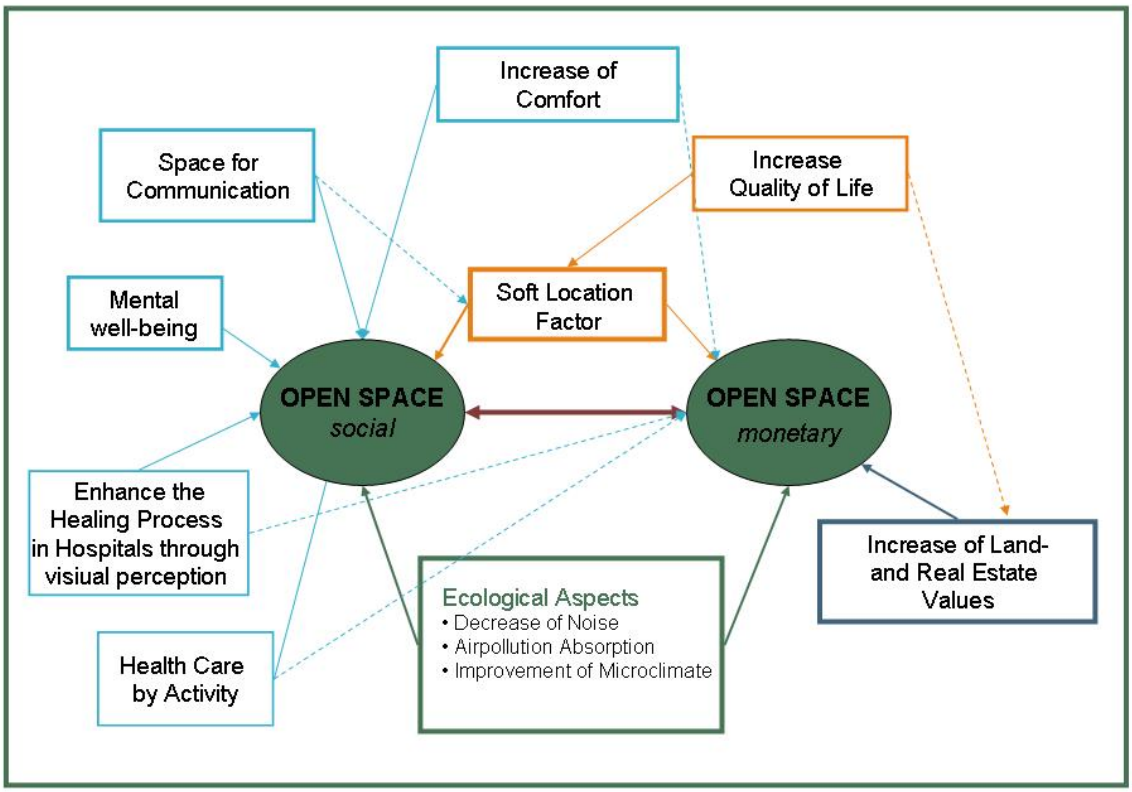
All the shown functions are important for making a city liveable, some only for plants and animals, others only for dwellers, and many of them for both groups. And they depend from each other in some cases. If for example the trees in the city do not have the chance to survive, they cannot deliver their important functions for residents like climate regulation, air and water filtration or air exchange. Most of the ecological functions, of open or green spaces, especially the habitat functions, are of high importance for living of flora, fauna and human beings in urban areas (Grabaum et al. 2005, 5 p.).

Figure 1: Functions of open spaces

Own illustration based on (Selle 2000, A 20) and (de Groot, R. S. et al. 2002, 395)

The social and economic functions in some cases strongly concide. This is not the case with functions like land supply or production. Production depends on the soil quality it self and the land supply functions depend on the location of the plot and the demand of buildable space. In the presented paper we are focusing on the value influencing aspects of open spaces. The relationship between the social aspects and the economical aspects are pointed out in figure 2.

Figure 2: Social and economic factors of open spaces and there relationship



The relationship between social and economical factors mostly exists via the soft location factors. Health related factors like physical wellbeing, mental wellbeing or pre-health care options are soft location factors which have a direct impact on the economic functions of green spaces. They can increase or decrease the value of land or real estate. Some social functions also have a direct influence on the economic aspects of green spaces like health care function. The commitment is as follows, a person who exercises outside or is just doing any activity outdoor is less ill than others, caused by their activity which is very good for the immune system. It is proven that people who are exercising are less ill than others (Gies 2006, 5 pp).

The “increase of comfort” and the “space for communication” functions of open spaces are important for recreation and wellbeing of dwellers. If persons feel comfortable with their surroundings and use them, they can build out a stronger bond to that location which makes them not want to leave. It increases quality of life and people in nowadays are willing to pay more money for soft location factors, which means they are willing to pay for open spaces and their functions (Bochnig und Selle 1992); (Havemann und Selle 2010) & (Thießen 2003).

One of the key aspects when it comes to the value of green spaces is their accessibility of those areas. All above mentioned social and most economical functions can only be used or be benefited from when they are open to possible users and reachable for them. There must be in mind, that a child or older person can not travel the same distances to a park area like a young adult or teenager (Gälzer 2001, 56 p). Green spaces are only used by people when they are accessible in short time and for less cost (Lockwood und Tracy 1995, 157 p), they have to be attractive, they much give the visitors the feeling of safety and they have to be not too small (Gälzer 2001).

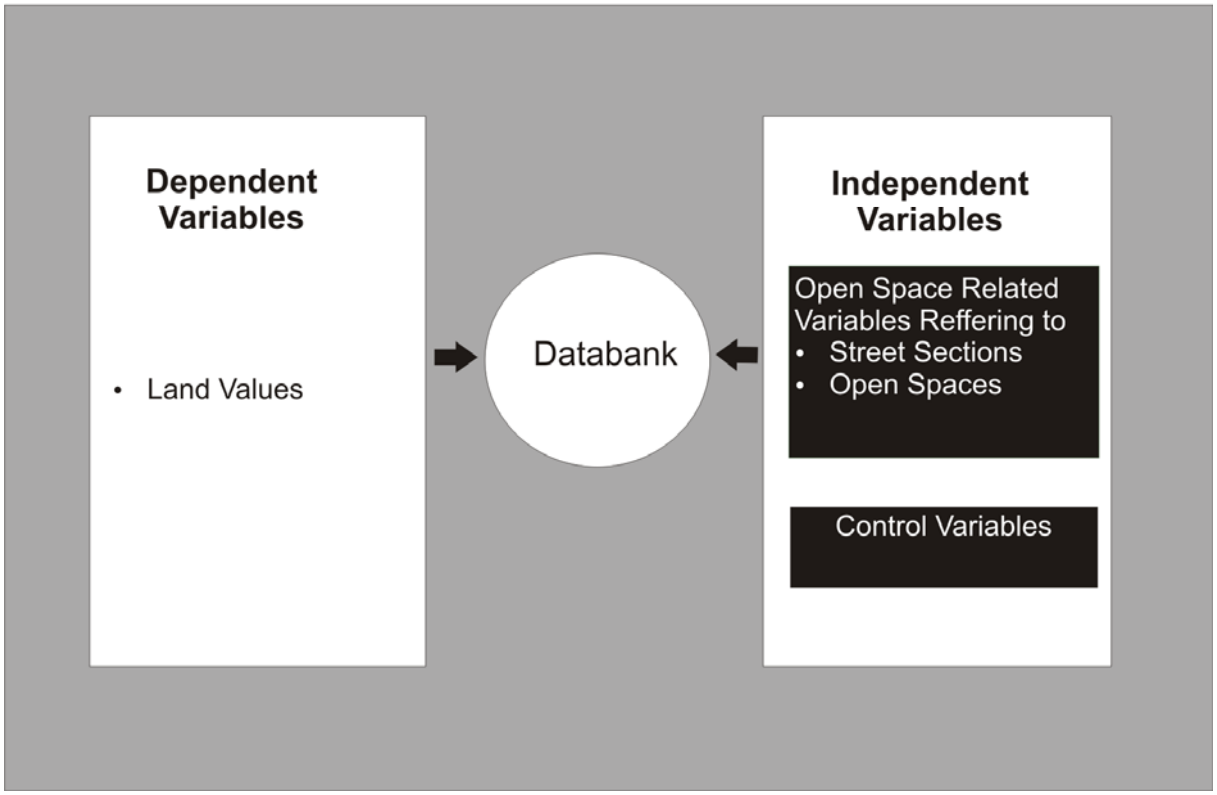
As pointed out here, open spaces may have a wide variety of functions and the social and economic factor have a direct or indirect influence on the land value. There are some studies existing which try to proof that fact (like Ernst and Yong for New Yorkers for Parks did for seven parks in New York City), but they are not comparable to other US states or even to Germany. Budinger nee Hoffmann and Gruehn did on behalf of the GALK e.V. (Germen Federation of Park and Recreation Administration) a German wide study in middle and large sized cities to show how much high quality open spaces of different types can improve the mean land values of the surrounding area. The result of this study will be presented in the next chapter (Hoffmann und Gruehn 2010).

3. Research study on behalf of the GALK

The results of the different studies you can find all over the world are very specific in their locations of examination or only deal with one special type of green space. The economic effects need to be pointed out more clearly especially for future developers in the cities. Even for a more rational debate on the economical impact of green spaces it is very helpful to be able to specify which open spaces are valued by users and which economic effects can be measured as a result of them (Hoffmann und Gruehn 2010).

The aim of the study was to discover this relationship and to verify the value-increasing effect of green spaces on cities with the help of statistical methods. To answer this question, open space related data (independent variables) was collected in 26 German large and middle sized cities as well as land values (dependent variables) as shown in figure 3 below (Hoffmann und Gruehn 2010).

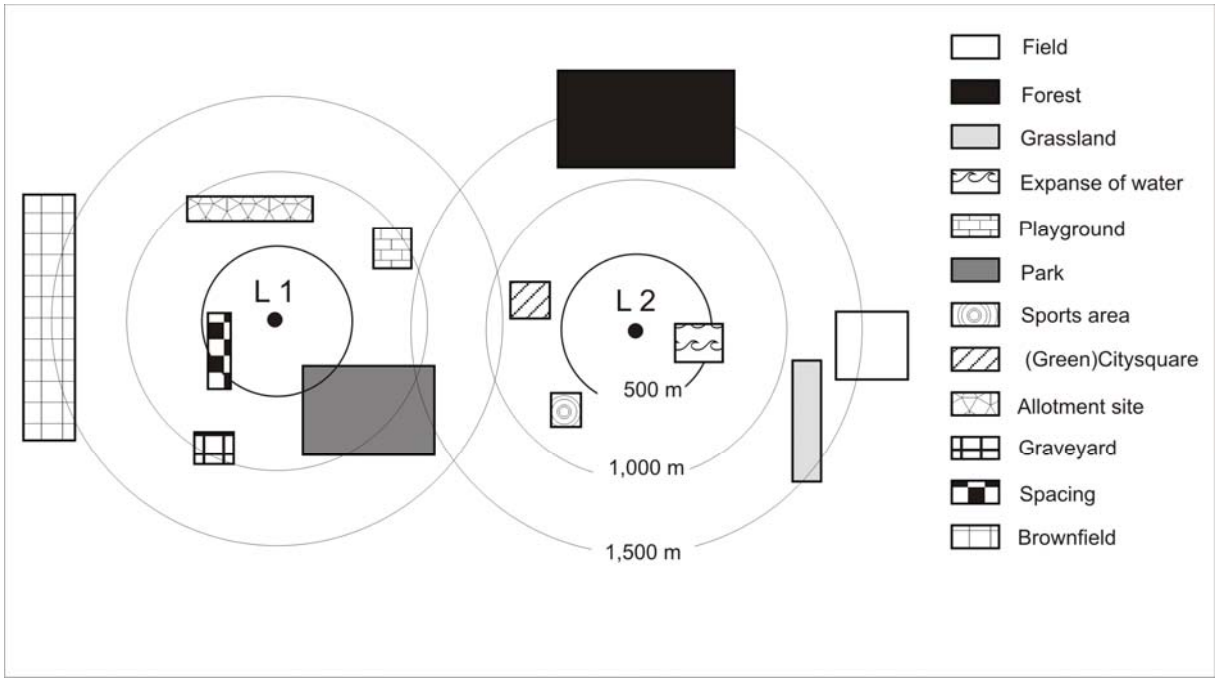
Figure 3: Data Acquisition



In all 26 cities 150 different street sections were identified out of a random sample of different the five defined city types (high density city area, apartment area, garden related area, rural character area, industrial and commercial zone). The different city types were important to show how the effects of open spaces can differ depending on this variable. There were also used to exclude other location based factors with impact on the land value. The green and open spaces relevant for the analysis were identified via different buffer around the locations of examination as shown in figure 4. Some of the data collected during the preparation phase of the study was:

- Distance between open spaces and street sections,
- distance of street sections to city centres,
- number of listed gardens with in different buffers,
- Lack of local city parks in specific urban environments,
- visual street quality,
- accessibility of open spaces,
- condition of maintenance of open spaces,
- intensity of design of open spaces,
- quality of sojourn of open spaces,
- provision of street sections with trees (Hoffmann und Gruehn 2010).

Figure 4: Street sections with surrounding open spaces



The research hypothesis, that the collected open space related variables have a positive influence on the land value, which was tested via ANOVA. The analysis of variance (ANOVA) is a method which helps to identify the effect of independent variables on one or several other dependent variables. Within all tests a p-value of ≤ α with α as significance level of 0,05 is needed to agree to the tested hypothesis. Test was the effect of the location criteria (independent variable) on the land value (dependent variable).

The impact of the different variables on the mean land value is measured with eta² (Hoffmann und Gruehn 2010).

In the following some results of the study will be presented.

Figure 5: Land value and area type

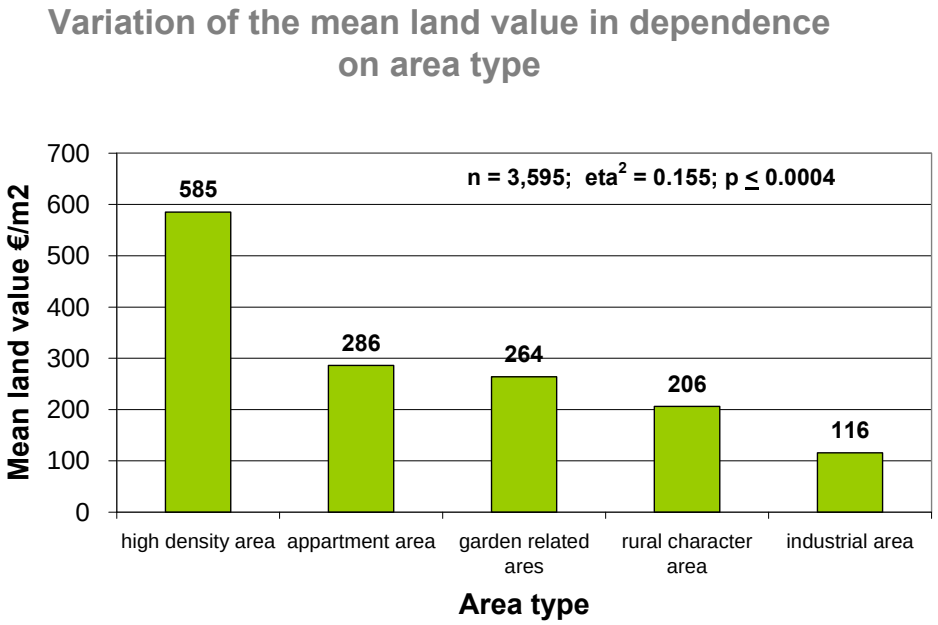
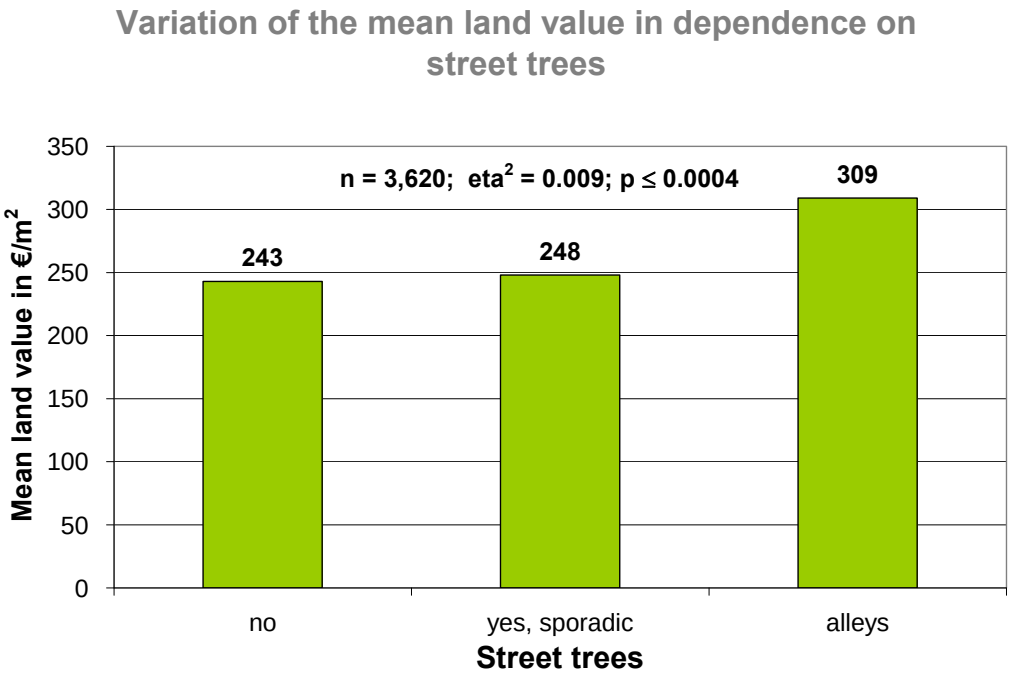


Figure 5 points out the impact of the area type on the mean land values in the observed cities. As a control variable this variable shows how the building structure influences the mean land values. Its explanatory power with 15.5 % is measured to a confidence level of 0.0004 (Hoffmann und Gruehn 2010).

In figure 6 the effect of street trees is shown. This variable is open space related and depends on the elected street sections. Meaningful is that street trees planted as alleys have a positive influence on the mean land value, none or only sporadic existing trees do not have a positive influence. The highest mean land values could be measured with 309 €/m² in areas with alleys. The effect strength is 0.09 % (Hoffmann und Gruehn 2010).

Figure 6: Land value and street trees



The open space related variables measured with the selected open spaces are shown in the following charts. The condition of maintenance as one of these factors, has a strong effect with 4.1 % (figure 7). With a very good condition of maintenance the mean land value is 333 €/m² in street sections with green spaces within a buffer of 500 m. The difference between areas with worse conditions of maintenance and those with very good maintenance conditions is 130 €/m² in the mean land value (Hoffmann und Gruehn 2010).

Figure 7: Land value and condition of maintenance

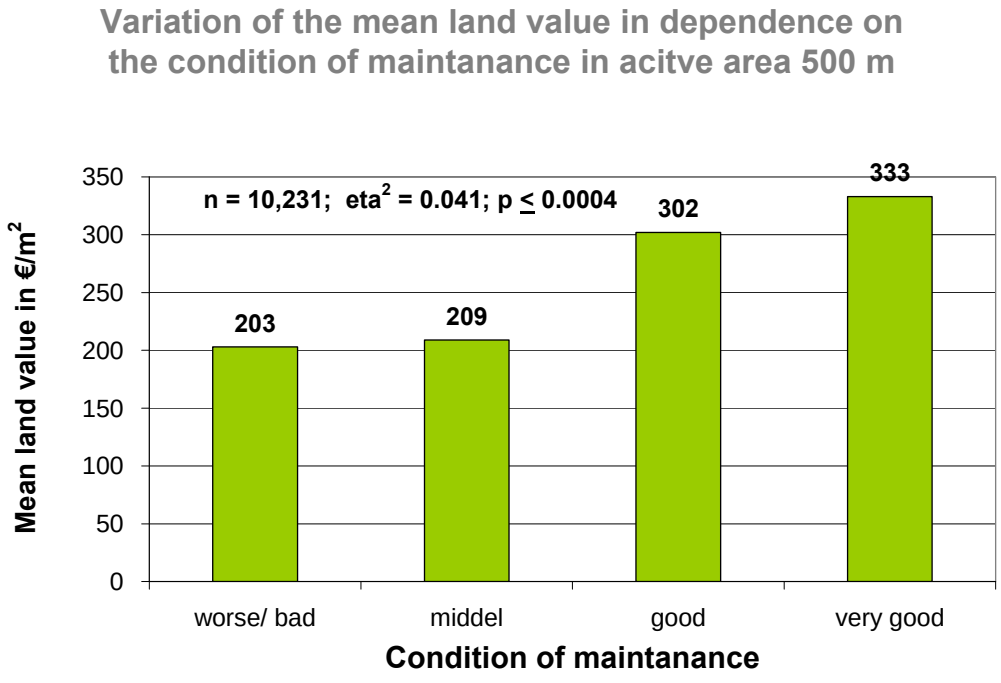
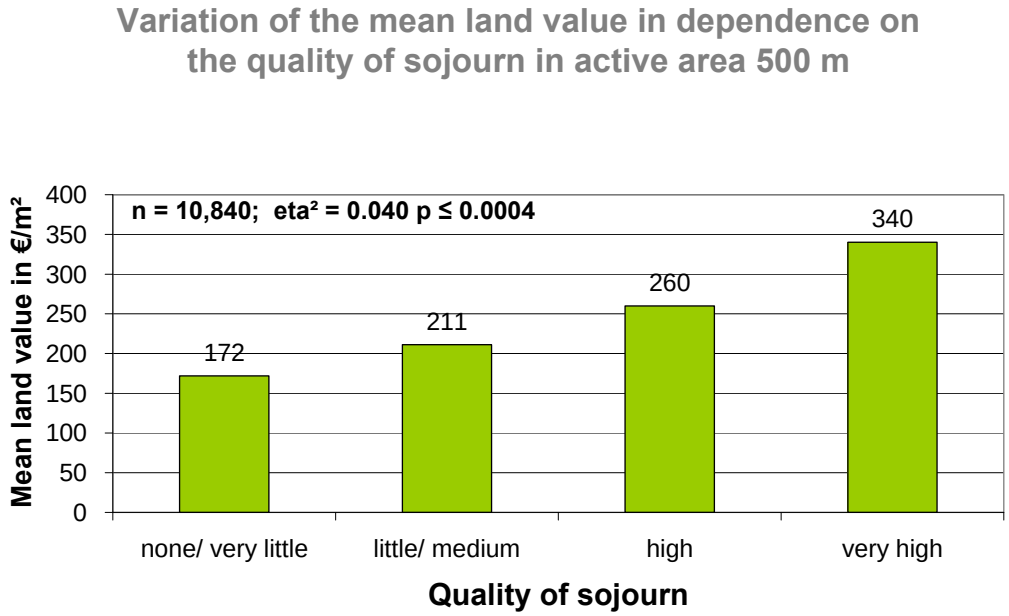


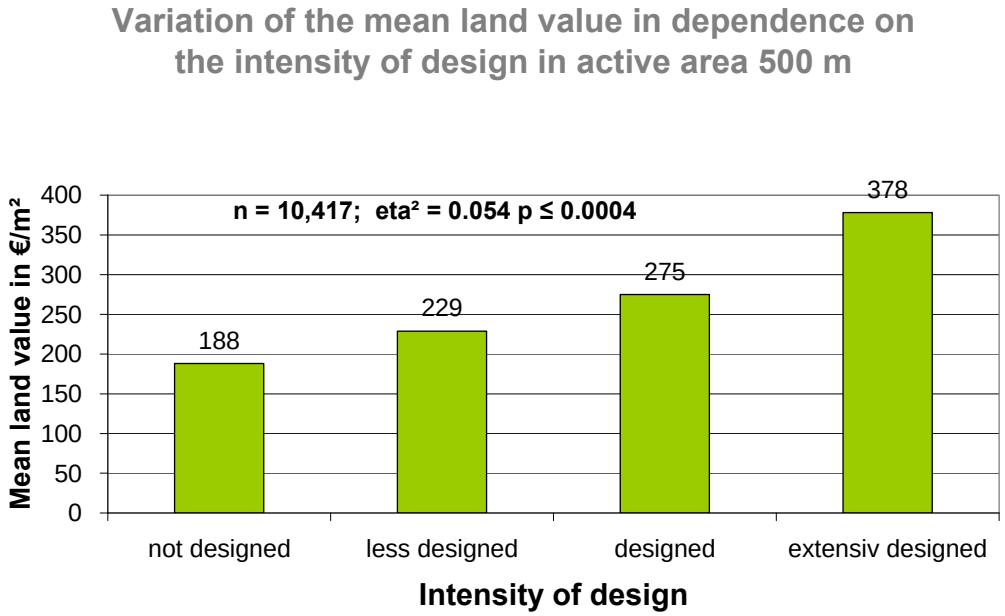
Figure 8 shows the variation of mean land values in dependence of the quality of sojourn. The highest mean land values are measured with 340 €/m² in areas with a high quality of sojourn in their green spaces in a maximum distance of 500 meter. The explanatory power is 0.041. Differences in the land values are significant with p≤0.0004 (Hoffmann und Gruehn 2010).

Figure 8: Land value and quality of sojourn



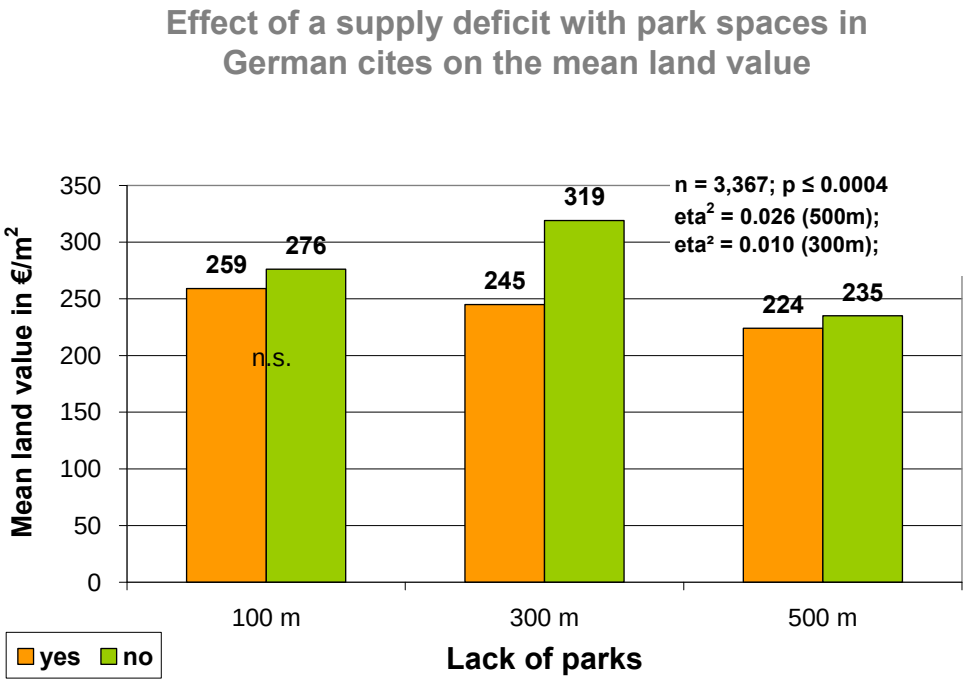
The variable with the highest measurable effect in the mean land value in an active area 500 m tested in all groups of city types is the intensity of design (figure 9). Eta² is 0.054 or 5.4 %. Meaningful is that as higher the intensity of design level is, the mean land values are significantly increasing up to 378 €/m² (Hoffmann und Gruehn 2010).

Figure 9: Land value and intensity of design



An additional interesting result besides the measured effects of different green space attributes is the importance of the existence of usable green spaces for the land value

Figure 10: Lack of parks



As presented in figure 10 the effect of parks existing with in 300 and 500 meter buffers around the selected street sections is significant, within a 100 meter buffer the difference is not significant to a 95% confidence level. In the case that a lack of parks exists, the significantly lower mean land values are measured in the areas with no park. The explanatory power is 2.6 % (300 m), and 1.0 % (500 m). Only the existence of open

spaces, not talked about the quality of that space at this point, can make a difference on the real estate market (Hoffmann und Gruehn 2010).

4. Why green use for brownfields example?

The existence of brownfields is not only a German problem, structural change and a decrease of population can be seen all over the world. Every city has its own brownfield problems. There are a lot of different definitions of brownfields, in this paper brownfields should be understood as land which is not longer in use or underused and could be contaminated by its further use. There is no size limitation; they can be big like old industrial sites or small like an old gas station. Revitalizing a brownfield is a great opportunity, a former closed area can be opened to the public again and there is a chance to give back a better image to a neighbourhood. The Federal Republic of Germany has defined the goal to reduce its land consumption to 30 ha/day. To reach this goal the reuse of unused land is a must (Rat für nachhaltige Entwicklung 2004). There is no need to expend natural land for new building projects when brownfields site are available in the cities. Reusing brownfields is sustainable development in cites and has some advantages opponent to rural locations like existing traffic infrastructure or good location within the city (Federal Environmental Agency 2005, S. 6 f.). Due to the shrinking population there is mostly no need to completely reuse a brownfield site with residential or commercial uses. Public green spaces can be realized on such plots and can help to enhance a new and better image of the surrounding neighbourhood.

The Millenium Park in Chicago is an example for such a revitalization process. The former commuter rail lines, surface parking lot and old and rundown park in downtown Chicago at the edge of Grant Park on Michigan Ave. was underused for several years and in 2004 reopened and revitalized as Millenium Park. Millenium Park is a 24.5 acres public parks which has several entertainment facilities which are for free. The Pritzker Pavillion is on of the most impressive buildings in the park for concerts, the Cloud Gate and the Jaume Plensas's Crown fountain are signs for the very high design standards of the park. The speciality of the brownfield revitalization is not only the breathing in of new life into an old place and extend the lake front park system to the Michigan Avenue, it is a giant roof top garden, which covers the Millenium Garage an parts of the Harris Theatre below street level (Uhlir 2006, S. 20 f.).

The land value around Millenium Park increases long before the park was opened to the public. The knowledge of the upcoming development doubled the land prices four years prior the opening. Sales of condominiums around Millenium Park have gone higher compared to the planned development years before. Seven new condominium projects were realised with Millenium Park, they reached a square foot price of 592$ which was the highest sales price in Chicago at that time. Goodmann Willams estimated a value increasing of residential development of 1,4 billion $ due to the revitalizes brownfield. The new Park has not only increased sale and rental prices; it has also increased the visitor number of Chicago, which has also an economic impact (Uhlir 2006, p. 22 pp.) & (Goodman Williams Group and URS Corporation 2005).

5. Conclusion

Open spaces have positive influence on the land value in German large and medium-sized cities and can contribute to an increase of land values. Up to 5 % of the land value can be explained by green spaces. Other factors are important too, but first of all there has to be an open space within short distance around a home or working area. Additionally the following factors are of importance: the condition of maintenance, the quality of design and the quality of sojourn. As better the quality of sojourn is, as higher the land values can be referred to figure 8.

When brownfields occur in cities, there is a chance to increase the value of the neighbourhood surrounding that plot and to improve the image of the city quarter. As the Millennium Park example shows, there can be a high impact on the neighbourhood and the whole city. The increasing value effects are not limited on sale and rental prices. In cities like Chicago they even increase the city tax income through new retailers, more jobs and more visitors' spending money in the city. Revitalizing brownfield sites as parks or gardens do not necessarily need to have the size of Millennium Park to create positive effects on the land market. It just has to be new open space in an area which had a lack of usable green space.

List of references

Bochnig, S.; Selle, K. (1992): Freiräume für die Stadt. Sozial und ökologisch orientierter Umbau von Stadt und Region. Instrumente der Freiraumentwicklung. Wiesbaden, Berlin: Bauverlag GmbH (2).

de Groot, R. S.; Wilson, M. A.; Boumans, R. M. J. (2002): A typology for the classification, description and valuation of ecosystem functions, goods and services. In: *Ecological Economics* 41 (3), S. 393–408.

Federal Environmental Agency (Ed.) (2005): The Future lies on Brownfields. Dessau.

Gälzer, Ralph (2001): Grünplanung für Städte. Planung, Entwurf, Bau und Erhaltung. Stuttgart (Hohenheim): Ulmer.

Gies, E. (2006): The health benefits of parks. How parks help keep Americans and their communities fit and healthy. Hg. v. The Trust for Public Land. San Francisco.

Goodman Williams Group and URS Corporation (Ed.) (2005): Millenium Park Economic Impact Study.

Grabaum, R.; Meyer, B. C.; Wolf, T.; Meyer, T.; Gehrung, J. (2005): Interaktives Nutzerhandbuch für das Verfahren MULBO. Textdokumente - Informationen zum Vergahren MULBO.

Havemann, Antje; Selle, Klaus (Ed.) (2010): Plätze, Parks & Co. Stadträume im Wandel ; Analysen, Positionen und Konzepte /. Detmold: Rohn.

Hoffmann, A.; Gruehn, D. (2010): Bedeutung von Freiräumen und Grünflächen in deutschen Groß- und Mittelstädten für den Wert von Grundstücken und Immobilien. Hg. v. D. Gruehn. TU Dortmund, Fakultät Raumplanung. Dortmund (LLP-report, 010).

Lockwood, M.; Tracy, K. (1995): Nonmarket economic valuation of an urban recreation park. In: *Journal of Leisure Research* 27 (2), p. 15-167.

Rat für nachhaltige Entwicklung (Hg.) (2004): Mehr Wert für die Fläche: Das "30 Hektar Ziel" für die nachhaltigkeit in Stadt und Land. Empfehlungen des Rates für nachhaltige Entwicklung an die Bundesregierung. Rat für nachhaltige Entwicklung.

Selle, Klaus (2000): Vom sparsamen Umgang zur nachhaltigen Entwicklung. Programme, Positionen und Projekte zur Freiraum- und Siedlungsentwicklung ; ein Lesebuch für Studierende und andere Interessierte /. 2., durchges. Aufl. Dortmund: Dortmunder Vertrieb für Bau- und Planungsliteratur.

Thießen, F. (2003): Weiche Standortfaktoren. In: *Bundesbaublatt* 2003 (12), p. 20–23.

Uhlir, E.K (2006): The Millenium Park Effect. Creating a cultural venue with an economic impact. In: *Greater Philadelpia Regional Review*, p. 20–25.

World Commission on Environment and Development (1987): Our common future. Hg. v. United Nations.