🏆 *reviewed paper*

Old Brownfields, new Parks of Tomorrow. Chances to Improve the Environment of the Cities

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1 ABSTRACT

The contribution intends to present the importance of green spaces in the urban structure, their meaning for ecological and social quality in the city and their importance for the economic value of properties. It gives an overview on the originating of brownfields – urban waste land and the chance and opportunity to use them for improvement of urban districts. Two specific aspects were regarded more detailed, the importance of the integration of the inhabitants in the reuse process and the meaning of green spaces for the land value. By presenting examples of different German cities, the authors specify these aspects and point out the importance to include those in the urban planning process. The combination of social activities and economic factors occupies an important role in the sustainable urban planning process and how to consider them can be an advice for other cities.

2 BROWNFIELDS/ URBAN WASTELAND/ ABANDONED OR UNDERUTILIZED LAND, BACKGROUND

The growing number of urban wasteland is a worldwide phenomenon and has different reasons often they are the result of an economic change. In general, it is combined with a loss of population. Due to political and economic reasons parts of cities fell and still fall apart and thereby create a specific planning and development problem. We can find examples in Germany, in the Ruhr Area and the New Bundesländer; in Great Britain, we can find them in Manchester and Liverpool; in the USA, e.g. in Detroit and it is Osaka in Japan, we find them even in the Russian Federation, in Ivanovo (ATLAS OF SHRINKING CITIES 2006). An example of a shrinking due to geographical circumstances we can find with New Orleans (flooding) or the Chittagong Region (storm). But often we see a recovering of these cities.

In general we find the decreasing population in industrial countries, while the population in the developing countries is growing, combined with an enormous demand of open space. In these city regions, the problem is more one of the low quality of residential areas and therefore the question how to improve these quarters and how to do this ideally together with the inhabitants.

As a result of an experience phase of more than two decades we can learn from the so called old industrial countries how to deal with:

- The problem of industrial brownfields – which will be also created in developing countries - with a lot of serious pollution.
- The decreasing quality of residential areas due to social problems.
- The abandoned, empty residential areas, caused by a moving and declining population.

The question is how to stabilize these parts of the city, often well-equipped with infrastructure, but with a negative image and undergoing a severe demolition process.

To redevelop the inner city areas also helps to avoid the process of urban sprawl. One of the main goals in the Federal Republic of Germany is to reduce the land use from ca. 100 ha per day down to 30 ha per day (DEUTSCHER BUNDESTAG 2004). To reach this goal German cities have to follow the “inner-development instead of outer-development” principal. That means that they have to use areas located within the built-up area and not at the fringe of the city. Developing and stabilizing these urban areas and to make them usable and attractive for new people and companies can be regarded as a part of sustainable urban development. Since the Rio Conference in 1994 sustainability is a general political objective in the urban planning process.

The following figure shows the elements of sustainability.

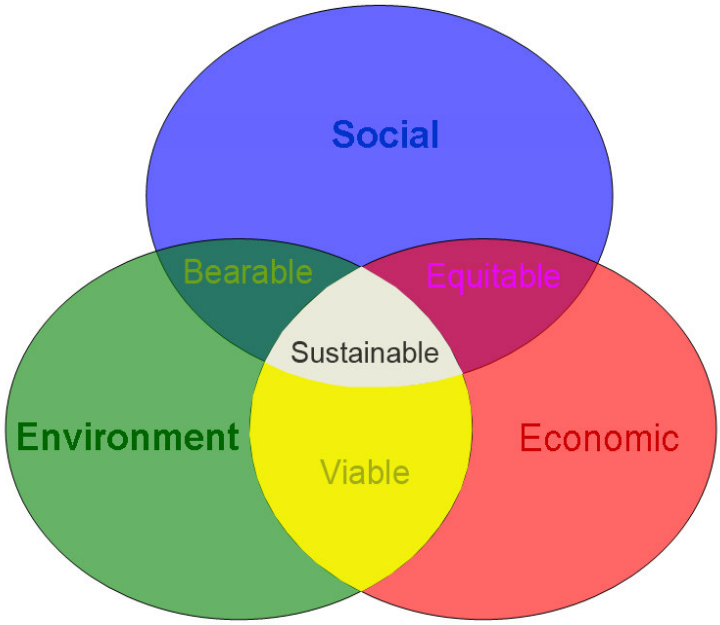

Fig. 1: Elements of Sustainability

Starting from the general definition of sustainability we can define: “Sustainable brownfield regeneration is the management, rehabilitation and return to beneficial use of the brownfield land resource base in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally non degrading, economically viable, institutionally robust and socially acceptable ways.” (Rescue 2005: 11)

Using a brownfield or an abandoned site for a new development has many advantages. The good quality of the site in ways of centrality, public transport connections and often the urban environment and neighbourhood are good reasons. On the other hand the costs of technical infrastucture for a community are the higher the lower the settlement density is: 1.400 €/year/ inh. for single family houses; 500 €/y/inh. for multi family houses in inner city. In times of low public budgets this is a good argument for inner city development. (FEDERAL ENVIRONMENTAL AGENCY 2003; BESECKE 2005)

In Germany the Federal Environmental Agency published a guide book with the title “The Future lies on Brownfields”, which is an information for investors and real estate owners. This guide book stresses the meaning of cooperation and public private partnership on the one hand and the importance of creating an environment with a high quality, including adequate open spaces. This is the base for the concept of green parks and gardens on city wasteland, implemented with the inhabitants.(F.E.A., ICSS, 2005).

The experience of 20 years of sustainable brownfield regeneration, not only in Germany, but also in Europe, can be used as a reservoir for ideas which could be transferred to other countries. It is not only the aspect of developing of already used land but also the requirements of sustainable treatment of the natural resources. The focus however of this contribution lies on the development of brownfields to green areas, the participation of people and the enhancement of the property value through a green environment.

3 FUNCTIONS OF GREEN SPACES

In many European countries a contradictory debate of the value of and the benefits from urban open spaces is going on. On the one hand, they are highly regarded not only due to social, ecological and health related matters, but also increasingly to economic benefits resulting from them. Above all, they are seen as a mean to counter act migration out of cities and, thus, the deterioration of wide parts of the city centres. On the outskirts, their importance for the attractiveness of areas of complex housing has recently been recognised, at least in Germany. Finally, the provision and the quality of urban open spaces increasingly represent an important soft location factor for cities particularly with regard to attracting companies to settle down (FLL 1999; LUTHER 2000).

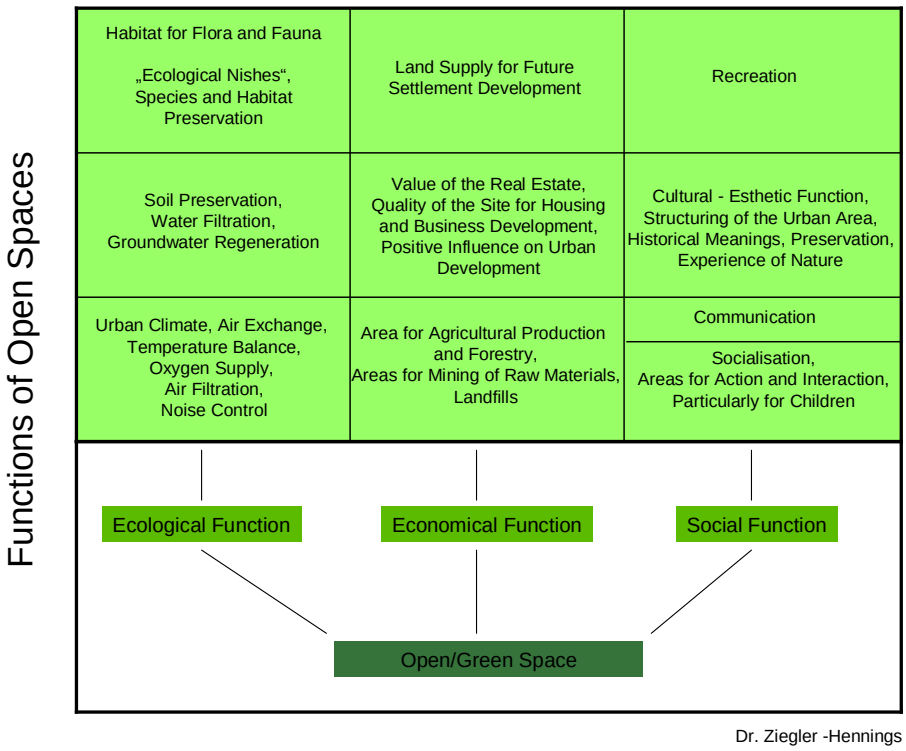

Fig. 2: Functions of open spaces

The social and economic function of open spaces often cause each other, even though they are sometimes in competition with the ecological functions.

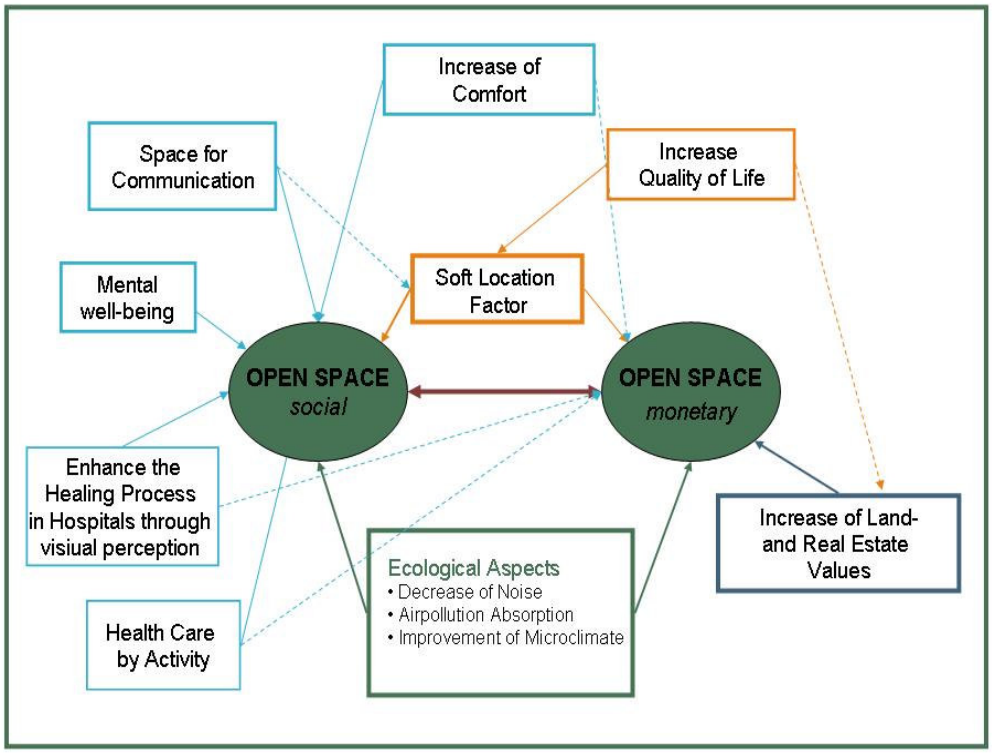

Fig. 3: Social and economic factors of open space

People are willing to pay a large amount of money to obtain property close to a park or any other kind of open space of a good quality. (SHERER 2006). The reason for this phenomenon is founded on the fact, that

living near to a green space can achieve many possibilities to do something for health and well-being and it allows the opportunity to socialize.

It is proved, that green space has a positive influence on human health and well-being. A study from the Netherlands has shown that looking out of a hospital room into the green significantly shortens the healing process of the patients.

Using green spaces is limited and determined by several factors, if they are not fulfilled green space has a very low social and economical impact.

These factors are:

- Accessibility within 10 minutes walk or biking,
- dimensions of green space, larger ones are more attractive than smaller ones,
- subjective feeling of safety and
- the attractiveness of the green space (playground, outdoor furniture, water…) (GÄLZER 2001)

The access to green space within a short walking distance influences the willingness of outdoor activities. If a person needs too much time to reach an open green space he will not use it.

Through the engagement in regular physical activity you can reduce the risk of premature death. If you enable the inhabitants of a city to gain access to a nearby open green space they are more likely to exercise and that supports the mental and physical well-being. (GIES 2006).

An urban green space is always a place of communication and a meeting point for different kinds of groups, for example, children, mothers with little kids or older people. Getting in touch with others is important for forming a community. Young families for example are very interested in getting in touch with other families to get their kids in contact. The importance of play because of the “playing is learning” idea is an important factor even for families with young children. They integrate this knowledge in their search for a home. (GIES 2006: 17). These are reasons for a location decision in the settling process.

Green is a soft location factor as mentioned before and shown in the figure 3 above. Mental well-being, communication and health are important parts of human life and so a lot of people are interested in supporting those functions. But as said before, the quality of the green area is important for those two functions of green. The park or green space, in other words, must be safe and of high quality. The definition of high quality is discussed in the case study, which is presented in chapter 5.

The entire above mentioned are reasons why green space has an economic function besides the social and ecological ones. People nowadays are willing to pay more money for more green. That causes an increase of land and real estate values. (GRUEHN 2006)

This increasing value of land and real estate prizes is not only valid for residential housing but also for commercial buildings. Ernst and Young showed this in a report they did for the “New Yorkers for Parks” Initiative. The Bryant Park, which was redesigned and reopened in 1992, for example, raised up real estate prices between 115 and 225 percent between 1990 and 2000. (ERNST AND YOUNG 2003)

4 GREEN DEVELOPMENT (WITH HOUSING) AND CIVIC COMMITMENT

There are different views and approaches regarding the combination of brownfields and open space planning. One view originates in the context of sustainable urban development and concentrates on the protection of greenfields and landscape at the border of cities through the development of brownfields. Another view stresses the development of biotopes with rare species on the brownfields site itself. In this context the brownfields should be defined as nature protection areas. A third view takes into regard the improvement of the environment in residential areas by creating new parks on abandoned sites.

As mentioned before, green spaces or parks have several functions for the inhabitants. Beside the improvement of the natural environment as water and local climate they play an important role for the recreation, for children’s play and for social life. Therefore it is important to plan and to implement a net of residential open spaces, parks and green connections for pedestrians and cyclists. Green development of brownfields can contribute to these concepts. For economic reasons often a combination of housing and

green spaces is desirable. And there are many examples of successful neighbourhood of green and housing plots.

As a result of so many different social and economical circumstances the concepts demand a high flexibility. One main distinction exists between temporary and permanent use. The following figure shows the wide range of green uses. To maintain the green plots civic commitment and the cooperation with the inhabitants is important.

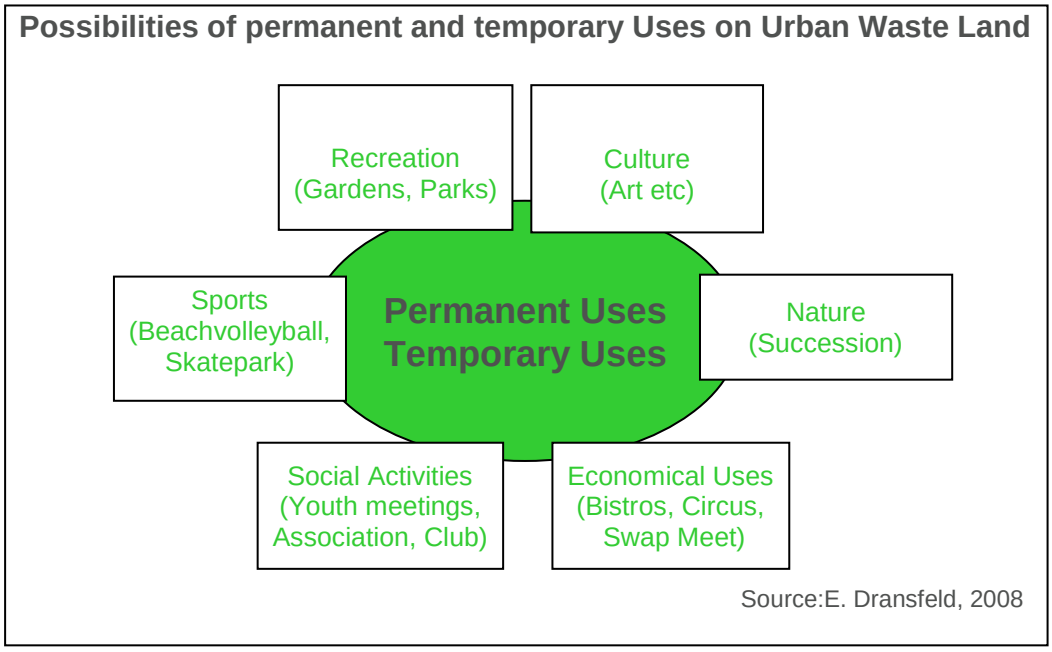

Fig. 4: Possibilities of permanent and temporary uses on urban waste land

In the following, three different approaches will be described concerning green space development (with residents) on brownfields - urban waste land:

- New green residential areas.
- Spaces for children's nature experience, wilderness for children.
- Temporary uses with citizens.

4.1 New green residential areas

As mentioned, the combination of housing areas and open spaces has many advantages. It causes a better quality of living and therefore people stay in the inner city. It increases the value of the property and guarantees a reasonable price. It even strengthens the identification of the inhabitants with their quarter and the willingness to care about green spaces.

In Germany we can find interesting examples in the Ruhr Area with a lot of industrial brownfields or in cities as Freiburg with big former military sites. In the Ruhr Area the International Building Exhibition from 1989 to 1999 was established. One of the central themes was housing, including the refurbishment of old worker settlements as garden city types and the construction of several thousand flats on brownfield sites. The following examples could be showed:

Bochum, Zeche Holland: Mulitfamily housing on a former mining site sourrounded by green and water.

Dortmund, Tremoniapark: Singlefamily housing around a park on a former industrial site.

Freiburg VaubanViertel: housing in different structures with a lot of green and good environmental concepts (e.g. energy)

4.2 Spaces for children's nature experience

This type of green brownfield combines two aspects. The genuine development of nature and the free, wild play of children. Children, often raised in an artificial environment, lose the contact with nature and do not experience the feeling of "wilderness". In these "Naturerfahrungsräume" they can learn the identification

with nature, the self determined play and some knowledge about ecology. Especially for schools such areas (1-2 ha=2,5-5 acres) are important places as outside classrooms. A research study is recently done to evaluate the positive influence of these spaces for children's health and attitudes.

Examples of playgrounds for children; paved unattractive environment and green spaces for free, creative planning.

Own source (Source: Tschäppeler, S. et al.: 2007)

4.3 Temporary uses with citizens

Especially the cities of Germany's East have to deal with a declining population, the moving away of people and remaining areas with little development chance. Therefore "temporary uses" for these building plots and sites have become an important phenomenon in city development. Temporary uses today are the product of structural changes in the economy. They are a strategy in a transformation process, they must be developed together with the citizens and they must be integrated in the urban planning remit.

Berlin and Leipzig present important examples of these transformation strategies. Berlin has about 1000 building plots with 170 ha in the inner city and is a pioneer in the creative development of these properties.

Leipzig as a member of the program " Urban Redevelopment Scheme in former East Germany" took part in the research study "Temporary Uses and new Open Spaces".

Leipzig lost 20% of its population and has a surplus of 60.000 flats. Both cities are very progressive in ideas and concepts for the empty space development and follow a strategy which has the participation of citizen as an objective.

The range of development projects is extremely wide, e.g.: New parks and urban forests in large residential areas; summer-gardens with the neighbours; coloured gardens, asylum plant flowers and vegetable; gardens for disabled people; school gardens; playgrounds for children; urban farms for urban children; BMX spontan, a sporting area for bikers; SANDSATION, sculpture park; nature conservation projects with livestock.

There are numerous projects. The common idea is the toleration of the owner of a temporary use, often the citizens' initiative and the support by the city. Often these projects are realized with a very low budget.(Ziegler-Hennings, Chr.: 2007)

5 INCREASING VALUE THROUGH GREEN SPACE (CASE STUDY FFM)

Increase of property and real estate value, is that possible?

At present, less attention has been paid to urban open spaces in every day political and administrative life. This has led to a severe neglect of these amenities. As a consequence, they do not only lose their positive effects on the environment in terms of ecosystem services to a great extent, but might also actually be partly responsible for an accelerating decay of certain parts of cities because unkempt, littered and run down parks are often associated with crime and under-privileged neighbourhoods by the public (Mahler 1998, Urban Park Forum 1999). The location of a site is the main factor for fixing property and real estate value, the factor open space is part of the location factor.

The economic effects of (urban) open space, as described in chapter 2, need to be pointed out, especially for developers of cities. Consequently, for a rational debate on the importance of (urban) open spaces and their

economic effects, it is important to find out more about which kinds of open spaces are appreciated by the public and which economic benefits actually result from them. This is the main goal of a research study on behalf of the GALK DST (German Federation of Park and Recreation Administration)) named "The Effect of Urban Open and Green Spaces on the Value of Properties and Real Estates". Against the background of the completed research study (at the University of Berlin and the Austrian Research Centers, Vienna) as well as the purpose of the project, to create a representative, German wide data basis for the evaluation of property and real estate values, is one aim of the project, to enlarge the data basis of about 15 cities about 10 more cities in collaboration with the already concerned cities of the former study. Afterwards the complete dataset has to be statistically evaluated and produced in a report. Additionally there will be a city specific analysis of some cities.

Statistical analyses of land value data from European Cities based on random samples reveal new information regarding economic benefits of open spaces (LUTHER 2000; LUTHER & GRUEHN 2001; LUTHER & GRUEHN 2002; LUTHER, GRUEHN & KENNEWEG 2002; GRUEHN 2004, GRUEHN 2006; HOFFMANN, GRUEHN 2010).

The aim of the research is:

- to discover the relationship between land value and the provision and quality of open spaces as well as
- to verify the value-increasing effects of urban open spaces by means of statistical methods.

The central hypothesis is:

Open spaces, or, respectively open space related criteria, have a positive influence on land value.

The research method is a statistical analysis of collected data, which describes on the one hand the open space itself and on the other hand the street sections, which are defined at the beginning as an average and stratified sample.

Data acquisition comprises two types of data, dependent variables (e.g. land values) and independent variables (open space related variables referring to street sections or open spaces in the vicinity of the examined plots). Additionally control variables (urban density, urban development restrictions or allowances) were included to eliminate interpretation errors (see figure below).

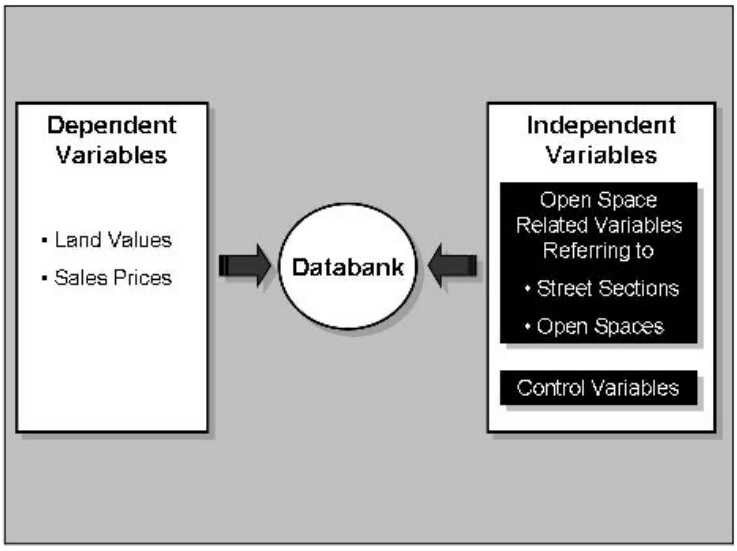

Fig. 5: Data Acquisition

The identified street sections are the locations of examination (US 1 and US 2 in the figure), 150 in each participating city. To identify green spaces relevant for the analysis we surround the locations with 500, 1000 and 1500 meter buffers. The following list gives some examples of open space related criteria which is collected and analysed in this study:

- Distance (of the sample elements) to neighbourhood open spaces,
- number of listed gardens within a radius of 500 m,

- lack of local city parks in specific urban environments,
- vicinity to open spaces and inshore waters,
- number and size of nature reserve areas or areas of great natural value in the vicinity of the sample,
- visual street quality,
- urban fabric.

Hypotheses were formulated which stated that each of the above mentioned criteria has a positive effect upon land value. Whether or not the hypotheses were correct was determined through the application of specific statistical tests on the data collected. A confidence level of at least 95 % (i. e. a p-value $\leq$ significance level α ($\alpha = 0.05$)) is necessary to accept a hypothesis. If accepted under this condition, there is a significant connection between the sample and the population from which the sample was drawn. In other words, there is a significant effect upon land value of the criteria examined.

The ANOVA (analysis of variance) was the main tool for the statistical analysis. It is a method which helps to detect the effect of certain variables on one or several other variables (BACKHAUS et al. 1996). Its purpose within the survey was to examine if there is a statistically significant effect of the independent variables (location criteria) on the dependent variable (land value). If so, additional statements regarding the level of the influence can be derived. Thus, it is possible to distinguish and to weigh the individual location criteria with respect to their importance as regards land value.

In addition to the ANOVA, other test statistics were applied, depending on the quality of data available and on the specific questions to be researched: the t-Test and nonparametric procedures, like e. g. the KRUSKAL-WALLIS-H-Test and the U-Test of MANN and WHITNEY.

The case study presented in this paper is placed in Frankfurt Main, Germany. Additional to the case study, which is under process, we will present results of the former study, carried out by Prof. Gruehn, from Berlin and Malomoe. Pre-analyses have shown that there is a missing of high and very high quality green areas within the boarder.

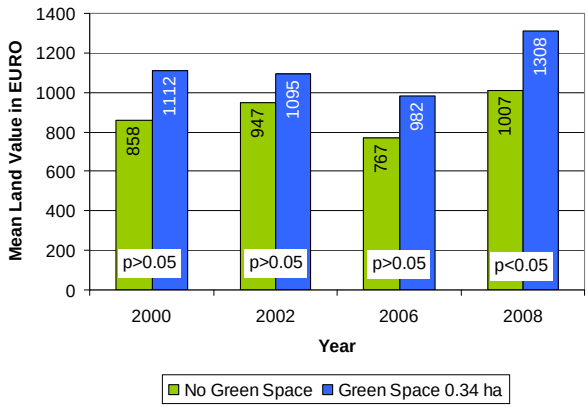

Fig. 6: Effect of the existence or not existence of green space on the mean land value

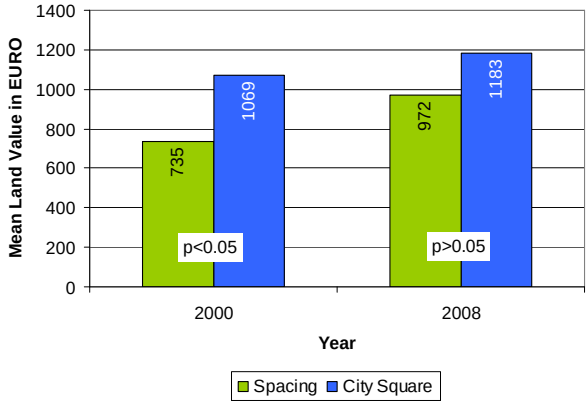

Fig. 7: Effect of spacing areas and city squares on the mean land value

As you can see in the figure above (6) effect of green space in cases of existence or not existence within a 100m radius around the locations of examination can be shown from 2000 to 2008 by of the mean value of the land value in the area around the future European Central Bank building. The result of the executed t-Test is that the values for 2008 are significant with $p<0.05$.

As you can see in figure 7, there is a difference in the mean land value between locations of examination with a spacing and those with a (green) city square of high quality related to the intensity of design. The mean difference is significant to a 95 % confidence level (t-Test) for the year 2000. Frankfurt has a very strong real estate market, so that the significance is getting lower in the years 2002, 2006 and 2008.

Also significant results can be shown from Berlin in Germany and Malmoe in Sweden. The data analysis for Berlin revealed that the extent of the sample land values is unambiguously dependent on the distance of the statistical blocks to their next neighbourhood open space. Comparing the means of the different categories, it can be shown that land prices decrease with a growing distance to this open space category (Figure 8). The mean value of the blocks with a distance less than 400 m is about 170 €/m² higher than the mean land value of blocks with a distance more than 400 m. The mean difference is significant to a 99.9 % confidence level (t-Test).

Fig. 8: Effect of the Distance to Neighbourhood Open Spaces on the Mean Land Value in Berlin (t-test)

Also the data analysis revealed that locations with a high density of listed gardens have significantly higher land prices than those with a lower density (Figure 9). If there are at least two listed gardens within the radius examined, then the plots are on average about 370 €/m² more expensive than those without such a feature. The variable ”Number of listed gardens within a radius of 500 m” has an effect of 18.9 %, i. e. the variation of land prices is nearly 20 % dependent of this factor.

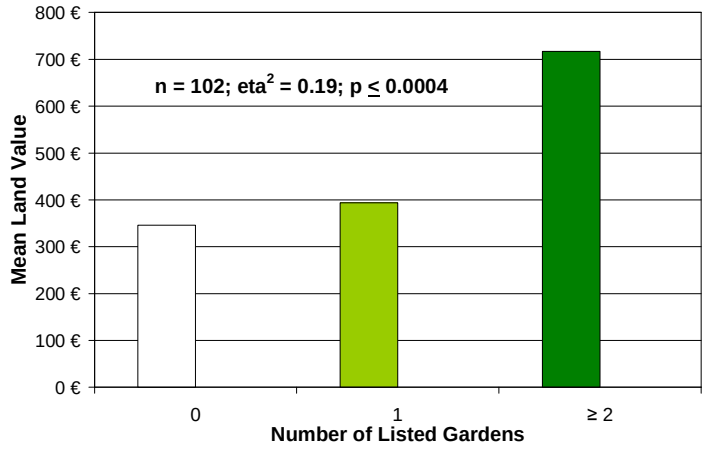

Fig. 9: Effect of Listed Gardens within a Radius of 500 m on the Mean Land Value in Berlin (ANOVA)

Figure 10 points out the effect of local city parks and missing of local city parks respectively, on the land value on residential quarters in Malmoe (Sweden). The data is valid for mixed development zones in the inner city, which are characterized by enclosed block development. Missing of local parks is linked with a significant negative impact on the mean land values in both cases, apartment houses and offices. The absence

of local parks explains 13 % or 22 % respectively, of the total variation of land values in mixed development zones in the inner city of Malmoe. The effect is significant to a 99.9 % confidence level.

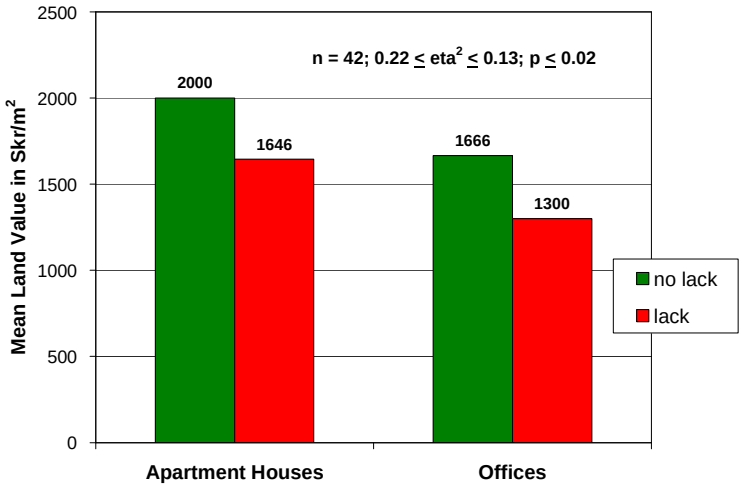

Fig. 10: Effect of Missing of Local City Parks on the Mean Land Value in Residential Quarters in Malmoe/Sweden (ANOVA)

6 CONCLUSION

The results of the described examples and the conducted studies present the importance of green spaces in the urban structure, their meaning for ecological and social quality in the city and their importance for the economic value of properties. The paper gives an overview on the originating of brownfields – urban waste land and the chances and opportunities to use them for improvement of urban environment.

Two specific aspects were regarded more detailed, the importance of the integration of the inhabitants in the reuse process and the meaning of green spaces for the land value. By presenting examples of different German cities, the authors specify these aspects and point out the importance to include them in the urban planning process. As shown through statistical analysis the land value and the prices on the real estate market are dependent on the existence and quality of urban green spaces. The inhabitants recognize very well the quality of their urban environment. The combination of social activities and economic factors occupies an important role in the sustainable urban planning process. The presented way to consider them can be an advice for other cities.

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