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# Economic Valuation of Urban Open Spaces and their Contribution to Life Quality in European Cities

## Background

In many European countries a contradictory debate on 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 means to counter 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).

On the other hand, however, recently 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 to a great extent lose their positive effects on the environment in terms of ecosystem services, 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).

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 what economic benefits actually result from them.

## Methodology and Data

Because the provision of green areas is a public good, their appreciation is difficult to measure as market prices are not available. That is why special methods must

be employed to obtain benefit information. Basically there are two methodological approaches for estimating economic values of non market goods: stated preferences and revealed preferences. The former one finds out individual preferences by asking people directly regarding their willingness to pay for certain goods (contingent valuation). The latter approach is to analyse the relationship between private market goods and public goods and to conclude the value of the public good from the price of the private good. That means the benefits resulting from public goods are reflected in private ones.

This method is basically adopted within the research projects presented here: 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).

The aim of our 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.

Our central hypothesis is:

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

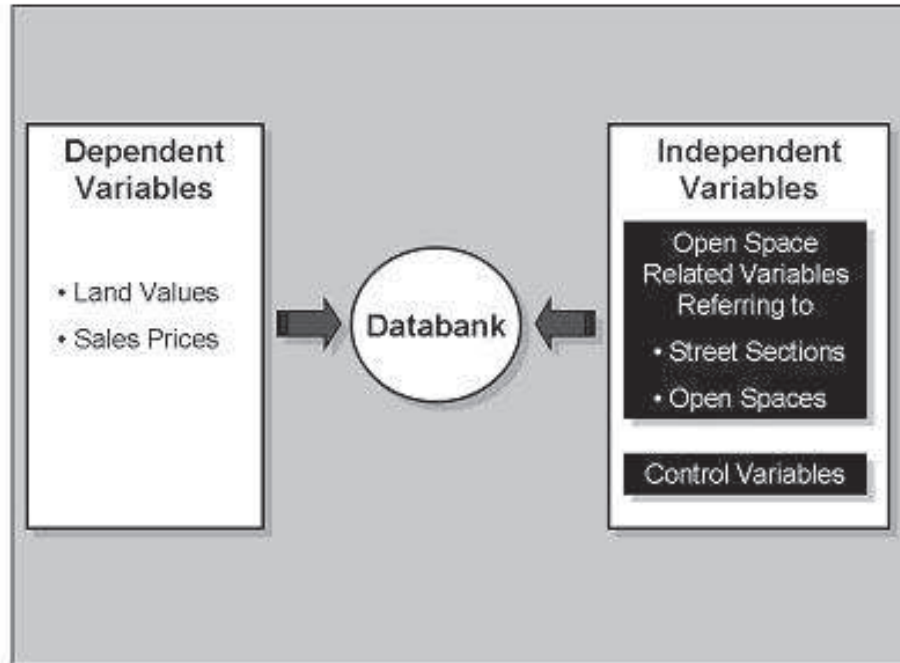
Generally land values are characterized by a large variation according to certain location factors. Due to the experience of practitioners in the field of real estate assessment, the factor 'centrality' seems to explain the greatest part of the total variation of land values. Despite of that empirical studies reveal that a central location does not explain more than 50 or 70% of the total variation of land values. Hence, there is every reason to believe that location factors are not limited on the aspect of less or more central locations. It makes sense to prove other soft location factors, for instance open space related criteria.

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.

The following list gives some examples of open space related criteria:

- 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.

Figure 1  
Data Acquisition



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 (significance level ( $\alpha=0,05$ )) 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.

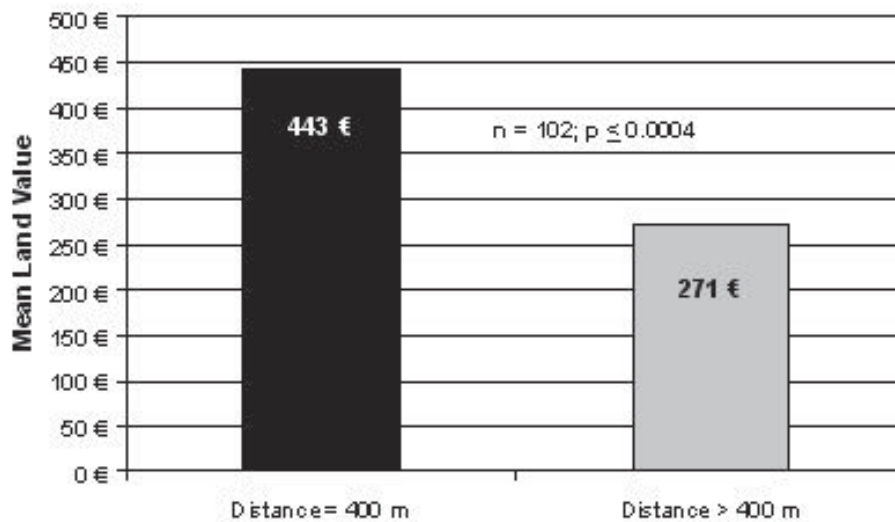
The ANOVA (analysis of variance) was the main tool for the statistical analysis. It is a method which helps to detect the effect of certain variables on one or several other variables (BACKHAUS et al. 1996). Its purpose within the survey was to examine if there is a statistically significant effect of 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.

There is data available at University of Dortmund from about 20 European cities, mostly German cities (Luther 2000; Gruehn 2004, Gruehn 2006). This paper focuses on data from Berlin (Germany) and Malmoe (Sweden).

Figure 2

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



## Results

In the following the most striking results will be summarised. The analysis of the data collected makes it plain that many of the criteria examined actually have a positive effect upon land value. That means, a higher quantity and/or a better quality of open spaces (e.g. small distance to parks or the existence of street trees etc.) results in higher land prices.

The data analysis 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 2). The mean value of the blocks with a distance less than 400 m is about 170#/m# higher than the mean land value of blocks with a distance more than 400 m (Figure 2). The mean difference is significant to a 99,9 % confidence level (t-Test).

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 3). If there are at least two listed gardens within the radius examined, then the plots are on average about 370#/m# more expensive than those without such a feature. The variable "Number of listed gardens within a radius of 500m" has an effect of 18,9%, i.e. the variation of land prices is nearly 20% dependent of this factor.

Figure 4 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

Figure 3  
Effect of Listed Gardens within a Radius of 500 m on the Mean Land Value in Berlin (ANOVA)

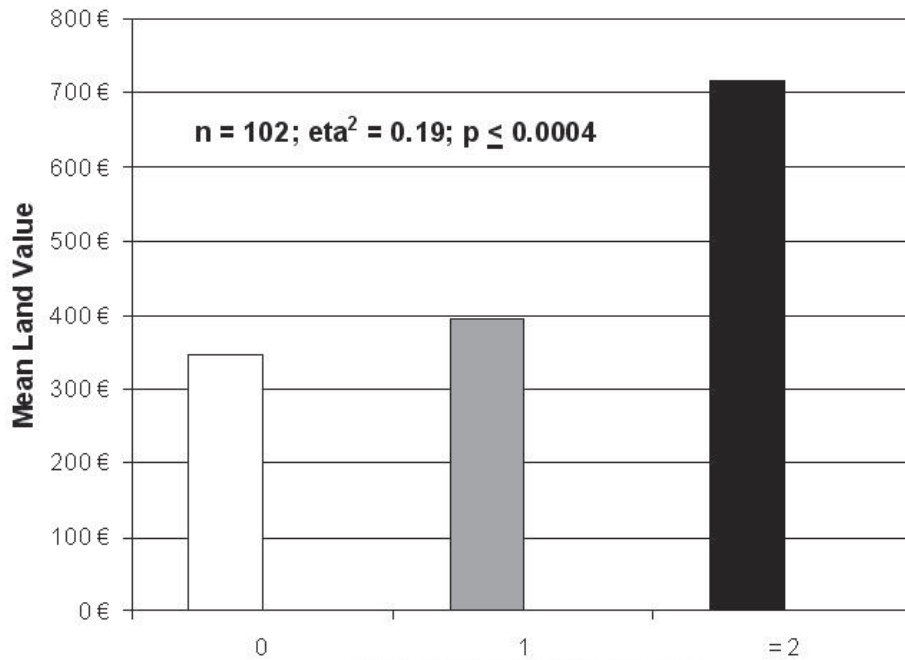
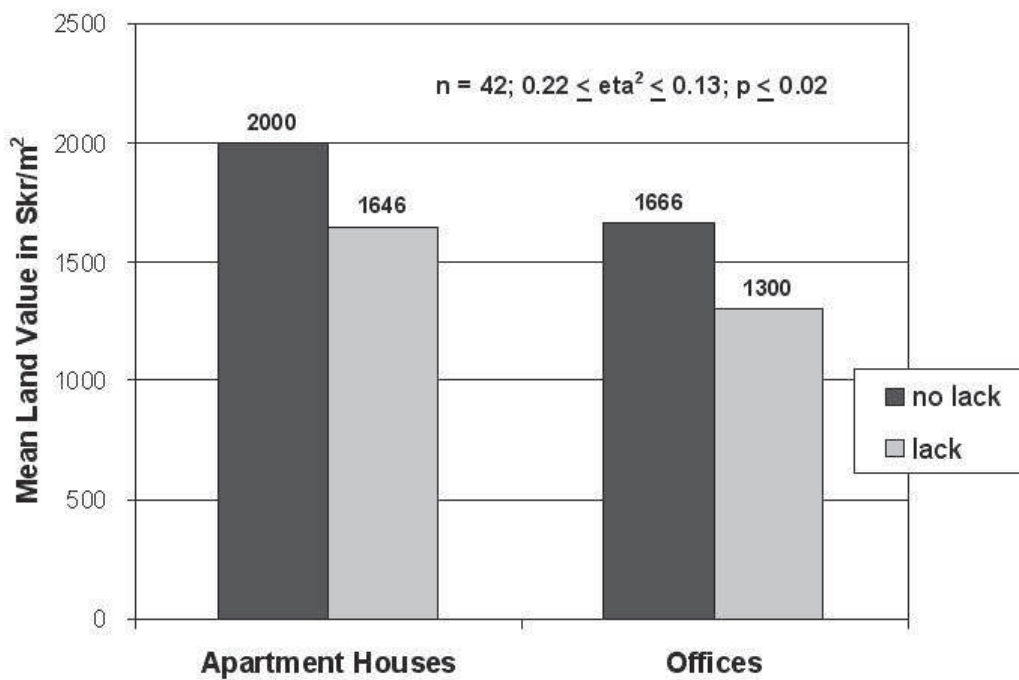


Figure 4  
Effect of Missing of Local City Parks on the Mean Land Value in Residential Quarters in Malmoe/Sweden (ANOVA)



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.

## Conclusions

Regarding the initially formulated question it can be stated that a variety of criteria concerning the provision of open spaces have a clear and significant value-increasing effect upon land prices in Berlin and Malmoe. More expensive prices of private plots within a "green environment" are an expression of greater appreciation of residents for their surroundings. This discovery ought to be recognised by politicians when setting priorities in financial- and tax decisions.

Against the background of the difficult financial situation of communities mentioned initially and in the light of the results found here, local authorities might consider if and how they might enlist property owners to contribute to the future funding of the open space system whether for the creation of new parks or for their maintenance. The amount to be contributed should depend on the benefit the property owners gain from the appealing quality of urban open spaces. This notion could be put into practice by modifying the council tax and business rates respectively. This procedure might represent one possible "innovative approach" of financing open spaces and might, therefore, be of value to the Urban Green Spaces Taskforce mentioned earlier. Finally, the results could also deliver inputs for the discussion on shrinking cities. Beside other factors development and maintenance of high quality open spaces could be a means to raise life quality and image of all those cities suffering under population decrease and not being able to compete with 'life quality champions' like Vienna, Zurich or Geneva.

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## Summary

### EKONOMICZNA WYCENA OTWARTYCH PRZESTRZENI MIEJSKICH I ICH UDZIAŁ W JAKOŚCI ŻYCIA MIESZKAŃCÓW MIAST EUROPEJSKICH

Jeśli chodzi o pierwotnie sformułowane pytanie można stwierdzić, że różne kryteria dotyczące zapewnienia otwartych przestrzeni mogą mieć wyraźne i znaczące zwiększenie wartości wpływu na ceny gruntów w Berlinie i Malmoe. Droższe ceny działek prywatnych w ramach „zielonych środowisk” są wyrazem większego uznania dla ich mieszkańców. To odkrycie powinno być rozpoznawane przez polityków przy ustalaniu priorytetów w decyzjach finansowych i podatkowych. Władze lokalne powinny rozważyć, czy i w jaki sposób mogą pozyskiwać właścicieli nieruchomości w celu przyczynienia się do przyszłego finansowania na otwartej przestrzeni, czy systemu do tworzenia nowych parków lub na ich utrzymanie. Kwota powinna zależeć od zysków jakie właściciele nieruchomości uzyskują z atrakcyjnych terenów otwartych. Mogłoby to zostać wprowadzone poprzez modyfikacje stawek podatkowych. Procedura ta może stanowić jedno z możliwych

„innovacyjnych podejść” finansowania otwartych przestrzeni. Wyniki te mogą także stanowić dane do dyskusji na temat malejącej liczby miast. Poza tymi czynnikami rozwoju i utrzymania wysokiej jakości otwartych przestrzeni mogą być one środkiem do podniesienia jakości życia i wizerunku wszystkich tych miast, które „cierpią” na zmniejszającą się liczbę ludności i nie są w stanie konkurować z „mistrzami jakości życia”, takimi jak Wiedeń, Zurych czy Genewa.