

## **DO NEIGHBOURHOOD PARKS AND OPEN SPACE INFLUENCE THE VALUES OF SURROUNDING HOUSING PRICES? A RESEARCH REVIEW AND SYNTHESIS**

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### **ABSTRACT**

*An attractive environment is likely to influence house prices. Houses with an attractive environment will have an added value over similar less favorably attractive ones. The presence of trees and forests can make the environment a more pleasant place to live, work, and spend leisure time and thus makes substantial improvements in individual well-being, including opportunities for leisure out in the yard or in the neighborhood, reduced heating and cooling costs, privacy, and the lack of a need to construct fences or screens. While a number of studies have implicitly examined the effects of open space on home values, few have done so explicitly. Furthermore, relevant studies have had a narrow geographic focus. Most of the previous studies have relied on narrow definitions of open space and have lacked, consequently, a generality by which to draw stronger conclusions. Based on the extensive review carried out, it was discovered that, parks appear to have a positive impact on property values. This suggests that communities that plan for parks and recreational open space will have higher property values and generate greater property tax revenues for local government than those areas lacking such amenities. Future research should devote to developing a comprehensive model with more factors and conducting more empirical studies from a large number of actual transactions. Computing the total benefits from preserving open spaces, and the distribution of these benefits across residents, remain important areas for future research.*

***Keywords:*** *Housing Price, Neighbourhood, Open Space, Parks and Property Values.*

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### **INTRODUCTION**

Housing is a multi-attribute commodity, accessibility to work, transport and amenities, and its neighboring properties are routinely considered by housing buyers. The previous studies consistently demonstrated that, urban green space had a 5%-20% premium on neighboring property values (Zhang, Xie and Zhang, 2012).

Open spaces such as public parks, natural areas and golf courses may have an influence on the sale price of homes in close proximity to those resources. The net effect of open-space proximity is theoretically uncertain because the positive externalities associated with

proximity such as a view or nearby recreation facility might be outweighed by negative externalities, for example, traffic congestion and noise (Bolitzer & Netusil, 2000).

The notion that parks have a positive impact on proximate property value was recognized in the debates surrounding the pioneering of large urban parks in England in the first half of the nineteenth century, and subsequently in the spread of this movement to the US in the latter half of that century. The empirical basis for these early assertions was rudimentary and naïve (Crompton, 2005). The premise that parks have a positive impact on proximate property values derives from the observation that people frequently are willing to pay a larger amount of money for a home located close to a park, than they are for a comparable home (Crompton, 2005).

One way to quantify the benefit of protecting open space in an urban environment is to determine the impact of open space on housing prices. Parks can provide recreational opportunities and attractive views for nearby residents. They might also lead to increased traffic and noise (Espey and Owusu-Edusei, 2001).

In the words of Asmawi, Noor, Manzahari & Abdullah (2014), there is an increasing awareness that urban environmental quality is highly favoured by the existence of accessible, protected and well maintained green spaces within cities, for instance, parks, green provisions, fields and others. It is found that the function of urban green areas is optimized in a reasonable time by acceptable distance as people are not willing to spend more time on reaching a green area closest to them. A study completed by the parks and public works commission found that there was „overwhelming evidence that well-designed and fastidiously integrated parks and public works projects maintain and enhance the long-term tax base of neighborhoods while improving their quality of life. It additionally found that those areas sustaining the best property values tended to be adjacent to well-connected parks with a range of community resources.

Morancho (2003) suggested that green space supported with other amenities and infrastructure could influence the house price. For instance, a study conducted in the Netherlands by Luttik (2000) discovered that the provision of open space could increase the house price within its vicinity between the ranges of 6-12%. This is supported by Crompton (2005) in which he said that the property value could increase up to 20% if the property fronting a passive park (Asmawi, Noor, Manzahari & Abdullah, 2014).

While a number of studies have implicitly examined the effects of open space on home values, few have done so explicitly. Furthermore, relevant studies have had a narrow geographic focus, have relied on narrow definitions of open space, and have lacked, consequently, a generality by which to draw stronger conclusions. For example, Do and Grudnitski (1995) study the effects of golf courses on residential home property values “entirely within [one] ZIP code. Weicher and Zerbst (1973) examine the externalities of three neighborhood parks on adjacent property values. Finally, Correll et al. (1978) study

the effects of three urban greenbelts on surrounding residential properties (Anderson L M and H K Cordell. 1988).

### **THEORETICAL MOTIVATIONS AND UNDERPINNINGS**

The multiple benefits of open space fall into two categories. The “passive use” benefits of open space include, for instance, the pleasure derived from knowing that open land is being conserved (Brefle, et al., 1998). The “active use” benefits include recreational use of the area, as well as scenic views, privacy, and a barrier to adjacent development provided by the area. Based on these definitions, passive use benefits are non-rivalrous. That is, the passive use benefit one individual derives from open space preservation does not preclude another individual from enjoying the same benefit. By contrast, active use benefits are rivalrous. That is, when one individual chooses to reside near or adjacent to open space, he or she necessarily precludes someone else from enjoying the same benefits (convenient recreational opportunities, scenic views, privacy, and protection from adjacent development) derived from living near that particular space (Anderson, 2000).

Because the active use benefits of open space are rivalrous, we expect that prospective homebuyers will bid up the prices of those homes near or adjacent to open space in order to gain these benefits. Therefore, the rivalrous, active use benefits of open space will be reflected in residential home values, while the non-rivalrous, passive use benefits will not. Economic theory tells us, then, that the value of adjacent and non-adjacent sites will differ by the capitalized value of the active use externality generated by adjacency to open space (Weicher and Zerst, 1973 as quoted by Anderson, 2000).

A common and well-established method for measuring the value of a residential amenity, such as adjacency to open space, is hedonic price regression. In hedonic price regression highly differentiable goods (like cars or homes, for instance) can be viewed as a bundle of characteristics,  $\{Z_1, Z_2, Z_3...Z_n\}$ , where the total price is a function of these characteristics,  $P(Z) = P(Z_1, Z_2, Z_3...Z_n)$ . Econometrically, we can estimate the prices of these individual characteristics using regression analysis (Rosen, 1974). In the context of the housing market, then, each coefficient estimate represents the marginal contribution of the corresponding housing characteristic to overall home value (Anderson, 2000).

Specification of the full housing price model varies from study to study. In general, however, residential home value can be seen as a function of housing structure characteristics, neighborhood characteristics, accessibility factors, and amenities. Structural characteristics often include home size, number of bedrooms and bathrooms, lot size, construction quality and other characteristics. Neighborhood characteristics include ethnic and racial composition, income levels, school quality, housing density, and other variables. Accessibility variables include distance to employment, shopping, recreational and entertainment opportunities. 3 Finally, amenity characteristics vary greatly from study to

study, but could include such variables as adjacency to a body of water, adjacency to a toxic waste dump, or degree of local air quality as a matter of fact (Anderson, 2000).

Previous studies have used such methods to examine the effects of open space directly or to control for the effects of open space while examining some other variable. Their formulations of the open space variable vary. Do and Grudnitski (1995) use a dummy variable to measure the effects of adjacency to a golf course on residential home values. Weicher and Zerbst (1973) use a dummy variable to measure the effects of adjacency to city parks on home values. Palmquist (1980) controls for proximity to open space with straight line distance to the nearest park. Finally, Correll, et al. (1978), in their study of the effects of urban greenbelts, employ walking distance to the greenbelt as their variable of study (Anderson, 2000).

In most studies, house price data and structural characteristics data are obtained via local government assessors' records and/or multiple listing services. Because sale price data (obtained from assessors) represent actual market transactions, they are generally preferred over listing price data (obtained from multiple listing services). Neighborhood characteristics data are obtained from a variety of sources, including U.S. Census tract data and various other government sources. Finally, amenity characteristics data are collected on site or obtained from various other sources (Anderson, 2000).

In general, these studies have implicitly shown that the externalities generated by open space have a positive impact on residential home values. Do and Grudnitski found that adjacency to a golf course increases residential home value by approximately 7.6%. Weicher and Zerbst find that adjacency to neighborhood parks may increase home values by as much as 23%. 4 Finally, Correll et al. (1978) find that property values decrease by approximately 8.5% per 1000 feet in walking distance from the urban greenbelt. 5 These empirical results support the hypothesis that adjacency to open space will increase residential home property values (Anderson, 2000).

## **ECONOMIC VALUE OF OPEN SPACE, URBAN PARKS AND GREENWAYS**

### **3.1 Open Space**

Land near open spaces often has a higher value than comparable land in other places. Open spaces provide accessible recreation and proximity to natural beauty. These features are reflected in the increased value of nearby properties. For example, a study of homes near the extensive network of greenbelts in Boulder, Colorado showed that housing prices next to open space tracts are 32% higher than those located 3,200 feet away. The study of Boulder greenways showed that an open space in one neighborhood added \$5.4 million to the value of the neighborhood, translating into \$500,000. According to a review of studies that estimate the effect of open space and parks on property values, properties adjoining a park or open space are in the range of 20% more valuable than similar properties without

open space. Open spaces that are especially attractive yield greater value increases (Madsen, Algosos and Ouzts, 2004).

In the words of Fausold and Lillieholm (1996), while much has been written about the economic value of the environment in general and of open space in particular, the literature is segregated by discipline or methodology. It is therefore difficult to comprehensively assess the economic value of open space. It is even more difficult to apply what is known in a public policy context. Open space often plays an important role in the provision of "public goods" and "common property resources." Public goods have two characteristics. First, they are non-excludable, meaning that once they are produced, it is impossible or very costly to exclude anyone from use.

Second, public goods are non-consumptive, meaning that one person's enjoyment of the good does not diminish its availability for others (Fausold and Lillieholm, 1996). Examples of public goods produced by open space include clean water, clean air, and biological diversity (Tietenberg 1996). Other public goods more directly associated with open space protection efforts include scenic vistas, the community character embodied in traditional working landscapes, solitude or simply the lack of human congestion and occupation, and viewing the many forms of wildlife that typically depend in part on habitat provided by open space (Fausold and Lillieholm, 1996).

Fausold and Lillieholm (1996) further opined that open space can also produce common property resources, that is, resources that are owned in common, rather than privately, by some defined group of co-owners. For example, privately-owned open space may serve a vital role in the production of common property resources such as fish and wildlife. In the case of wildlife, open space produces both public goods (e.g., bird and animal watching) and consumptive resources (e.g., hunting and fishing).

### **Urban Parks**

In the words of Nicholls (2004), though traditional urban parks have historically attracted the most attention in terms of their property value impacts (Frederick Law Olmsted was one of the earliest proponents of the proximate principle, which he used as economic justification for park development including that of New York's Central Park in the late 19th century), recent studies remain relatively uncommon. In Portland (Bolitzer & Netusil, 2000), 193 public parks ranging in size from 0.2 to 567.8 acres were, as a group, found to have a significant positive impact on the value of properties within a straight line distance of 1,500 feet (Nicholls, 2004).

Between one and three percent of the value of such properties could be attributed to park proximity. Further analysis of 115 of these urban parks (ranging in size from 0.4 to 195.7 acres) found that the greatest premiums (of 2 to 3 percent of value) occurred for homes within 800 feet of a park; Beyond 800 feet, there was no significant prop

erty value impact. Park size was also found to be significant, the largest premiums being indicated for parks of 148 acres (Lutzenhiser and Netusil, 2001). In Dallas (Miller, 2001), homes facing one of 14 parks were found to be worth 22 percent more than homes more than one half mile from such an amenity. The Dallas study further suggested that approximately 85 percent of an urban park's positive property value impact occurs within 800 feet of its edge (Nicholls, 2004).

In Austin (Nicholls, 2002), impacts of parks appeared more mixed. In one instance, no significant relationship, positive or negative, was found between property value and distance to a park school combination. In the second instance, the relationship varied from no impact to a \$10 decline in value per foot from a park or other outdoor recreation area (depending on the variety of other property value influences also considered). In both cases, however, the surrounding neighborhoods had easy access to the substantial greenway network (described below) in the area, which might have reduced the impact of these individual parks (Nicholls, 2004).

### **Greenways**

While many studies exist of homeowners' perceptions of the impact of greenway proximity on their home values, many fewer scientific calculations of the actual price premiums exist. In Indianapolis (Lindsey et al, 2003), researchers examined the impacts of location within a one-half mile straightline distance of 14 greenway corridors on sales prices. They differentiated between three broad categories of these amenities: the Monon Trail, the most heavily used such facility in the city; six other publicly accessible multi-use trails; and seven "conservation corridors" for the most privately owned land which, though designated greenway, does not necessarily provide public access and is not regulated more heavily than any other areas (Nicholls, 2004).

Analysis showed that location within one-half mile had a significant, positive effect in the case of both the Monon Trail and the conservation corridors (accounting for nearly 15 percent of average sales value in the former location and 2 percent in the latter), but that properties within this distance of the other six public greenways did not experience any significant price premium. When aggregated across all properties within one-half mile, the additional, taxable property value generated by the eight greenbelts equaled \$166.5 million (\$120.4 million for the Monon Trail and \$46.1 million for the seven conservation corridors) (Nicholls, 2004).

In Austin (Nicholls, 2002), three separate neighborhoods adjoining the Barton Creek Greenbelt were examined. In two of these neighborhoods, statistically significant increases in value occurred for properties directly adjacent to the amenity, with greenbelt adjacency representing between 6 percent and 12 percent of the value of all adjacent homes (Nicholls, 2004).

Based on these calculations, the total increase in property value attributable to greenbelt adjacency in these two neighborhoods alone was estimated at \$13.64 million, again representing a sizeable addition to the value of property on which taxes can be levied in the city (Nicholls, 2004). In the third Austin neighborhood, however, adjacency to the greenbelt appeared to have no impact on property values. Consideration of the nature of the greenbelt might explain this finding. In the first two areas, the greenbelt consists of gently undulating topography dominated by mature oak trees and open grassy areas, a visually attractive amenity offering obvious recreational opportunities. In the third area, however, the landscape is in many places too steep to navigate and covered by dense scrub vegetation, rendering it less appealing from both a visual and an activity perspective. In such cases, therefore, green space adjacency may have little, if any, positive impact on property price (Nicholls, 2004).

### **HEDONIC PRICE MODEL**

The real estate market consistently demonstrates that many people are willing to pay a larger amount for property located close to parks and open space areas than for a home that does not offer this amenity (Crompton, 2004).

The price of a house reflects the value of a bundle of attributes including structural characteristics, neighborhood characteristics, and environmental characteristics. The hedonic housing price technique can be used to model the price of a house as a function of these various characteristics as follows: where  $P$ , is the price of a given house,  $S$ , is a vector of structural characteristics.  $N$ , is a vector of neighborhood characteristics, and  $E$ , is a vector of environmental characteristics. The first derivative of  $P$  with respect to any one variable reflects the marginal value of that characteristic. For example, if an environmental variable that measures proximity to a park in miles is included, the price model would show the value of being one mile closer to a park (Espey and Owusu-Edusei, 2001).

The hedonic pricing technique (Freeman, 1993) views the price of a home as reflecting its structural, environmental and neighborhood attributes. Invoking several assumptions about the housing market, including the requirement that the housing market is in equilibrium and the study area represents one market for housing services, the marginal value for a small change in an attribute can be estimated from the hedonic price function (Bolitzer & Netusil, 2000).

A number of studies use hedonic analysis to estimate the amenity value of particular types of open space, such as golf courses (Do and Grudnitski 1995), neighborhood parks (Weicher and Zerbst 1973, Espey and OwusuEdusei 2001), greenbelts (Correll et al. 1978, Lee and Linneman 1998), forest areas (Tyrvaainen and Miettinen 2000), and wetlands (Doss and Taff 1996, Mahan et al. 2000, Earnhart 2001). Other studies use alternative methods: Schultz and King (2001) use aggregate census data to estimate the effects of open space on

average home values; Breffle et al. (1998) employ survey methods to estimate the willingness to pay to preserve undeveloped land; Riddel (2001) models the dynamic effects of an open space purchase on housing and labor markets. See McConnell and Walls (2005) for a comprehensive survey of open space valuation studies that use stated preference and property value methods (Anderson and West, 2003).

Several studies have investigated the impact of different open-space types on a home's sale price or assessed value. Weicher and Zerbst (1973) investigated parks in Columbus, OH and Correll, *et al.* (1978) studied greenbelts in Boulder, CO. Do and Grudnitski (1995) examine the effect of golf courses on residential house prices in San Diego, CA, concluding that golf courses have a positive and statistically significant effect on adjacent homes. Several studies (Lupi *et al.*, 1991; Doss and Taff, 1996) have looked at the effect of different types of wetlands on a home's value; one recent study investigated this question for homes in Portland, OR (Mahan, 1997). The sale price of a home can be represented by Equation (1), where  $P_i$  is the price of the  $i$ th home,  $S_i$  is a vector of structural characteristics,  $Q_i$  is a vector of environmental characteristics and  $N_i$  represents a vector of neighborhood characteristics (Bolitzer & Netusil, 2000).

## **PREVIOUS EMPIRICAL STUDIES**

### **Positive Effect of Parks on Property Values**

Open spaces, such as public parks, natural areas and golf courses provide numerous amenities for nearby residents including recreation opportunities and attractive views. Residents who live in close proximity to these resources, however, may also experience disamenities such as traffic congestion and noise (Bolitzer & Netusil, 2000).

Urban parks and open spaces not only provide a pleasant and natural environment but also improve the quality of life in urban areas and undertake essential environmental functions (Bolund and Hunhammer 1999; Jensen *et al.* 2000; Li and Wang 2003; Chen and Jim 2008; Zhang *et al.* 2011). Additionally, abundance of literatures reported that the appearance of the park had great influences on neighboring residential property values (for example Espey and OwusuEdusei 2001; GLA 2003; Jim and Chen 2010). However, there have been few studies undertaken in some part of the world like Asia, Africa and the likes (Zhang, Xie and Zhang, 2012).

In the word of Zhang, Xie and Zhang (2012), for now, almost 85% of parks are free to the public in Beijing, and the local government takes the responsibility of creation and maintenance of urban green spaces. Although the external effects of parks on housing values create extra profits for property owners, few people understand the relationship between urban green space and property value, and therefore the role of urban green spaces is often ignored or underestimated. There is a need for further research to be undertaken with the economic effect of public green spaces on property values in Beijing (Zhang, Xie and Zhang, 2012).

However, the effect of urban open space and parks on residential property values is very difficult to quantify, by the complicated relationship between house price and environmental factors (Hui *et al.* 2007). The environmental factors are what people would consider before buying a house, and such elements are reflected in the property prices, for instance, noise, air quality, and the accessibility of green areas (Freeman 1979; Tyrvaainen 1997). While previous studies presented strong evidence that parks and open space had a substantial positive impact on proximate property values (for example Netusil *et al.* 2000; Lutzenhiser and Netusil 2001; Irwin 2002; Dunse *et al.* 2007), there was some findings not supportive of the proximate principle (Crompton 2001, 2005 as quoted by Zhang, Xie and Zhang, 2012)).

A useful analogy is with a well-groomed front lawn which is likely to increase the value of a home, but if it is overgrown with weeds then the property value is likely to be diminished (Fox 1990). Since parks and open spaces are homogeneous, there are qualitative differences among them that are likely to result in different impacts on proximate property values (Crompton 2001). Therefore, these findings emerging from previous studies of park and open space in different areas may not be generalizable to Beijing because of differences in context, scale or mission (Zhang, Xie and Zhang, 2012).

A number of empirical studies in Euro-American region consistently demonstrate that, parks and open space have a positive impact on property values. However, this effect has not been investigated in Africa (Zhang, Xie, Xia and Zhang, 2012).

A number of studies have used hedonic models to estimate the effect of different open space types on a house's sales price or assessed value. Weicher and Zerbst (1973) studied parks in Columbus, Ohio. Correll, Lillydahl and Singell (1978) studied greenbelts in Boulder, Colorado. Frech and Laffert (1984) estimated that actions by California Coastal Commission to preserve open space increased home prices by between \$990 and \$5000. Do and Grudnitski (1995) focused on proximity to golf courses and found the impact on property values did not extend beyond about 1000 feet (Espey and Owusu-Edusei, 2001).

Doss and Taff (1993) and Mahan, Polasky, and Adams (2000) all estimated a positive value of proximity to different types of wetlands. More recent studies include an analysis of trees, water and open space in the Netherlands (Luttik 2000) and an analysis of open space and land-use patterns in urban watersheds (Acharya and Bennett 2001). The only recent research focusing on urban parks is Bolitzer and Netusil (2000) and Lutzenheiser and Netusil (2001). Both examined the impact of proximity to various types of open space, parks included on property values in Portland, Oregon (Espey and Owusu-Edusei, 2001).

### **Potentially Negative Influences of Parks on Property Values**

Some parks and open spaces are more desirable than others as places to live nearby. For example, there is convincing evidence that large flat open spaces which are used primarily for athletic activities and large social gatherings, are much less preferred than natural areas

containing woods, hills, ponds or marsh.<sup>13</sup> Because demographics, lifestyles and interests change, some parks and open spaces which were valuable assets are now of the wrong kind in the wrong place at the wrong time. Their value was in another era and no longer fits into the lifestyles and preferences of their proximate populations. In such cases, it is unlikely they will add much if any, proximate value (Crompton, 2004).

In the words of Crompton (2004), there are contexts in which parks exert a negative impact on property values. A useful analogy is with a well-groomed front lawn which is likely to increase the value of a home, but if it is overgrown with weeds and littered with trash then the property value is likely to be diminished. Adverse impacts may result from nuisances such as:

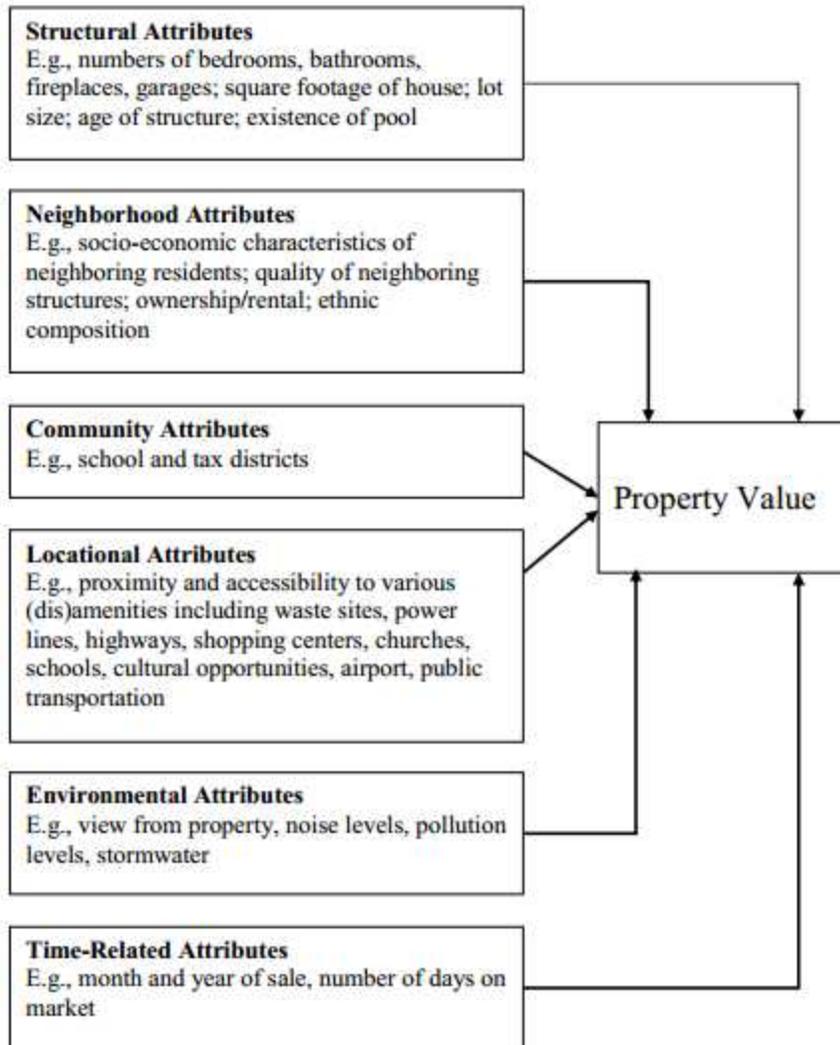
- Congestion
- street parking
- litter and vandalism that may occur due to an influx of people coming into a neighborhood to use a park
- noise and ball field lights intruding into adjacent residences
- poorly maintained, or blighted derelict facilities
- groups congregating in a park engaging in morally offensive activities

Some evidence on the negative impact of parks was offered by Home track, an English property database company that investigated the impact of various features on the price of houses. The nature of their data base and the statistical processes used were proprietary, but they reported that living next to a derelict piece of land reduced the value of property in their sample by £20,280 (15%) on average (Crompton, 2004).

Conclusions emerge from the discussion in this section. First, irrespective of the type of park or the amenities offered, negative impacts will emerge if a park is not well designed, landscaped and maintained. In 1998, the deputy director of the Parks Council, a non-profit advocacy organization in New York City reinforced the point when she observed:

We have many poor neighborhoods in the South Bronx near parks. But the parks are not helping them. If you put money into a park, chances are that you will improve one portion of the neighborhood. But if the park does not have proper security and maintenance, it becomes a liability for nearby homes (Crompton, 2004).

The realization that property value at a given point in time results from its relationship to multiple attributes within each of these six broad groups of influences, eroded confidence in the findings of the simplistic studies which had been used to verify the proximate principle. Clearly, more sophisticated analytical techniques were needed. The figure below shows the main indicators of residential property value.



**Figure 1: Factors influencing Property Value**

**Source: Crompton (2004)**

Based on the above figure, it could be rightly said that open space and parks are categorized under neighbourhood attributes. They significantly influence the values of housing price within a neighbourhood.

### **Early Statistical and Empirical Studies**

A 1972 study in Philadelphia focused on seven sites, at three parks, three schools and one school-park combination (Lyon, 1972). During the sample years of the study, 1, 725 property sales were recorded in the neighbourhoods around the sites. As a percentage of total housing units in each area, the sample size ranged from 12% to 25.5%. In all seven neighbourhoods, regression analyses indicated that distance from the site had an impact on

property values, enabling the author to conclude, there appear to be a locational advantages to school and parks facilities and these advantages have been capitalized in the sale price of nearby property (Lyon, 1972). The Philadelphia study was one of the few to test for a “net effects” curve which postulates that while there is a positive impact on the value of properties abutting a park, it may be lower than the impact on properties a block or two away which are not subjected to any nuisance created by access and egress (Crompton, 2005).

Another Philadelphia study in 1974 analyzed the impact on sales price of 336 properties in the vicinity of Pennypack Park (Hammer, et. al., 1974). This 1, 294-acre stream-valley park is in northeast Philadelphia. It was surrounded by residential areas developed at a density of approximately ten dwelling units per acre. The area around the park was comprised of ‘unimaginative housing, heavy in scale with natural landscaping losing out to concrete and stone. Based on their subjective evaluation of the area, the researchers hypothesized that ‘the residents do not consider natural amenity to be very important’ so ‘public open space would be expected to have a relatively low effect on land values compared to other neighbourhoods’ (Crompton, 2005).

Despite the authors’ pessimistic prognosis, regression analysis indicated that the accounted for 33% of land value at 40 feet. This dropped to 9% at 1,000 feet and 4.2% at 2,500 feet which was the peripheral limit set for the study. From these data, the authors concluded that a net increase in real estate value of almost \$3.4 million (1974 values) was directly attributable to the park (Crompton, 2005).

The most frequently cited study in the literature of this era examined the effect of greenbelts on property values in three different areas of Boulder, Colorado (Correll et. al., 1978). A total of 1,382 acres of greenbelt had been purchased adjacent to residential developments in the 10 years prior to the 1978 study. The sample consisted of properties from each area that sold in a selected calendar year which were located within 3,200 feet of the greenbelt (n=82) (Crompton, 2005).

Variables in the regression model that were believed likely to influence the sales price of these single family homes were:

- a) walking distance in feet to the greenbelt;
- b) age of each house;
- c) number of rooms in each house;
- d) square footage of each house;
- e) lot size;
- f) distance to the city centre; and
- g) Distance to the nearest major shopping centre

The regression results showed that other things being equal, there was a \$4.20 decrease in the price of residential property for every foot if one moved away from the greenbelt. This suggested that if other variables were held constant, the average value of properties

adjacent to the greenbelt was 32% higher than those locate 3,200 walking feet away (Crompton, 2005).

One of the three neighbourhoods had been able to take much greater advantage of the open space amenity in its planning than the other two neighbourhoods. Therefore, the authors initiated further analyses on it. In this neighbourhood, price decreased \$10.20 for every foot when one moved away from the greenbelt (Crompton, 2005).

A study undertaken in Worcester, Massachusetts in the early 1980s examined the relationship between four parks and the values of all properties sold within a 4,000 foot radius of each park during the preceding five years (n=170) (More, et. al., 1982, 1988; Hagerty, et. al., 1982). The results showed that, on average, a house located 20 feet from a park sold for \$2,675 more than a house located 2,000 feet away. However, 80% of the aggregate increase in value was derived from properties located within 500 feet of the parks. Effects could not be traced beyond 2,000 feet from the parks. Using these data, it was estimated that the aggregate property value increase attributable to these parks was \$3.5 million (Crompton, 2005).

The impact of two parks on the values of proximate residential development in Dayton and in Columbus, Ohio, was reported in 1985 (Kimmel, 1985). The 170-acre Cox Arboretum in Dayton was a wooded open space containing specialized herb, ornamental and other plant gardens. Its impact on an adjacent fairly new sub-division of 300 properties was assessed. The 152-acre Whetstone Park in Columbus, contained ball fields, trails, natural areas and a 13-acre rose garden, and it was adjacent to an older residential area. In both cases, samples of approximately 100 residences were used in the study (Crompton, 2005).

The regression analyses indicated that for every additional foot of distance a property was located away from Cox Arboretum and Whetstone Park, the selling price decreased \$3.83 and \$4.87 respectively. The average distance of properties in the study areas were 814 feet and 973 feet from Cox Arboretum and Whetstone Park, respectively, and these properties yielded proximate premium of \$3,100 and \$4,700. Given the average selling prices of properties in the residential areas were \$58,800 and \$64,000 respectively, the park premium represented 5.1% in the Cox Arboretum subdivision and 7.3% at the Whetstone Park residential area. In neither case was an assessment made of how this average premium varied between properties immediately abutting the parks and those located (say) 2,000 feet away, which presumably were much less impacted by the parks (Crompton, 2005).

An empirical investigation in Salem Oregon in 1986 reported that open space in the form of greenbelt at the fringe of the urban area exerted an influence on urban land values that extended inward from the urban boundary about 5,000 feet (Nelson, 1986). The researcher concluded that urban land adjoining farmland zoned exclusively for agriculture was worth \$1,200 per acre more than similar land 1,000 feet away (Crompton, 2005).

Washington County, Wisconsin, is located 40 minutes northwest of Milwaukee and is growing rapidly. The impact of two parks in the county on property values was studied (Sielski, 2002). Jackson Park is a 25-acre park located in the Village of Germantown. The study used assessed values and measured the parks' impacts within half-mile (2,640 feet) variables. The results showed that properties within 200 feet increased by \$113.36 in assessed value for each foot a property was closer to the park (Crompton, 2005).

### **5.5 Recent Empirical Studies**

Open space may provide a number of benefits, including opportunities for recreation, fitness, and education. In a residential context, open space may also provide privacy, pleasing views, or simply the absence of negative externalities associated with development (Irwin and Bockstael 2001 and Irwin 2002). In a competitive housing market prospective homebuyers will bid up the prices of homes near open space in order to gain these benefits, and the externalities generated by proximity to open space will be capitalized into residential property values (Anderson and West, 2003).

Open space may also provide various ecological benefits, such as wildlife habitat or improved water quality that are not likely to be reflected in property values. A large and growing literature estimates the effects of open space on residential property values. Some recent studies measure the distance to nearby open areas and distinguish between specific land use types (Bolitzer and Netusil 2000, Lutzenhiser and Netusil 2001, Smith et al. 2002). In general these studies find that home value increases with proximity to open space and that the effect varies by type (Anderson and West, 2003).

Additionally, Bolitzer and Netusil (2000) and Lutzenhiser and Netusil (2001) find that home value increases with the size of nearby open areas. Other recent studies measure the total quantity of surrounding open space and distinguish broadly between protected open space, such as public parks and land under conservation easement, and developable open space, such as privately owned agricultural land (Irwin and Bockstael 2001, Irwin 2002, Geoghegan 2002, Geoghegan et al. 2003). This distinction is relevant since the effect of open space on home value reflects both current and expected future amenities (Anderson and West, 2003).

In general these studies find that preserved open space increases home value while developable open space has a lesser, insignificant, or negative effect on home value. Cheshire and Sheppard (1995) find that the quantity of publicly accessible open space surrounding a home has a larger positive effect on home value than inaccessible open space. Few hedonic studies consider the possibility that the effects of open space on property values vary spatially within a single housing market. Geoghegan et al. (1997) find that the amenity effect of open space first increases and then falls with distance to the CBD, while Acharya and Bennett (2001) find that the effect of surrounding land use patterns on home value depends on population density. Geoghegan et al. (2003) estimate separate hedonic functions for the three counties in their study area. They find that the effects of

open space on home value differ by county and speculate that these differences may be related to variation in county income levels and quantities of open space (Anderson and West, 2003).

Cheshire and Sheppard (1998) use implied marginal prices from their first stage hedonic equation to estimate demand for accessible and inaccessible open space. They find that demand for both types of open space increases with income. A number of studies in the local public goods literature also suggest that amenity values for open space may vary spatially. Several studies use government expenditure data to estimate voter demand for parks (Bergstrom and Goodman 1973, Borcharding and Deacon 1972, Pack and Pack 1978, Perkins 1977, Santerre 1985). These studies find that spending on parks is positively related to income (Anderson and West, 2003).

Additionally, Santerre (1985) finds that spending decreases with distance to the central business district (CBD), while Bergstrom and Goodman (1973) find evidence that spending increases with population density and age. Bates and Santerre (2001) use land use data to estimate voter demand for locally owned public open space. They find that the quantity of open space demanded increases with income. Interestingly, they find that privately owned open space, such as golf courses or preserved farmland, is not a good substitute for public open space. They do not estimate the effect of private lot sizes on Demand (Anderson and West, 2003).

### **MAJOR FINDINGS AND LESSON LEARNT FROM PREVIOUS STUDIES**

Zhang, Xie and Zhang's (2012) study summarized what the effects of public green spaces are on property values in Beijing, China. The findings are mostly consistent with previous studies in Euro-American region. Results show that proximity to a park has a statistically significant effect on the neighborhood property value, of which effect can reach 850–1604 m, and the price premiums vary from 0.5% to 14.1% by park location. Besides, this study provide an important step in quantifying the total benefits, and an interesting implication is that property tax revenues to local governments will increase due to the creation of certain types of open spaces (Zhang, Xie and Zhang, 2012).

By and large, the Zhang, Xie and Zhang's (2012) study presented a strong evidence that park has a statistically significant and positive impact on the prices of neighboring residential properties, and discussed the distribution of these benefits across regions. Besides, the current research can contribute to a better understanding of the role of urban green spaces in Beijing. However, the relationship between house price and location is more complicated (Zhang, Xie and Zhang, 2012).

All results in Zhang, Xie and Zhang's (2012) study to a large extent relate to the notion of property value of "location". And this notion is the key to understand the innate nature of property and the property value it commands. Such simple estimation may sometimes

generate biased results over or under-estimate the value of individual housing attributes as a matter of fact.

Results from Bolitzer and Netusil's (2000) analysis indicate that distance from a home to an open space and the type of open space can have a statistically significant effect on a home's sale price. Importantly, these estimates reflect a fraction of the benefit from preserving open spaces. Benefits that have a strong 'public good' element, for example, improvements in water quality resulting from open-space preservation, are unlikely to affect a home's sale price and are, therefore, not reflected in this study's results (Bolitzer & Netusil, 2000).

## **CONCLUSION**

In general, parks appear to have a positive impact on property values. This suggests that communities that plan for parks and recreational open space will have higher property values and generate greater property tax revenues for local government than those areas lacking such amenities. Better estimates of the impact of parks on home sales values could be valuable information to local parks and recreation departments attempting to justify and fund land acquisition in rapidly growing areas. Such information could also be useful to developers deciding whether or not to include parks or other open space in new subdivisions, or to land-use planners attempting to implement open space requirements for newly developed areas (Espey and Owusu-Edusei, 2001).

In the words of Anderson (2000), it appears that these results are in accord with theory and previous empirical work. The breadth of our geographic focus, however, lends a degree of generality to our estimate that previous studies have lacked. We can conclude, therefore, that adjacency to open space has positive externality effect of \$40,000 on single family, residential home property values within the Minneapolis suburban area. These results have several important implications. First, open space must be considered when attaching value to residential property. Second, as residential homeowners value open space, planners and developers have incentive to design future communities with this in mind. Finally, local and regional governments must factor in the tax revenue benefit of open space preservation (as realized through increased property values) when making fiscal decisions (Anderson, 2000).

Empirical evidence from Bolitzer and Netusil's (2000) study that the negative externalities associated with open space adjacency dominate the positive externalities is not found in the study area. Homes that are within one-half block of any type of open space are estimated, on average, to experience the largest positive effect on their sale price. This effect, however, is not statistically significant. Additional information on the specific amenities of the open spaces in the study area, for example, the existence of hiking trails, swimming pools, tennis courts, etc. would permit a more detailed investigation of this question.

## **8. FUTURE RESEARCH AVENUES**

Future extensions of other research will focus on demographics and comparison across various cities and towns to determine how demographic characteristics, city size, and proximity to other types of open space (e.g. farm land or state forests) affect valuation of neighborhood parks (Espey and Owusu-Edusei, 2001).

Hence, future research should devote to developing a comprehensive model with more factors and conducting more empirical studies from a large number of actual transactions in Beijing (Zhang, Xie and Zhang, 2012).

The results of Bolitzer and Netusil's (2000) study provide an important step in quantifying the total benefits from preserving open spaces in an urban environment. The reported estimates, however, reflect only the benefits captured by changes in the sales price of homes. Computing the total benefits from preserving open spaces, and the distribution of these benefits across residents, remain important areas for future research.

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