

## **Kane County Residential Value: The Influence of Open Space Amenities**

by

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### **Abstract**

The loss of open space has become an issue concerning all levels of government. In the Midwest (the focus of this study), the great majority of open space is in agricultural uses. However, because this land is owned for profit-making purposes, there is always the possibility farmland will be developed, taking open space amenities with it. Government may take two different actions to preserve open space. First, parks, forest preserves and other publicly accessible open space may be purchased. However, this is expensive and requires continued public spending for upkeep. The second strategy is keeping open space in private uses through such policies as zoning and purchase of development rights. The question is which approach is most reasonable, both in terms of money spent and amenities preserved. This paper explores the benefits from public and private open space by considering how much homeowners paid for access to open space in subdivisions located throughout Kane County, Illinois, a Chicago fringe county. We analyzed the sale prices of residences outside of municipalities during 1995 and 1996, focusing on land uses surrounding each house. This is made possible through the use of Geographic Information Systems datasets from 1991 in which a 1.5 mile buffer is created around each residence to assess the effect of surrounding land uses. Ordinary least squares regression findings support the assertion that different types of proximate land uses affect residential sale prices differently with increased amount of farmland adding to sale prices. Quite unexpectedly, publicly accessible open space diminished sale prices. This suggests policy makers need to consider a fuller range of open space options when making decisions that affect local land markets.

### **Introduction**

The environmental benefits of open space, as provided by parks, nature preserves, wetlands and farmland, have been embraced as a public good with value to users and non-users alike. Just knowing open space exists to serve these purposes and provide potential refuge from everyday life is appreciated by the public. This is due in great part to open space's ability to provide habitat for wildlife, mitigate air and water pollution, and prevent flooding.

Because the general public profits equally from environmental goods, open space benefits may be seen as a public good that the government should provide. However, because the benefits are greater to the individual who sees deer running through the fields, breathes fresh air and drinks clean water, open space can also be seen as a quasi-public good benefitting specific individuals more than others. As a result, attempts by specific individuals to benefit from the amenities open space offers lead many away from the cities and into the countryside contributing to conversion of open space and ultimately to suburban sprawl.

The loss of open space to suburban sprawl and attendant problems of flooding, congestion, and air and water pollution (Sierra Club, 1997) has become a public policy issue of great concern for national, state and local policy makers; however, it is not an issue easily dealt with. First, while in some parts of the United States open space land is publicly held and under government control, the great majority of open space, especially in the Midwest (the focus of this study) is privately owned and in agricultural uses. This land not only provides open space amenities but also produces food and fiber for the United States and much of the world. However, because this land is owned by individuals and corporations for profit-making purposes, there is always the possibility farmland will be developed, taking with it open space amenities. And as more agricultural land is converted, the impact of its loss will grow as will recognition by the public of the benefits it offers.

Second, in spite of the benefits offered by open space, whether publicly or privately owned, it is exceptionally difficult to measure and assess its monetary value. Land may be appreciated by the public due to its existence value, not only as a potential personal refuge, but also for use by future generations. However, individuals living near open space benefit directly from its presence. These benefits may be directly reflected in the sale price of their homes.

This paper explores the benefits from public and private open space using a hedonic pricing approach. To accomplish this we first review the literature concerning the influence of environmental amenities or disamenities on the price of houses. Next, we test determinants of residential sale prices focusing on different land uses surrounding parcels in Kane County Illinois subdivisions during 1995 and 1996. Kane County, a Chicago collar county, was chosen because it is in the path of sprawling development that is converting large amounts of prime farmland (Greene, 1997; Sorensen et al., 1997). Finally, we draw conclusions and give policy suggestions for the protection of open space.

## Literature Review

As has been stated so well by the real estate agents maxim, the price of a property is determined by three things – location, location, location. Location is more than proximity to jobs and amenities, as provided by access to highways and/or central business districts with their jobs, stores and cultural activities and reflected in residential prices (Colwell and Munneke, 1997; McDonald and Thorson, 1997), but also proximity to open space such as wetlands, forests, parks and farmland.

Governmental entities may directly affect the value of residences through the purchase and upkeep of publicly accessible open space such as greenbelts, parks, forest preserves, golf courses and campgrounds. A substantial body of research demonstrates that proximity to open space enhances the value of residential property. Correll et al.'s (1978) study of publically owned greenbelts in Boulder, Colorado demonstrates a significant relationship between residential property values and walking distance to the greenbelt. Likewise, the closer a parcel is to a park, the more value is accrued to it whether in Columbus, Ohio (Weicher and Zerbst, 1973), Dallas and Fort Worth, Texas (Hendon, 1971), Oakland, San Diego and Santee, California (Darling, 1973) and Perth, Australia (McLeod, 1984). Additionally, aesthetically pleasing parks have a strong positive effect (Hendon, 1971) while recreational facilities (Weicher and Zerbst, 1973) and elementary/secondary schools detract from residence value (Hendon, 1973).

Two studies in England considering surrounding land uses show similar results. Cheshire and Sheppard (1995) suggest percent of open access land (i.e., parks) in the square kilometer containing the residence adds to its sale price. Likewise, Garrod and Willis (1992) find that the percent of publicly owned forested adds nearly four cents per added square foot of land in the 1.5 mile buffer area near rural England residences adds to the sale price.

While government ownership of open space influences land values, the main role government plays is structuring land market choices through zoning. Zoning invariably affects the value of land, adding to the sale price of some parcels and detracting from others, whether by setting minimum lot sizes as in Columbus, Ohio (Hushak, 1975) and DeKalb, Illinois (Stewart and Libby, 1998) or through land use boundaries, as seen in Brooklyn Park, Minnesota (Gleeson, 1979), Montreal, Quebec (Vaillancourt and Monty, 1985) or throughout the state of Oregon where the heralded state comprehensive land use plan has affected land values in Salem (Nelson, 1986a) and Portland (Knaap, 1985; Nelson, 1986b; 1988) with those properties within growth zones experiencing increased value and those outside losing value. Internationally, this effect is seen in Reading, England as sale prices of residences increased with each added percent of closed access open space land, such as provided by farmland (Cheshire and Sheppard, 1995).

It is apparent that government affects the land market in multiple, varied ways by providing infrastructure and open space amenities through the purchase and upkeep of publicly accessible land and, perhaps more pervasively, through zoning. This open space, whether publicly accessible or privately owned and zoned that way, has an effect not only on its own value, but also on the price of nearby residences.

However, the question remains as how to best test the influence of these different types of open space (publicly owned and accessible and privately owned and closed–access) on the sales price of neighboring residences. Cheshire and Sheppard's (1995) approach, which considers the percent of closed–access and privately owned open space (mainly farmland) and publicly owned and accessible open space by using kilometer square grids within which the residence is located, is promising. However, it does not specify exactly where in the grid the house is located, allowing for the possibility of error in estimating surrounding land uses (i.e., a house on the edge of the grid would not reflect land use types in the adjacent grid). We intend to build upon this foundation, and hopefully improve upon it, using Geographic Information Systems methodology that allows us to create equidistant buffers (a 1.5 mile radius) from the center of

each parcel. Presumably, this will allow us to analyze the influence of surrounding land uses on the value of residences.

## **Study Site and Data**

Kane County has been chosen as the focus of this study for three reasons. First, it is part of the Southern Wisconsin and Northern Illinois Drift Plain, which has been identified as the nation's third most threatened agricultural area. This is due to a combination of high quality soils which grow feed and cash grains and other specialty crops and high levels of development through growth in the nearby cities of Chicago, Madison, Milwaukee and Rockford (Greene, 1997; Sorensen et al., 1997:9). Kane County's 14.03 percent growth from 1980 to 1990 (Kane County, 1996:112) threatens an agricultural base of 178,000 acres of farmland producing an average market value of \$85 million worth of agricultural products (12–13). Specifically, this much appreciated open space amenity is subject to external pressures of more development and resultant sprawl, providing a theoretically interesting baseline.

Additionally, previous research on suburban–agricultural land use conflict in Kane County exists. A study by Esseks and McCallister (1986) on the attitudes of farmers whose land bordered unincorporated subdivisions in this and other Chicago–land collar counties establishes areas that are or were previously agricultural (Esseks and McCallister, 1986). Analysis of selected parcels reveals they border 55 subdivisions containing 3,976 parcels covering 4,540 acres (Kane County, 1997).

While Esseks and McCallister (1986) focus on the farmer's attitudes towards their subdivision neighbors, the farmland itself provides environmental amenities for their residential neighbors. The attitudes of the farmers surveyed reflect growth pressures placed on them by recent transplants from suburbs and cities, individuals who often do not appreciate the "business" of farming with late night harvesting, pesticide and fertilizer applications and slow–moving farm vehicles (amongst other inconveniences), even though they appreciate the open space amenities of farmland.

Taken together, these three reasons establish the value of Kane County as a case to study due to prime farmland under pressure, the threat of suburban sprawl and attempts by the county to control and focus growth patterns. In other words, many of the issues being faced in Kane County are being faced in communities throughout the United States. Developing a better understanding of the land market by understanding surrounding land uses may provide policy makers with insight needed to develop and implement more effective tools (see [Table 1](#)).

For this study we collected a total of 206 valid residence sales from 47 subdivisions during the years 1995 and 1996. Data is derived from records kept by the Kane County Assessors Office and various township assessors offices within the county. The Kane County Planning Office's GIS map of county land uses provides locational data. Variables chosen are based upon both literature reviewed and available data and can be grouped into two categories of residential and locational characteristics as discussed in more detail below (see [Table 2](#)).

## **Housing Characteristics**

The dependent variable is the sale price of the residence. The data are based on arms length sales in subdivisions outside of municipalities during 1995–1996. Because these sales took place over the course of two years and presumably are susceptible to external stressors such as inflation, the sale price is converted to 1995 dollars using the monthly housing price index for the Chicago area to control for these effects. The average sale price during this time was \$223,298 (see [Table 3](#)).

As can be expected, and as reflected in the literature, the characteristics of the residence play a strong role in its value. The age of the house is a major factor in house buying decisions, with older houses, due to expected repair bills, costing less. Other residence characteristics expected to add to a house's value include size of the lot on which it is located, size of the house itself, number of plumbing fixtures, whether the house has a fireplace and whether there is a pool (see [Table 3](#)).

## **Land Uses**

Analysis of land uses in proximity to the residences is carried out through the use of a GIS land use data set provided by the Kane County Planning Department. This dataset was collected and validated in 1991 and consists of different data layers from which maps are made and geographic characteristics are analyzed with the ARC/INFO program.

While the land use dataset does not connect directly with the sales data (1995–96 sales data; 1991 land use GIS dataset), it provides the best estimate of land use available at this time and a fairly effective approximation of the importance of land uses in the sales of residences.

The first variable is derived from the road database and is measured in foot increments in straight lines from the residence to major roadway interchanges and ultimately to either Interstate 88 or Interstate 90, major routes into Chicago and Rockford. Hypotheses based on the extensive literature suggest that distance from an interchange has a negative effect on the price of a house. In other words, access to the metropolitan Chicago and Rockford areas and the jobs and amenities it offers are highly valued and increase the sales price of the house.

The second, and focal, part of our analysis considers the influence of surrounding land uses on the value of the residence. These categories, as seen in Table 2, are derived from the land use zoning GIS data set based "buffers" that create a zone based on a 1.5 mile radius from the "centroid," a point within a parcel that represents its center. The area of the buffers surrounding the land uses are measured in square feet. The land uses are based on zoning maps and can be broken down into residential uses (>1.5 acres; .5–1.49 acres; <.5 acres; and multiple family residences), transportation (railroads, highways, airports and utilities), private sector production (mining, commercial and industrial, which are combined due to the lack of variance and expected similar effect on sale prices), public sector functions (institutional uses such as government buildings, schools, hospitals and churches) and open space (see Table 3). It can be expected that residential, institutional, transportation, and mining, commercial and industrial categories, by contributing to congestion and sprawl, will have a negative influence on residential sales prices.

**Table 1**

**Land Use Variable Descriptions**

**(Kane County, 1996:117–123)**

collinearity and autocorrelation.

In this study, findings concerning the entire model show that the specified model, upon inspection of the F–ratio (30.131), is highly significant (at the 99 percent level). The adjusted R–square, which controls for the number of independent variables in the equation, shows the equation explains nearly 66 percent of the variance (see Table 4). This figure is comparable to the majority of studies reviewed.

Residence characteristics generally act in the predicted fashion and are significant predictors of the sale price of a residence. For every added year of age of the home, the residence sells for \$1,519 less. Both the lot size and the square footage of the house are highly significant. Each square foot in the lot adds 30 cents and every extra square foot in the house adds \$36 to the final price. Plumbing fixtures are an important amenity, adding \$6,127 for each additional fixture (there are three fixtures per each full bath– bath, sink and toilet), as is having one or more fireplaces, which adds \$20,786 to the sale price of the residence. Finally, having a pool on the property increases the sale price by \$20,897.

the study area from which cases were drawn (unincorporated subdivisions in Kane County), and disconnect between the year the GIS database was compiled (1991) and the years when the residential sales data was collected (1995–1996), constrain the conclusions that may be drawn, this study is important for at least two reasons. First, to our knowledge, the creation of equidistant buffers around residences to understand the influence of different land uses on sales prices is a novel use of a new technology (Geographic Information Systems). Second, this study demonstrates the importance of using land use buffers as a tool to understand the land market. Taken together, land use planners, politicians and other interested parties now have a new tool to understand local land markets and the effect of their decisions concerning zoning and the purchase and maintenance of publicly accessible land may have.

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